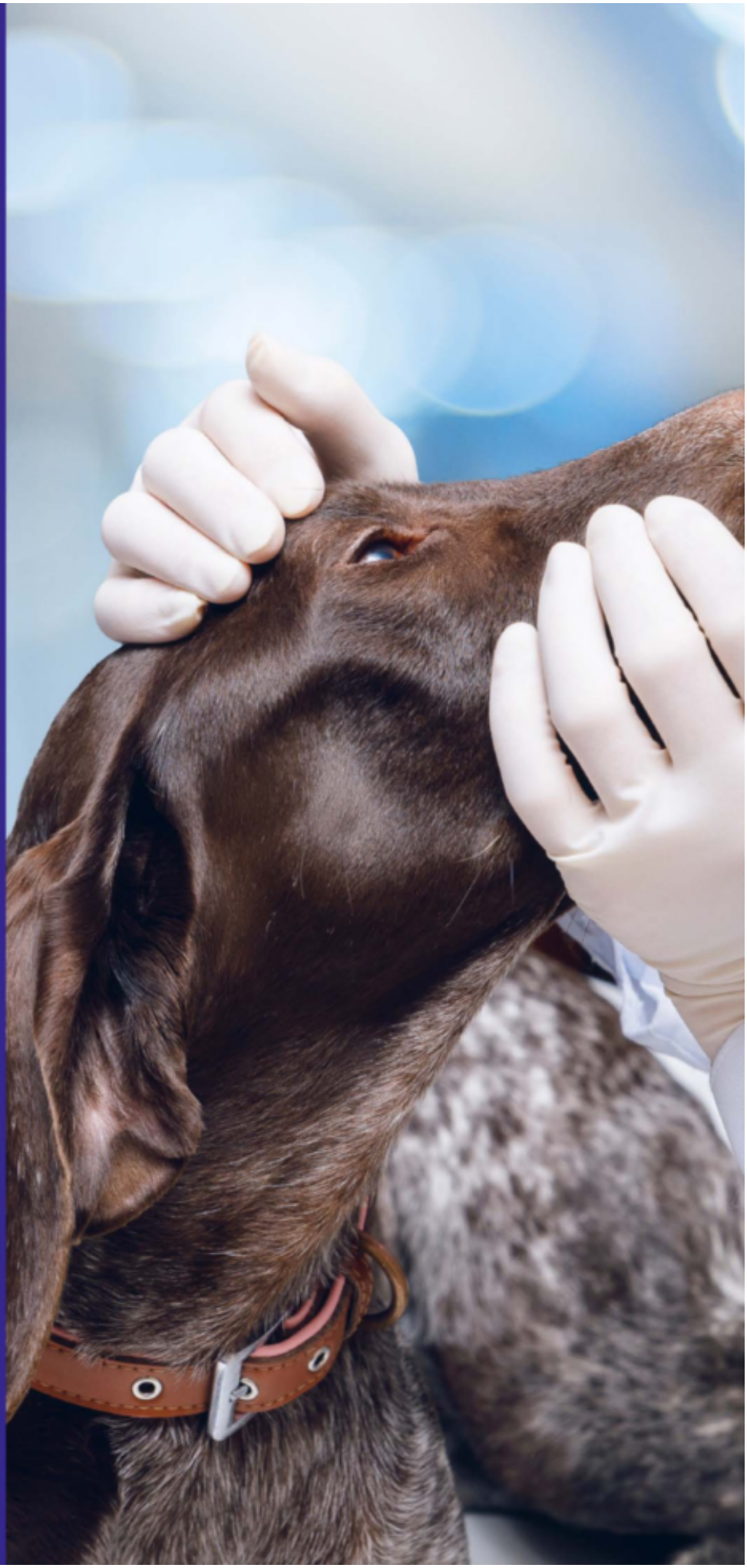
13th Edition

The Blue Book

OCULAR DISORDERS PRESUMED TO BE INHERITED IN PUREBRED DOGS



GENETICS COMMITTEE OF THE AMERICAN COLLEGE OF VETERINARY OPHTHALMOLOGISTS

2021

Foreword

Ocular disorders, proven or presumed to be inherited in purebred dogs, have been a topic of intense dialogue by Diplomates of the American College of Veterinary Ophthalmologists (ACVO) for many years. Discussions commenced in the latter half of the 20th century during the early days of this College's inception, have continued into the 21st century, and will no doubt continue for years to come. Our knowledge of the existence, nature, progression, and inheritance of ocular disorders continues to expand as this field of veterinary science evolves. The Genetics Committee of the ACVO was originally formed in response to requests by registries, breed groups, and veterinarians, with the intent to provide a scientific advisory panel and guidelines regarding ocular disorders in purebred dogs. The Genetics Committee of today remains engaged in an ongoing effort to update information on ocular disorders for this purpose.

The content of this production has originated from several sources as the ACVO recently created a Companion Animal Eye Registry (CAER), which is a joint effort between the Orthopedic Foundation for Animals (OFA) and the ACVO. The addition of eye examination results to the OFA database makes the OFA the most complete source of canine health screening results in the world, allowing responsible breeders to make more informed breeding decisions in an effort to reduce the incidence of inherited disease.

The generation of statistical information is made possible by the efforts of dedicated breeders of purebred dogs who present their dogs to Diplomates of the ACVO for an OFA Companion Animal Eye Registry examination. The research copies of these examinations are then conscientiously submitted to OFA by the examining Veterinary Ophthalmologists. These data generate annual statistics. The statistics for each breed are then reviewed by the Genetics Committee for the most recent year and from the previous 5 years. Recommendations regarding the ocular disorders listed for each breed and the breeding advice are compiled following guidelines detailed elsewhere in this publication. A comprehensive review of the scientific literature since the last published edition was undertaken by all committee members. The scientific articles and breed disorders from the statistical and literature review have been added to the information on each breed in the production of this document. The collective educated clinical experience of the committee members is utilized to reach a consensus of opinion in areas where there remains a paucity of hard scientific proof regarding certain identified breed problems.

The current Genetics Committee has instituted an annual scientific literature search, in addition to the previously established yearly statistical data review. This information is compiled and submitted in an effort to maintain a bank of current information for future editions and versions of this document. The content of all editions past, present, and future will remain dynamic and ever changing as more precise technologies advance the study of the canine genome, as continued scientific research expands our knowledge, and as the database grows.

It is an honor and a privilege to serve the ACVO, our fellow Diplomates, reputable dog breeders, and our most trusted canine companions in this endeavor.

Genetics Committee 2021

Freya Mowat (Chair), Sony Kuhn Asif (Co-chair), Katelyn Fentiman (Past Chair), Emily McCool, Simone Iwabe, Ursula Dietrich, Sami Pederson, Melissa Kubai

Gus Aguirre – Advisor 2021
Simon Petersen-Jones – ECVO Advisor 2021
Katie Diehl – OFA Liaison 2021

13th Edition
2021 Version Acknowledgements

The following groups and individuals deserve credit for the production of this edition of Ocular Disorders Presumed to be Inherited in Purebred Dogs ("The Blue Book"):

The ACVO Board of Regents

Genetics Committee Chairs Dr. Andras Komaromy 2006-2008, Dr. Katie Diehl (2009-2011), Dr. Jacqueline Pearce (2011-2012), Dr. Carrie Breaux (2011-2013), Dr. Kenneth Pierce (2014), Dr. Wendy Townsend (2015), Ellen Belknap (2016), Jessica Meekins (2017), Renee Carter (2018), Adam King (2019), Jane Ashley Huey (2020), Freya Mowat (2021) and all previous Genetics Committee members

Eddie Dziuk, Chief Operating Officer, and Erika Werne, CAER Program Manager, for the OFA

Introduction

What is the purpose of this book?

The Orthopedic Foundation for Animals (OFA), Canine Eye Registration Foundation (CERF), other breed registry groups, breed clubs, and practicing veterinarians have requested that the American College of Veterinary Ophthalmologists (ACVO) provide a scientific advisory panel to furnish guidelines regarding ocular disorders of major concern to purebred dogs. The Genetics Committee of the ACVO was formed in response to these requests and is engaged in an ongoing effort to update information on ocular disorders proven or suspected to be hereditary in purebred dogs. The compendium of ocular disorders and breeding recommendations which follow are interim guidelines. They are reviewed regularly and revised whenever additional information becomes available.

How can this information be used?

National and international breed clubs are encouraged to submit their input regarding breeding decisions for ocular disorders found in their breeds. **Local breed clubs** can participate by encouraging and organizing ocular examination clinics and forwarding their requests and concerns to their national organization. **Practicing veterinarians** are encouraged to contribute by informing all owners of potential breeding animals of the value and availability of ocular examinations, prior to breeding. Information regarding ocular disorders found in litters or individuals can be forwarded to the Genetics Committee via any ACVO diplomate. **Individual breeders** wishing to uphold high ethical standards for the improvement of their breed are urged to contribute by annual examination of their breeding animals and by encouraging the same from other breeders. Further information can be obtained from the Orthopedic Foundation for Animals (OFA): 2300 E Nifong Boulevard, Columbia, MO, 65201-3806, 573-442-0418. Only through increased awareness of the problems and a sustained cooperative effort to disseminate accurate information, will we be able to control and/or eliminate hereditary eye diseases in purebred dogs.

How do we identify an inherited eye disease?

Although there are noteworthy exceptions, most of the ocular diseases of dogs which are presumed to be hereditary have not been adequately documented. Genetic studies require examination of large numbers of related animals in order to characterize the disorder (age of onset, characteristic appearance, rate of progression) and to define the mode of inheritance (recessive, dominant). In a clinical situation, related animals are frequently not available for examination once a disorder suspected to be inherited is identified in an individual dog. Maintaining a number of dogs for controlled breeding trials through several generations is a long and costly process. Both of these obstacles are compounded by the fact that many ocular conditions do not develop until later in life. Due to the potential for disease to arise from inherited genetic defects at any age, the Genetics Committee recommends annual eye exams.

Until the genetic basis of an ocular disorder is defined in a published report, we rely on what statistical information is available from registry organizations, informed opinions and consensus from ACVO diplomates, and must satisfy ourselves with terms like "presumed inherited" and "suspected to be inherited." Several companies provide information on genetic testing which greatly assists in providing more information and data to aid in defining the canine genetics of ocular diseases.

When do we suspect that a disorder is inherited in a given breed?

- When the frequency is greater than in other breeds
- When the frequency increases in a given breed as a whole
- When the frequency is greater in related dogs within a breed
- When it has a characteristic appearance and location
- When it has a characteristic age of onset and course of progression (predictable stages of development and time for each stage to develop)
- When it looks identical to an entity which has been proven to be inherited in another breed

Special thank you to the "Father of Veterinary Medical Genetics," Donald F. Patterson, DVM, DSc. Dr. Patterson, who died in 2013, was Emeritus Professor of Medicine and Medical Genetics, University of Pennsylvania School of Veterinary Medicine and Emeritus Professor of Human Genetics, University of Pennsylvania School of Medicine. These guidelines on the heritability of disorders in dogs are based on his lectures and publications.

Guidelines Used by the ACVO Genetics Committee in Making Breeding Recommendations

In this book, we chose the term "**BREEDING ADVICE**" and intentionally avoided the words "certifiable" and "registerable." The ACVO does not serve as a registry organization. Registry organizations operate independently of the ACVO and set their own standards for registration. However, the OFA does follow the guidelines set forth by the ACVO Genetics Committee in this publication. Any registry organization may use the information in this compendium and results of examinations performed by ACVO Diplomates in the registering of animals with regard to breeding suitability as they see fit.

It is important to recognize that the sensitivity of genetic disorder detection is greater when large numbers of dogs are examined. The extensive number of disorders listed in this book for some breeds may reflect the popularity of the breed and the numbers of animals evaluated. Conversely, the lack of disorders listed for other breeds often reflects only the paucity of examinations reported for each breed. For these reasons, the ACVO Genetics Committee strongly recommends annual evaluations of dogs of all breeds as the imperative first step in the control of hereditary ocular disorders. We would like to acknowledge the contribution of the Orthopedic Foundation for Animals (OFA) and Canine Eye Registration Foundation (CERF) for providing statistical summaries of ophthalmic examinations from their files.

For each breed, specific ocular disorders have been listed which are known or suspected to be inherited based on one or more of the following criteria:

1) There are published reports in the scientific literature regarding a condition in a particular breed with evidence of inheritance.

2) The incidence of affected animals (from OFA and CERF reports) is greater than or equal to 1% of the examined population with a minimum of five affected animals per five year period. Regardless of the population of dogs examined, if 50 or more affected individuals are identified in a five year period, the entity will be listed for that breed.

3) A specific request from a breed club that a condition be included for their breed may be considered at the ACVO annual meeting of the Genetics Committee if information is received by August 1. Such requests are reviewed critically and must include specific documentation as to the disorder in question and the numbers seen. Further information from the breed club may be requested. The request must receive agreement by a majority of the committee.

4) There is overwhelming opinion by a majority of the Genetics Committee members that clinical experience by ACVO Diplomates would indicate a particular condition should be listed for a breed, in spite of the absence of direct evidence of affected animals on OFA or CERF reports.

5) Results of genetic laboratory research and genetic testing.

The "Breeding Advice" given is determined by the significance of the condition to vision and/or very strong evidence of heritability:

Two categories of advice regarding breeding have been established:

> **NO**: Substantial evidence exists to support the heritability of this entity AND/OR the entity represents a potential compromise of vision or other ocular function.
>
> **BREEDER OPTION**: Entity is suspected to be inherited but does not represent potential compromise of vision or other ocular function.

When the breeding advice is "**NO,**" even a minor clinical form of the entity would make this animal unsuitable for breeding. When the advice is "**BREEDER OPTION,**" caution is advised. In time, it may be appropriate to modify this stand to "**NO**" based on accumulated evidence. If, in time, it becomes apparent that there is insufficient evidence that an entity is inherited, it may be deleted from the list.

There are currently eleven disorders for which there is an unequivocal recommendation <u>against</u> breeding in all breeds:

These are conditions which frequently result in blindness and for which there is definite evidence of heritability in one or more breeds. However, these disorders will not be listed on the individual breed page for a given breed, unless they also meet the criteria described above.

- **Keratoconjunctivitis sicca (KCS)** – Breeding is not recommended for any animal demonstrating keratitis consistent with KCS. The prudent approach is to assume KCS to be hereditary except in cases suspected to be non-genetic in origin. See *note.
- **Glaucoma** – See *note.
- **Persistent Pupillary Membranes**
    - **Iris to Lens**
    - **Iris to Cornea**
    - **Iris Sheets**
    - **Endothelial Opacity/No Strands**
- **Cataract** – Breeding is not recommended for any animal demonstrating partial or complete opacity of the lens or its capsule *unless the examiner has also checked the box for "suspect not inherited" or unless specified otherwise for the particular breed*. See *note.
- **Lens luxation or subluxation** – See *note.
- **Persistent hyperplastic primary vitreous (PHPV)/persistent hyperplastic tunica vasculosa lentis (PHTVL)** – See *note.
- **Retinal detachment** – See *note.
- **Retinal atrophy – generalized (PRA)** - Breeding is not advised for any animal demonstrating bilaterally symmetric retinal degeneration (considered to be PRA unless proven otherwise).
- **Retinal dysplasia, geographic or detached forms** – See *note.
- **Optic nerve coloboma**
- **Optic nerve hypoplasia**

*Note: The prudent approach of these disorders is to assume they are hereditary except in cases specifically known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

In breeds recognized with Persistent Pupillary Membrane (PPM) as an inherited problem there is an unequivocal recommendation against breeding when there is PPM iris to lens, or PPM iris to cornea, or iris sheets. Breeding advice is **"NO."**

The following breeds are recommended to have a preliminary examination prior to initial pharmacological dilation to best facilitate identification of these disorders:

Dalmatian – iris hypoplasia/sphincter dysplasia
Australian Shepherd – iris coloboma
Miniature American Shepherd/Miniature Australian Shepherd – iris coloboma
Toy Australian Shepherd – iris coloboma
Any Breed with Merle Phenotype – iris hypoplasia/iris coloboma

What can be detected during an Eye Certification Examination?

A routine eye screening examination includes indirect ophthalmoscopy and slit lamp biomicroscopy following pharmacological dilation of the pupils. Gonioscopy, tonometry, Schirmer tear test, electroretinography, and ultrasonography are not routinely performed; thus, dogs with goniodysgenesis, glaucoma, keratoconjunctivitis sicca, or some early cases of progressive retinal atrophy might not be detected without further testing.

The diagnoses obtained during an ophthalmic eye certification examination refer only to the **phenotype** (clinical appearance) of an animal. Thus, it is possible for a clinically normal animal to be a carrier (abnormal **genotype**) of genetic abnormalities.

An individual ACVO Diplomate may disagree with the breeding advice contained in this compendium. It is appropriate for this examiner to contact the ACVO Genetics Committee to voice disagreement, initiate change, or suggest additions. The members of the Genetics Committee represent the ACVO but acknowledge that the information generated for a breed may not agree with the knowledge and clinical experience of every individual ACVO Diplomate.

What is the role of the responsible dog breeder?

The final beneficiary of the information in this book is the dog breeder. It is up to the conscientious breeder to use this information along with other criteria in selecting which animals to breed. To assist this determination, current certification is recommended. Animals currently free of heritable eye disease will be issued a certificate on receipt of the examination/application by OFA. To avoid confusion between a normal animal (no evidence of heritable eye disorders) and one that may have a minor fault coming under the advice of Breeder Option, the Breeder Option category will be printed on the certificate. This is intended to stimulate conversation as to the specific nature of the Breeder Option condition found in that particular animal, allowing breeders using a dog in a breeding program to make an informed decision.

There are many ocular conditions which are a direct result of selection for a facial conformation considered desirable by breeders.

These include:

- Entropion
- Ectropion
- Macroblepharon
- Exposure keratopathy syndrome

Facial conformation with excessively prominent eyes, heavy facial folds, or eyelids which are either inverted or everted predispose animals to corneal irritation, discomfort, and if left untreated, can lead to loss of vision. A responsible breeding program should recognize and select away from these exaggerated facial

features.

THE ROLE OF GENETIC TESTING IN THE DETECTION OF OCULAR DISEASE

Genetic testing plays a very important role in the diagnosis of disease. However, it is important to be aware of the limitations of genetic testing and understand its role in the detection and control of genetically inherited diseases.

Genetically inherited diseases are caused by a deleterious sequence change (mutation) in the DNA that results in an abnormal protein (protein can be absent, have insufficient function, or have an abnormal function) that results in disease.

Genetic tests are developed by comparing the DNA sequence of a normal animal to that of an animal with disease. This allows the identification of a particular DNA sequence that can be causally associated with the disease. This is an extremely powerful tool that, in some cases, allows for identification of disease even before it is evident clinically.

However, a particular test is only capable of detecting the DNA sequence it was designed to detect. That is, the DNA test only tests for a specific change in the DNA that can cause disease. For example, a DNA test specific for the *PDE6B* gene mutation (responsible for the rcd1 form of PRA in the Irish Setter) will not detect any abnormalities in other breeds or mixed breeds that have other mutations in the same gene. Thus the specificity of a DNA test is also its limitation, and in the case of PRA in Irish Setters it is specific for the Irish Setter defect and not for any other defects.

In polygenic disorders, a genetic test cannot evaluate the integrity of all the proteins that make up a particular cellular process. Thus, it is possible for a DNA test that has been associated with a disease to be normal and yet the disease can still be present. The disease could be caused by an abnormality in one of the other genes that are involved with that particular cellular process. The defect in the other protein still results in an abnormal cellular process, which still results in disease. A perfect example of this is observed in oculo-skeletal dysplasia in Labrador Retrievers and Samoyed dogs. In both breeds the diseases are clinically identical, yet caused by mutations in different genes involved in fibril formation of a specific kind of collagen molecule.

Thus, obtaining a DNA test that is normal does not guarantee absence of disease. It only guarantees that the particular change the DNA test was designed to detect is not present, and that disease from that particular change will not occur. This is why genetic testing should be combined with ophthalmic examination for maximum efficacy. An ophthalmic exam evaluates the sum total or “result” of all the cellular processes required to maintain ocular health and result in vision, and is an essential part of the ocular wellness exam to ensure that other important clinically recognizable diseases are not present.

Breeder Option Codes

A – Eyelids

A1 Entropion
A2 Ectropion
A3 Distichiasis
A4 Ectopic Cilia
A6 Imperforate Lacrimal Punctum

B – Nicitans

B1 Cartilage Anomaly/Eversion
B2 Gland Prolapse

C – Cornea

C1 Corneal Dystrophy – Epithelial/Stromal
C2 Corneal Dystrophy – Endothelial
C4 Pigmentary Keratitis/Keratopathy

D – Uvea

D1a Uveal Cyst – Free Floating
D1b Uveal Cyst – Single
D1c Uveal Cyst – Multiple
D2 Iris Coloboma
D3 Persistent Pupillary Membranes – Iris to Iris
D4 Iris Hypoplasia

E – Lens

E1 Cataract – Suspect Not Inherited
E2 Posterior Y Tip Suture Opacities

F – Vitreous

F1 Persistent Hyaloid Artery
F2a Vitreous Degeneration – Syneresis
F2b Vitreous Degeneration – Anterior Chamber

G – Fundus

G1 Retinal Dysplasia – Folds
G5 Micropapilla
G6a CMR-Type Retinopathy
G6b Retinopathy

Glossary of Terms

(For more detailed definitions, the reader is referred to medical and genetic scientific texts.)

Achromatopsia: see **Day blindness**

Canine multifocal retinopathy: characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). The condition includes numerous distinct (i.e. multi-focal), roughly circular patches of elevated retina with accumulation of material that produces gray-tan-pink colored lesions (multifocal bullous retinal detachments). These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs and might not progress or progress slowly, or may appear to heal with discrete areas of tapetal hyper-reflectivity or hyperpigmentation. Most dogs exhibit no noticeable problem with vision despite their abnormal appearing retinas.

Cataract: any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

Ceroid lipofuscinosis: an inherited disease of man and animals characterized by the accumulation of lipopigment in various tissues of the body including the eye. It results in progressive neurologic disease including blindness. (Also called Batten's disease.)

Choroidal hypoplasia: a congenital, inherited, non-progressive defect primarily affecting the choroid resulting in some or all of the following: decreased or lack of pigment in the retinal pigment epithelium or choroid, tapetal thinning, and reduced or abnormal choroidal blood vessels.

Chronic superficial keratitis (CSK): see **Pannus**

Collie eye anomaly: a congenital syndrome of ocular anomalies characterized by bilateral and often symmetrical defects including any combination of **choroidal hypoplasia**, **coloboma**, and **retinal detachment(s)**.

Coloboma: a congenital abnormality in ocular development usually characterized by focal absence of tissue, commonly (though not exclusively) located at the 6 o'clock position associated with failure of closure of the optic fissure.

Cone degeneration: the loss of photopic vision caused by selective degeneration of the cone photoreceptors. Also known as day blindness, hemeralopia, or achromatopsia.

Corneal degeneration: opacification of one or more of the corneal layers frequently resulting from deposition of lipid or mineral and occurring secondary to chronic inflammation.

Corneal dystrophy: non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers (**epithelium, stroma, endothelium**). The term dystrophy implies an inherited condition. It is usually bilateral although not necessarily symmetrical and the onset in one eye may precede the other.

> **Corneal dystrophy - endothelial:** breed-related loss or dysfunction of corneal endothelial cells resulting in bilateral, progressive corneal edema.

Corneal dystrophy - epithelial, stromal: breed-related, non-inflammatory, white to silver-colored opacification of the corneal epithelium and/or stroma frequently resulting from deposition of lipid.

Day blindness: see **Cone degeneration**

Dermoid: a congenital, non-cancerous growth occurring on the cornea, conjunctiva, or eyelid typified by the presence of skin-like structures.

Distichiasis: the presence of abnormally oriented eyelashes, frequently protruding from Meibomian gland ductal openings.

Dry eye: see **Keratoconjunctivitis sicca**

Dysplasia: abnormality of development.

Dystrophy: non-inflammatory, developmental, nutritional, or metabolic abnormality; dystrophy implies a possible hereditary basis and is usually bilateral.

Ectopic cilia: aberrant hairs emerging through the palpebral conjunctiva which often causes ocular discomfort and corneal disease.

Ectropion: a conformational defect resulting in eversion of the eyelid margin, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several factors defining the skin and other structures, which make up the eyelids, orbital contents, and conformation of the skull.

Entropion: a conformational defect resulting in inversion of the eyelid margin which may cause ocular irritation. It is likely that entropion is influenced by several factors defining the skin and other structures, which make up the eyelids, orbital contents, and conformation of the skull.

Euryblepharon: an exceptionally long eyelid marginal length, which may lead to Ectropion or Entropion. Euryblepharon is synonymous with the term macropalpebral fissure.

Exposure/pigmentary keratitis: a condition characterized by variable degrees of superficial vascularization, fibrosis, and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos, and macropalpebral fissure.

Glaucoma: characterized by an elevation of intraocular pressure (IOP) which causes optic nerve and retinal degeneration and results in blindness. Diagnosis and classification of glaucoma requires tonometry and gonioscopy, which are not part of a routine eye certification examination.

Glaucoma, pigmentary: see O**cular melanosis**

Goniodysgenesis: congenital anomaly characterized by the persistence of a variably fenestrated sheet of uveal tissue spanning the iridocorneal angle, extending from the iris base to the peripheral cornea. Diagnosis is by gonioscopy, which is not part of a routine eye certification examination.

Hemeralopia: see **Cone degeneration**

Imperforate lacrimal punctum: developmental anomaly resulting in an imperforate opening of the lacrimal puncta. An imperforate lower punctum may result in epiphora, an overflow of tears onto the face.

Iridocorneal angle: the junction between the iris and the cornea; the drainage angle. Aqueous humor leaves the anterior chamber via the trabecular meshwork within the iridocorneal angle into the venous circulation.

Iris coloboma: a congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue, commonly (though not exclusively) located at the 6 o'clock position associated with failure of closure of the optic fissure. A partial-thickness defect in iris tissue should be recorded as iris hypoplasia on the eye certification form.

Iris cyst: see **Uveal cyst**

Iris hypoplasia: a congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as a partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the eye certification form.

Iris melanoma: see **Uveal melanoma**

Iris sphincter dysplasia: a congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue at the level of the iris sphincter, causing pupillary dilation. This abnormality has been noted in the Dalmatian breed.

Keratitis: inflammation of the cornea.

Keratitis, punctate: inflammation of the cornea accompanied by multifocal, coalescing areas of stromal corneal ulceration of variable depth.

Keratoconjunctivitis sicca (KCS): an abnormality of the tear film attributed to deficiency of the aqueous portion of the tears. Progressive KCS may result in ocular surface irritation and/or vision impairment via corneal opacification. Also called dry eye. The test for this condition is the Schirmer Tear Test, which is not part of a routine eye certification examination.

Lens subluxation/luxation: partial (subluxation) or complete displacement of the lens from the normal anatomic site. Lens luxation may result in elevated intraocular pressure (secondary glaucoma), causing vision impairment, pain, and/or retinal detachment.

Lenticonus: an anomaly of the lens in which the anterior or posterior surface protrudes in a conical form; usually congenital.

Macroblepharon: an exceptionally large palpebral fissure. Macroblepharon in conjunction with laxity of the lateral canthal structures may lead to lower lid ectropion and upper lid entropion. Either of these conditions may lead to severe ocular irritation.

Merle: an incompletely dominant phenotype in which heterozygous (M/m) dogs exhibit a coat color phenotype of various dilute color patches, while homozygous (M/M) dogs exhibit marked hypopigmentation and ocular defects, including microphthalmia, blindness and colobomas, and deafness. Deafness and ocular defects are sometimes seen in heterozygous individuals.

Micropapilla: a congenital anomaly which results in a small optic disk diameter without vision loss. Contrast with optic nerve hypoplasia, which may have a similar ophthalmoscopic appearance with vision loss.

Microphakia: a congenital anomaly in which there is an abnormally small lens.

Microphthalmos: a congenital anomaly in which the globe is abnormally small. Commonly associated with multiple ocular malformations and when severe, may affect vision.

Nictitans cartilage anomaly/eversion: a congenital anomaly in the nictitating membrane in which the T-shaped cartilage is malformed and/or folded.

Nictitans gland prolapse: protrusion of the tear-producing gland of the nictitating membrane from its normal position posterior to the nictitating membrane, to a position superior to the free margin of this structure.

Nodular granulomatous episclerokeratitis (NGE): an inflammatory disorder of the sclera and episclera, with occasional corneal involvement, characterized by granulomatous infiltrates. Previously known as **Proliferative keratoconjunctivitis**. This condition is most commonly seen in the Collie.

Nyctalopia: loss of scotopic (night) vision. Causes include genetic defects in photoreceptors and in retinal pigment epithelium, either dystrophy or degeneration of affected cells.

Ocular melanosis: progressive bilateral and sometimes asymetrical increase in pigmentation with melanocytic accumulation the uveal tract and adjacent tissues. Ultimately progresses to glaucoma and loss of vision in most cases (melanocytic glaucoma). Not associated with systemic disease or metastases. Most often recognized in Cairn Terriers.

Optic nerve coloboma: a congenital abnormality of the optic nerve commonly associated with failure of closure of the optic fissure, resulting in a defect in the optic nerve in the anterior-posterior plane. May result in partial or total vision loss.

Optic nerve hypoplasia: a congenital anomaly, which results in a small optic disk diameter and vision loss. Contrast with micropapilla, which may have a similar ophthalmoscopic appearance but without loss of vision.

Pannus: a bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the inferior or inferiotemporal cornea, followed by the formation of a vascularized subepithelial opacity that begins to spread toward the central cornea; pigmentation may follow the vascularization. If severe, vision impairment occurs. Plasma cell infiltration of the nictitans may occur in conjunction with CSK, or on its own. (Also called “CSK”.)

Persistent hyaloid artery (PHA): congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

Persistent hyperplastic primary vitreous (PHPV): congenital defect resulting from abnormalities in the regression of the hyaloid artery (the primary vitreous) and the interaction of the blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with congenital cataracts and frequently seen with PHTVL.

Persistent hyperplastic tunica vasculosa lentis (PHTVL): congenital defect resulting from failure of regression of the embryonic vascular network which surrounds the developing lens. Often associated with PHPV and a patent hyaloid artery.

Persistent pupillary membranes (PPM): persistent blood vessel remnants in the anterior chamber which fail to regress normally by 3 months of age. These strands arise from the iris collaret and may bridge from iris to iris, iris to lens, iris to cornea, or form sheets of tissue in the anterior chamber.

Persistent tunica vasculosa lentis (PTVL): clinically insignificant posterior epicapsular lenticular opacities resulting from incomplete regression of the embryonic vascular network which surrounds the developing lens.

Pigmentary glaucoma: see **Ocular melanosis**

Pigmentary uveitis: see **Uveitis, pigmentary**

Pigmentary keratopathy: a condition reported in Pugs in which the cornea becomes pigmented, often resulting in vision impairment. Development of pigmentary keratopathy is associated with congenital uveal pathology – iris hypoplasia and the presence of persistent pupillary membranes – but not with other factors such as Schirmer tear test values or medial canthal entropion.

Plasmoma: see **Pannus**. Also called Atypical Pannus. Bilateral thickening and depigmentation of the nictitans due to invasion of lymphocytes and plasma cells. It may or may not be associated with corneal involvement (Pannus).

Progressive rod-cone degeneration (PRCD) (see also **PRA**): Typically refers to recessively inherited generalized loss of rod photoreceptors followed by cone degeneration. Many different genetic mutations result in a similar phenotypic presentation.

Progressive retinal atrophy (PRA): an umbrella term used to describe a group of inherited dysplastic, dystrophic, or degenerative diseases of the retinal visual cells (photoreceptors, retinal pigment epithelium, or both).

Proliferative keratoconjunctivitis: see **Nodular granulomatous episclerokeratitis**

Retinal atrophy: a non-specific term used to describe a decrease in the number and deterioration of the cells of the retina, regardless of cause.

Retinal degeneration: see **Retinal atrophy**

Retinal detachment: a separation of the neurosensory retina from the retinal pigment epithelium.

Retinal dysplasia: abnormal development of the retina present at birth. This condition is non-progressive and recognized in 3 forms: **folds**, **geographic**, **detached**.

> **Retinal dysplasia – folds:** seen ophthalmoscopically as linear, triangular, curved or curvilinear foci of retinal folding. May be single or multiple. In puppies, retinal folds can be seen as a transient phenomenon, resolving as the eye retains maturity.
>
> **Retinal dysplasia – geographic:** an irregularly shaped area of retinal development containing both areas of thinning and areas of elevation. This form may be associated with visual impairment.
>
> **Retinal dysplasia – detached:** severe retinal disorganization associated with separation of the neurosensory retina from the retinal pigmented epithelium. This form results in visual impairment.

Retinopathy: any non-inflammatory condition of the retina. These conditions can usually be detected by ophthalmoscopic examination, but an electroretinogram (ERG) may be required in some instances (e.g. canine multifocal retinopathy).

Rod-cone dysplasia: an inherited retinal disease characterized by abortive or abnormal development of rods and cones. Affected animals become blind early in life, usually within the first 6 months, with the exception of *rcd4* in the Gordon and Irish Setter dogs. See specific breed pages for rod-cone dysplasia type descriptions.

Rod dysplasia: abnormal development of the visual cells resulting in vision impairment in dim light by 6 months and total blindness at 3-5 years.

Uveal cyst: a pigmented, fluid-filled epithelial-lined structure arising from the posterior iris or ciliary body epithelium. Cysts may remain attached to the pupil margin, iris, or ciliary body, or may detach and be free-floating within the anterior chamber. They may rupture and adhere to the cornea or anterior lens capsule. Uveal cysts may occur in any breed. Uveal cysts are commonly benign, although they may be associated with other pathologic conditions in various breeds.

> **Uveal cyst, anterior chamber:** a pigmented, fluid-filled, epithelial-lined structure arising from the posterior iris or ciliary body epithelium which has detached from its site of origin and is free-floating in the anterior chamber.
>
> **Uveal cyst, ciliary body:** a pigmented, fluid-filled, epithelial-lined structure arising from the ciliary body epithelium and attached to the ciliary body.
>
> **Uveal cyst, iris:** a pigmented, fluid-filled, epithelial-lined structure arising from the posterior iris epithelium and attached to the iris.

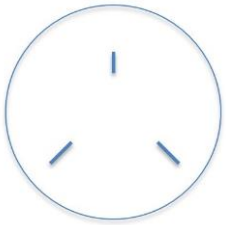
Uveal melanoma: a locally invasive melanocytic neoplasm arising within the uveal tract, may be benign (melanocytoma) or malignant (malignant melanoma). Uveal melanomas are reported in higher frequency in German Shepherd Dogs and Labrador Retrievers. Inherited iris melanoma has been reported in Labrador Retrievers.

Uveitis, pigmentary: a specific form of uveitis most commonly seen in middle-aged to older Golden Retrievers. Clinically manifests early as pigment deposition in a radial fashion on the anterior lens capsule with iridociliary cysts. Later stages are associated with posterior synechia, fibrinous anterior uveitis, cataract, and ultimately glaucoma. Not associated with systemic disease; may be asymmetric in presentation.

Uveodermatologic syndrome: an immune-mediated syndrome of anterior uveitis, chorioretinitis, dermal depigmentation (vitiligo), and hair depigmentation (poliosis). A similar syndrome in humans, called Vogt-Koyanagi-Harada syndrome (VKH), is an autoimmune disease directed against melanocytes. Secondary glaucoma and/or retinal detachment are frequent complications of this disease. Seen most commonly in the Akita, Samoyed, and Siberian Husky breeds.

Vitreous degeneration: Liquefaction of the vitreous gel which may predispose to retinal detachment resulting in blindness.

Y-suture tip opacity: These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



AFFENPINSCHER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
AFFENPINSCHER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	362		145		24	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
.110 MICROPHTHALMIA	1	0.3%	0	0.0%	0	0.0%
EYELIDS						
20.140 ECTOPIC CILIA	1	0.3%	2	1.4%	0	0.0%
25.110 DISTICHIASIS	21	5.8%	3	2.1%	2	8.3%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	0	0.0%	1	0.7%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.3%	0	0.0%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	0	0.0%	1	0.7%	1	4.2%
70.700 CORNEAL DYSTROPHY	6	1.7%	5	3.4%	1	4.2%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	26	7.2%	18	12.4%	2	8.3%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.3%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.3%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	4	1.1%	2	1.4%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	3	0.8%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	8	2.2%	1	0.7%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.7%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.3%	0	0.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.3%	0	0.0%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	0.3%	0	0.0%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.3%	0	0.0%	1	4.2%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	3	0.8%	1	0.7%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	0	0.0%	0	0.0%	1	4.2%
100.316 INCIPIENT CATARACT, NUCLEUS	0	0.0%	1	0.7%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	0.7%	1	4.2%
100.330 GENERALIZED/ COMPLETE CATARACT	3	0.8%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***13***	***3.6%***	***4***	***2.8%***	***3***	***12.5%***
VITREOUS						
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.6%	1	0.7%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	2	0.6%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	2	0.6%	0	0.0%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	0	0.0%	1	0.7%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	3	0.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	8	2.2%	1	0.7%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.3%	3	2.1%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	306	84.5%	110	75.9%	18	75.0%

AFGHAN HOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Corneal dystrophy - epithelial/stromal	Not defined	1, 2	Breeder option
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
D.	Cataract	Not defined	1, 3-6	NO
E.	Y-suture tip opacity	Not defined	1	Breeder Option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

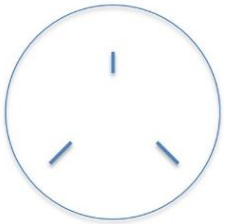
D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The characteristic cataract in the Afghan Hound begins as equatorial lens vacuoles in dogs from 4 months to 2 years of age. The opacities then extend into the anterior and posterior cortices. Rapid progression can occur with visual impairment in young adults. Test breedings have been done which support a hereditary basis; however, the exact mode of inheritance is unknown.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Vainisi SJ, Goldberg MF. *Animal models of inherited disease. In: Genetic and Metabolic Eye Disease* Little Brown and Company, Boston, 1974.

3. Roberts SR, Helper LC. Cataracts in Afghan hounds. *J Am Vet Med Assoc*. 1972; 160: 427. PMID: 5014602

4. Roberts SR. Hereditary cataracts. *Vet Clin North Am*. 1973; 3: 433. PMID: 4801921

5. Barnett KC. The diagnosis and differential diagnosis of cataract in the dog. *J Small Anim Pract*. 1985; 26: 305.

6. Barnett KC. Hereditary cataract in the dog. *J Small Anim Pract*. 1978; 19: 109-120. PMID: 642468

OCULAR DISORDERS REPORT
AFGHAN HOUND

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	2,161		406		84	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	0	0.0%	1	0.2%	0	0.0%
10.000	GLAUCOMA	2	0.1%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	2	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	26	1.2%	3	0.7%	1	1.2%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	0	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	3	0.1%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	232	10.7%	50	12.3%	12	14.3%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	3	0.1%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	4	0.2%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	57	2.6%	14	3.4%	3	3.6%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.0%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.0%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	0.2%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.0%	0	0.0%	0	0.0%
93.810	UVEAL MELANOMA	0	0.0%	1	0.2%	0	0.0%
FUNDUS							
97.120	COLOBOMA	2	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	9	0.4%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	126	5.8%	32	7.9%	3	3.6%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	3	0.1%	10	2.5%	1	1.2%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.1%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.0%	1	0.2%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	25	1.2%	25	6.2%	1	1.2%
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.2%	2	0.5%	3	3.6%
100.307	PUNCTATE CATARACT, CAPSULAR	8	0.4%	1	0.2%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	4	0.2%	3	0.7%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	2	0.1%	2	0.5%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.1%	0	0.0%	1	1.2%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	1	0.2%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	11	0.5%	2	0.5%	1	1.2%
100.316	INCIPIENT CATARACT, NUCLEUS	3	0.1%	1	0.2%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.1%	2	0.5%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	2	0.5%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	2	0.5%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	0.5%	0	0.0%
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	3	0.7%	0	0.0%

OCULAR DISORDERS REPORT
AFGHAN HOUND

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,161 #	 %	2016-2020 406 #	 %	2021 84 #	 %
LENS Continued						
100.328 Y-SUTURE TIP OPACITIES	16	0.7%	29	7.1%	7	8.3%
100.330 GENERALIZED/ COMPLETE CATARACT	2	0.1%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***103***	***4.8%***	***88***	***21.7%***	***14***	***16.7%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.0%	1	0.2%	0	0.0%
110.135 PHPV/ PTVL	1	0.0%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.2%	3	0.7%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	5	0.2%	3	0.7%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	5	0.2%	1	0.2%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	2	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	9	0.4%	0	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.1%	1	0.2%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	1	0.2%	2	2.4%
130.150 OPTIC DISC COLOBOMA	3	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	20	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	34	1.6%	0	0.0%	1	1.2%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	23	1.1%	13	3.2%	5	6.0%
NORMAL						
.000 NORMAL GLOBE	1,721	79.6%	273	67.2%	53	63.1%

AIREDALE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- iris to cornea	Not defined	1	NO
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
	- endothelial opacity/no strands	Not defined	1	NO
C.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and the more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
AIREDALE TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	773		154		25	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	3	0.4%	0	0.0%	0	0.0%
10.000	GLAUCOMA	0	0.0%	0	0.0%	1	4.0%
EYELIDS							
20.140	ECTOPIC CILIA	2	0.3%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	4	0.5%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	54	7.0%	12	7.8%	2	8.0%
CORNEA							
70.210	PANNUS	1	0.1%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	9	1.2%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	3	0.4%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	1	0.1%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	25	3.2%	7	4.5%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	7	0.9%	1	0.6%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	21	2.7%	1	0.6%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.3%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	4	0.5%	5	3.2%	2	8.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	3	0.4%	7	4.5%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	1	0.6%	0	0.0%
FUNDUS							
97.120	COLOBOMA	1	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	7	0.9%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	50	6.5%	9	5.8%	2	8.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	8	1.0%	5	3.2%	2	8.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	6	0.8%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.3%	1	0.6%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	4	0.5%	5	3.2%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	4	0.5%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	2	0.3%	2	1.3%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	9	1.2%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	9	1.2%	0	0.0%	1	4.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	6	0.8%	1	0.6%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	5	0.6%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	2	0.3%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	3	0.4%	0	0.0%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.6%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.6%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	1.3%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	4	0.5%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	0	0.0%	0	0.0%	1	4.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***72***	***9.3%***	***18***	***11.7%***	***3***	***12.0%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	3	0.4%	2	1.3%	0	0.0%
110.135	PHPV/ PTVL	1	0.1%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	7	0.9%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	20	2.6%	2	1.3%	1	4.0%

OCULAR DISORDERS REPORT
AIREDALE TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 773 #	 %	2016-2020 154 #	 %	2021 25 #	 %
RETINA Continued						
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	9	1.2%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	12	1.6%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	1	0.6%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	0	0.0%	1	0.6%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	8	1.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	35	4.5%	0	0.0%	1	4.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	11	1.4%	17	11.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	569	73.6%	101	65.6%	16	64.0%

AKBASH DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AKBASH DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AKBASH DOG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 39 #	 %	2016-2020 0 #	 %	2021 0 #	 %
GLOBE						
.110 MICROPHTHALMIA	1	2.6%	0		0	
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	3	7.7%	0		0	
22.000 ECTROPION, UNSPECIFIED	1	2.6%	0		0	
UVEA						
93.120 IRIS CYST	2	5.1%	0		0	
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	5.1%	0		0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	2.6%	0		0	
100.316 INCIPIENT CATARACT, NUCLEUS	1	2.6%	0		0	
100.330 GENERALIZED/ COMPLETE CATARACT	1	2.6%	0		0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***3***	***7.7%***	***0***		***0***	
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	2.6%	0		0	
NORMAL						
.000 NORMAL GLOBE	32	82.1%	0		0	

AKITA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Microphthalmia with multiple ocular defects	Not defined	1, 2	NO
B.	Entropion	Not defined	1, 3	Breeder option
C.	Distichiasis	Not defined	1	Breeder option
D.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
E.	Cataract	Not defined	1	NO
F.	Y-suture tip opacity	Not defined	1	Breeder option
G.	Retinal dysplasia - folds	Not defined	1	Breeder option
H.	Uveodermatologic syndrome	Not defined	1, 4-14	NO

Description and Comments

A. Microphthalmia with multiple ocular defects

Multiple ocular defects consisting of small eye (microphthalmia), opacity of the lens (cataract), conical shape of the posterior lens (posterior lenticonus), and folding of the retina into rosettes (retinal dysplasia) have been reported in related Akita pups. Cataracts affected primarily the nuclear and cortical lens. Retinal dysplasia affected the superior retina overlying the tapetal fundus. Affected dogs may have severe visual dysfunction. An autosomal recessive mode of inheritance is suspected but not proven.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. OFA data indicates that entropion in the Akita usually occurs by 2 years of age.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make strong recommendations with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Akita, many of these strands bridge between the iris and lens, thus resulting in focal cataract and possible vision impairment.

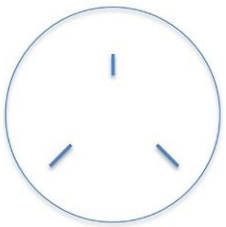
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

E. Cataract

Lens opacity which may affect one or both eyes and may involve the lens partially or completely. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require

further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and the more severe forms of retinal dysplasia is undetermined.

H. Uveodermatologic syndrome

Uveodermatologic syndrome in the Akita bears many similarities to a condition in people called Vogt-Koyanagi-Harada (or VKH) syndrome. Thus, the condition in dogs is often referred to as VKH or VKH-like syndrome. It is an immune-mediated disease in which pigmented cells (melanocytes) in the eye and in the skin are destroyed by white blood cells (lymphocytes). The first clinical signs are usually inflammation of the intraocular structures (or uveitis) in both eyes. The uveitis is very difficult to control medically and ultimately results in blindness in most affected dogs. Whitening of the hair (poliosis) and skin (vitiligo) may also be noted in advanced cases. The genetics of this condition are unclear, but some genetic predisposition is indicated by the higher prevalence of this disorder in Akitas compared with other dog breeds. Affected dogs are generally young, ranging in age between 1 ½ to 4 years.

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OCULAR DISORDERS REPORT
AKITA

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		10,725		893		141	
Diagnostic Name		#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	33	0.3%	5	0.6%	2	1.4%
10.000	GLAUCOMA	2	0.0%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	103	1.0%	10	1.1%	3	2.1%
22.000	ECTROPION, UNSPECIFIED	15	0.1%	0	0.0%	1	0.7%
25.110	DISTICHIASIS	67	0.6%	11	1.2%	1	0.7%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	6	0.1%	4	0.4%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	7	0.1%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	54	0.5%	9	1.0%	4	2.8%
UVEA							
93.120	IRIS CYST	1	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	266	2.5%	26	2.9%	6	4.3%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	37	0.3%	1	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	23	0.2%	5	0.6%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	3	0.0%	1	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	7	0.1%	12	1.3%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.0%	2	0.2%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	28	0.3%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	242	2.3%	21	2.4%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	8	0.1%	3	0.3%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	8	0.1%	1	0.1%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.0%	1	0.1%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.0%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	41	0.4%	18	2.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.0%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	12	0.1%	9	1.0%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	10	0.1%	2	0.2%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	39	0.4%	1	0.1%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	9	0.1%	1	0.1%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.0%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	16	0.1%	3	0.3%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	7	0.1%	1	0.1%	1	0.7%
100.317	INCIPIENT CATARACT, CAPSULAR	11	0.1%	1	0.1%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.1%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	1	0.1%	1	0.7%
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.1%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	7	0.1%	12	1.3%	2	1.4%
100.330	GENERALIZED/ COMPLETE CATARACT	26	0.2%	2	0.2%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***235***	***2.2%***	***59***	***6.6%***	***4***	***2.8%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	16	0.1%	4	0.4%	0	0.0%

OCULAR DISORDERS REPORT
AKITA

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 10,725 #	 %	2016-2020 893 #	 %	2021 141 #	 %
VITREOUS Continued						
110.135 PHPV/ PTVL	5	0.0%	1	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	8	0.1%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	200	1.9%	17	1.9%	2	1.4%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	21	0.2%	5	0.6%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	4	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	89	0.8%	1	0.1%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	6	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	1	0.1%	0	0.0%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.1%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	8	0.1%	1	0.1%	0	0.0%
130.150 OPTIC DISC COLOBOMA	2	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	52	0.5%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	177	1.7%	2	0.2%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	92	0.9%	29	3.2%	4	2.8%
NORMAL						
.000 NORMAL GLOBE	9,579	89.3%	721	80.7%	118	83.7%

ALANO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ALANO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ALANO

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	1	100.0%	0		0	

ALAPAHO BLUE-BLOOD BULLDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ALAPAHO BLUE-BLOOD BULLDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ALAPAHA BLUE-BLOOD BULLDOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		1		1	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0		1	100.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	0		0	0.0%	1	100.0%

ALASKAN KLEE KAI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes - iris to iris	Not defined	2	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
ALASKAN KLEE KAI

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 608 #	 %	2016-2020 228 #	 %	2021 66 #	 %
EYELIDS						
25.110 DISTICHIASIS	48	7.9%	9	3.9%	2	3.0%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.2%	3	1.3%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	1	0.2%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	11	1.8%	2	0.9%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	2	0.3%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	6	1.0%	5	2.2%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.2%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	5	0.8%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	11	1.8%	10	4.4%	2	3.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	2	0.3%	5	2.2%	2	3.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.4%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.4%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	1	0.2%	1	0.4%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	2	0.3%	3	1.3%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	7	1.2%	3	1.3%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.2%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	1	0.2%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***14***	***2.3%***	***14***	***6.1%***	***2***	***3.0%***
VITREOUS						
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.2%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	8	1.3%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	5	0.8%	0	0.0%	1	1.5%
OTHER						
900.000 OTHER, UNSPECIFIED	6	1.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	4	0.7%	1	0.4%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	8	1.3%	6	2.6%	1	1.5%
NORMAL						
.000 NORMAL GLOBE	528	86.8%	193	84.6%	61	92.4%

ALASKAN MALAMUTE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy: epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Cone degeneration - day blindness	Autosomal recessive	1, 2-8	NO	Mutation in the *CNGB3* gene

Descriptions and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Cone degeneration - day blindness or hemeralopia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Affected puppies develop day-blindness, color blindness, and photophobia between 8 and 12 weeks of age. Affected dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. Genetically, the condition results from a deletion in the *CNGB3* gene. A DNA test is available.

References

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OCULAR DISORDERS REPORT
ALASKAN MALAMUTE

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	8,714		1,086		187	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	0.0%	0	0.0%	0	0.0%
10.000	GLAUCOMA	2	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	5	0.1%	0	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	198	2.3%	15	1.4%	3	1.6%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	2	0.0%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.0%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	0.0%
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	1	0.1%	0	0.0%
70.700	CORNEAL DYSTROPHY	72	0.8%	13	1.2%	5	2.7%
UVEA							
93.120	IRIS CYST	6	0.1%	2	0.2%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	3	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	559	6.4%	84	7.7%	13	7.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	35	0.4%	7	0.6%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	12	0.1%	0	0.0%	1	0.5%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	4	0.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	8	0.1%	8	0.7%	2	1.1%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.0%	0	0.0%	0	0.0%
93.810	UVEAL MELANOMA	2	0.0%	0	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	3	0.0%	0	0.0%	0	0.0%
97.120	COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	125	1.4%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	347	4.0%	55	5.1%	6	3.2%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	26	0.3%	13	1.2%	3	1.6%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	140	1.6%	13	1.2%	3	1.6%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	20	0.2%	8	0.7%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	19	0.2%	4	0.4%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	71	0.8%	8	0.7%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	14	0.2%	11	1.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	39	0.4%	13	1.2%	3	1.6%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	27	0.3%	7	0.6%	1	0.5%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	356	4.1%	36	3.3%	6	3.2%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	41	0.5%	5	0.5%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	8	0.1%	1	0.1%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	78	0.9%	8	0.7%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	20	0.2%	4	0.4%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	42	0.5%	12	1.1%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	3	0.3%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	14	0.2%	15	1.4%	0	0.0%

OCULAR DISORDERS REPORT
ALASKAN MALAMUTE

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 8,714 #	 %	2016-2020 1,086 #	 %	2021 187 #	 %
LENS Continued						
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	0	0.0%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	2	0.0%	1	0.1%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	2	0.0%	1	0.1%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	1	0.0%	5	0.5%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	8	0.1%	5	0.5%	1	0.5%
100.330 GENERALIZED/ COMPLETE CATARACT	80	0.9%	1	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	7	0.1%	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,137***	***13.0%***	***174***	***16.0%***	***17***	***9.1%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	9	0.1%	3	0.3%	1	0.5%
110.135 PHPV/ PTVL	6	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	12	0.1%	1	0.1%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	60	0.7%	1	0.1%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	19	0.2%	2	0.2%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	2	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	17	0.2%	1	0.1%	0	0.0%
120.400 RETINAL HEMORRHAGE	2	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	10	0.1%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.1%	0	0.0%
120.960 RETINOPATHY	1	0.0%	1	0.1%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	2	0.0%	1	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	9	0.1%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	2	0.0%	2	0.2%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	75	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	257	2.9%	3	0.3%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	108	1.2%	47	4.3%	5	2.7%
NORMAL						
.000 NORMAL GLOBE	6,865	78.8%	778	71.6%	149	79.7%

ALASKAN NOBLE COMPANION DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ALASKAN NOBLE COMPANION DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ALASKAN NOBLE COMPANION DOG

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	53		33		4	
	Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA							
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	3.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	4	7.5%	1	3.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	3.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	3.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***0***	***0.0%***	***1***	***3.0%***	***0***	***0.0%***
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1	1.9%	0	0.0%	0	0.0%
OTHER							
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	3.0%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	50	94.3%	30	90.9%	4	100.0%

AMERICAN ALSATIAN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN ALSATIAN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AMERICAN ALSATIAN

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		2		1	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	0		2	100.0%	1	100.0%

AMERICAN BANDOGGE MASTIFF

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN BANDOGGE MASTIFF breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AMERICAN BANDOGGE MASTIFF

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	1	100.0%	0		0	

AMERICAN BULLDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Glaucoma	Not defined	2	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Multifocal retinopathy - *cmr1*	Autosomal recessive	3	Breeder Option	Mutation in the *BEST1* gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

American Bulldogs with glaucoma were reported to have uveal cysts (evident on ophthalmic exam, ultrasound biomicroscopy and/or histopathology), goniodysgenesis, and anterior segment inflammation. Consistent clinical findings among reported individuals included an absent menace response, diminished to absent light perception, mydriasis, and elevated intraocular pressures.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is

minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. A DNA test is available.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Pumphrey SA, Pizzirani S, Pirie CG, et al. Glaucoma associated with uveal cysts and goniodysgenesis in American Bulldogs: a case series. *Vet Ophthalmol*. 2012:1-9. PMID: 23110479

3. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci.* 2007 May;48:1959-1967. PMID: 17460247

OCULAR DISORDERS REPORT
AMERICAN BULLDOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	120		28		2	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
20.160 MACROPALPEBRAL FISSURE	3	2.5%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	9	7.5%	0	0.0%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	2	1.7%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	30	25.0%	2	7.1%	0	0.0%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	4	3.3%	0	0.0%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	1	0.8%	0	0.0%	0	0.0%
UVEA						
93.120 IRIS CYST	1	0.8%	0	0.0%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	0	0.0%	1	3.6%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	0.8%	4	14.3%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	3.6%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.8%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.8%	2	7.1%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	2	7.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***2***	***7.1%***	***0***	***0.0%***
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	3	2.5%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	16	13.3%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.8%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	84	70.0%	20	71.4%	2	100.0%

AMERICAN BULLY

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN BULLY breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AMERICAN BULLY

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1 #	 %	2016-2020 109 #	 %	2021 45 #	 %
EYELIDS						
25.110 DISTICHIASIS	0	0.0%	4	3.7%	1	2.2%
CORNEA						
70.700 CORNEAL DYSTROPHY	0	0.0%	1	0.9%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	6	5.5%	1	2.2%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	0	0.0%	2	4.4%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	5	4.6%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.9%	1	2.2%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	4	3.7%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	0.9%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	0.9%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***7***	***6.4%***	***1***	***2.2%***
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	0	0.0%	3	2.8%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	0.9%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	0	0.0%	1	0.9%	0	0.0%
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	5	4.6%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	1	100.0%	84	77.1%	41	91.1%

AMERICAN ENGLISH COONHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN ENGLISH COONHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AMERICAN ENGLISH COONHOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2		1		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	2	100.0%	1	100.0%	0	

AMERICAN ESKIMO DOG

(all varieties)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Cataract	Not defined	1	NO	
B.	Lens luxation	Autosomal recessive	2	NO	Mutation in the *ADAMTS17* gene
C.	Retinal atrophy (*prcd*)	Autosomal recessive	3	NO	Mutation in the *prcd* gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

C. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the American Eskimo is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. However in the American Eskimo Dog the phenotype can be very variable in the age of onset. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease

begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

Other forms of retinal degeneration that are not *prcd* are recognized in the breed. The currently available genetic test will not detect these other forms of PRA.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384. PMID: 22050825

3. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT
AMERICAN ESKIMO DOG

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		2,423		229		56	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	4	0.2%	0	0.0%	1	1.8%
25.110	DISTICHIASIS	18	0.7%	1	0.4%	0	0.0%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	9	0.4%	3	1.3%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.2%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	4	0.2%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	21	0.9%	0	0.0%	1	1.8%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.0%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	4	0.2%	1	0.4%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	4	0.2%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	3	0.1%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	136	5.6%	17	7.4%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	28	1.2%	7	3.1%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	10	0.4%	3	1.3%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	9	0.4%	2	0.9%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	7	0.3%	5	2.2%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.2%	2	0.9%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.1%	1	0.4%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	24	1.0%	9	3.9%	1	1.8%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	23	0.9%	3	1.3%	1	1.8%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	14	0.6%	2	0.9%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	5	0.2%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	3	0.1%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	6	0.2%	1	0.4%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	7	0.3%	1	0.4%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	0	0.0%	1	1.8%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.4%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.0%	1	0.4%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	3	0.1%	3	1.3%	1	1.8%
100.330	GENERALIZED/ COMPLETE CATARACT	10	0.4%	1	0.4%	0	0.0%
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***166***	***6.9%***	***42***	***18.3%***	***4***	***7.1%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	6	0.2%	2	0.9%	0	0.0%
110.135	PHPV/ PTVL	3	0.1%	0	0.0%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	18	0.7%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	8	0.3%	1	0.4%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2	0.1%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	182	7.5%	3	1.3%	0	0.0%

OCULAR DISORDERS REPORT
AMERICAN ESKIMO DOG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,423 #	 %	2016-2020 229 #	 %	2021 56 #	 %
RETINA Continued						
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.0%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	2	0.1%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	3	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	8	0.3%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	86	3.5%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	25	1.0%	9	3.9%	2	3.6%
NORMAL						
.000 NORMAL GLOBE	1,938	80.0%	183	79.9%	50	89.3%

AMERICAN FOXHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN FOXHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AMERICAN FOXHOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	9		2		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	0	0.0%	2	100.0%	0	
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	6	66.7%	0	0.0%	0	
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	2	22.2%	2	100.0%	0	
OTHER						
900.000 OTHER, UNSPECIFIED	1	11.1%	0	0.0%	0	
NORMAL						
.000 NORMAL GLOBE	6	66.7%	0	0.0%	0	

AMERICAN HAIRLESS TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Lens luxation	Autosomal recessive	1, 2	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sc*i. 2010 Sep;51:4716-4721. PMID: 20375329

2. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011 Nov;14:378-384. PMID: 22050825

OCULAR DISORDERS REPORT
AMERICAN HAIRLESS TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	27		70		18	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	0	0.0%	1	1.4%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	3.7%	1	1.4%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	3.7%	0	0.0%	3	16.7%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	3.7%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	1	1.4%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	5.6%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	0	0.0%	1	5.6%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	0	0.0%	1	5.6%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***3.7%***	***1***	***1.4%***	***3***	***16.7%***
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	0	0.0%	1	1.4%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	3.7%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1	3.7%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	3.7%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	23	85.2%	66	94.3%	15	83.3%

AMERICAN HUSKY

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN HUSKY breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AMERICAN HUSKY

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	1	100.0%	0		0	

AMERICAN LEOPARD HOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN LEOPARD HOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AMERICAN LEOPARD HOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		3		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0		1	33.3%	0	
NORMAL						
.000 NORMAL GLOBE	0		2	66.7%	0	

AMERICAN PIT BULL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Retinal atrophy - cone-rod dystrophy 2 (*crd2*)	Autosomal recessive	2-4	NO	Mutation in the *IQCB1* gene
B.	Retinal atrophy - cone-rod dystrophy 1 (*CRD1/rcd1b)*	Autosomal recessive	1	NO	Mutation in the *PDE6B* gene

Description and Comments

A. Retinal atrophy - cone-rod dystrophy 2 (*crd2*)

A cone rod dystrophy characterized by initial loss of cones (day vision) followed by degeneration of the rods (night vision). Evidence of vision loss is evident at an early age with severe retinal degeneration and complete blindness by a year of age. The disease is a severe early onset retinal blindness more appropriately considered a form of Leber congenital amaurosis (LCA). The condition is inherited as an autosomal recessive trait and caused by a mutation in *IQCB1.* A DNA test is available.

B. Retinal Atrophy - Rod-cone dysplasia 1b [previously considered cone-rod dystrophy 1(*crd1*)]

The disease was previously considered a cone-rod dystrophy (crd1) based on incorrect phenotype ascertainment using ERG. The term crd1 should no longer be used to refer to the disease in this breed. The disease is more appropriately classified as rod-cone dysplasia 1b (rcd1b). In affected dogs there is evidence of vision loss at an early age with severe retinal degeneration and complete blindness by early adulthood, and ophthalmoscopic evidence of advanced retinal degeneration by 1 year of age. The disease is caused by a mutation in the *PDE6B* gene, with clinical abnormalities similar to what is found in rcd1-affected Irish Setters, and rcd1a affected Sloughis and Spanish Water Dogs. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Miyadera K, Acland GM, Aguirre GD. Genetic and phenotypic variations of inherited retinal diseases in dogs: the power of within- and across-breed studies. *Mamm Genome*. 2012;23:40-61. PMID: 22065099

3. Goldstein O, Mezey JG, Schweitzer P, et al. IQCB1 and PDE6B mutations cause similar early onset retinal degenerations in two closely related terrier dog breeds. *Invest Ophthalmol*. 2013;54:7005-7019. PMID: 24045995

4. Kijas JW, Zanger B, Miller B, et al. Cloning of the canine ABCA4 gene and evaluation in canine cone-rod dystrophies and progressive retinal atrophies. *Mol Vis*. 2004;10:223-232. PMID: 15064680

OCULAR DISORDERS REPORT
AMERICAN PIT BULL TERRIER

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		191		48		4	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	5	2.6%	3	6.3%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	1	0.5%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.5%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	4	2.1%	3	6.3%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	1.0%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	1.0%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.5%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	3.7%	0	0.0%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	2	1.0%	0	0.0%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	1.0%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.5%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.5%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.5%	0	0.0%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.5%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	2.1%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.5%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***8***	***4.2%***	***1***	***2.1%***	***0***	***0.0%***
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2	1.0%	0	0.0%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.5%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	1.0%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	1	0.5%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	10	5.2%	1	2.1%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	4.2%	2	50.0%
NORMAL							
.000	NORMAL GLOBE	164	85.9%	38	79.2%	2	50.0%

AMERICAN STAFFORDSHIRE TERRIER*

*Please note that since 1972 the AKC considers the Staffordshire Bull Terrier a different breed from the American Staffordshire Terrier. Since the latter breed evolved from the former, it is possible that the same genetic diseases exist in both.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	2, 3	NO	
D.	Retinal atrophy - cone-rod dystrophy 2 (*crd2*)	Autosomal recessive	6	NO	Mutation in the *IQCB1* gene
E.	Retinal atrophy - cone-rod dystrophy 1 (*CRD1/rcd1b)*	Autosomal recessive	4-6	NO	Mutation in the *PDE6B* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make strong recommendations with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely

(diffuse) or in a localized region.

In this breed, cataracts usually develop by one year of age. There is initial opacification of the suture lines progressing to nuclear and cortical cataract formation; complete cataracts and blindness develop by three years of age. A simple autosomal recessive mode of inheritance has been proposed; however, the genetics have not been defined and additional studies will be required.

D. Retinal Atrophy - Cone-rod dystrophy 2 (*crd2*)

A cone rod dystrophy characterized by initial loss of cones (day vision) followed by degeneration of the rods (night vision). Evidence of vision loss is evident at an early age with severe retinal degeneration and complete blindness by a year of age. The disease is a severe early onset retinal blindness more appropriately considered a form of Leber congenital amaurosis (LCA). The condition is inherited as an autosomal recessive trait and caused by a mutation in *IQCB1.* A DNA test is available.

E. Retinal Atrophy - Rod-cone dysplasia 1b [previously considered cone-rod dystrophy 1(*crd1*)]

The disease was previously considered a cone-rod dystrophy (crd1) based on incorrect phenotype ascertainment using ERG (Aguirre, personal communication, 2016). The term crd1 should no longer be used to refer to the disease in this breed. The disease is more appropriately classified as rod-cone dysplasia 1b (rcd1b). In affected dogs there is evidence of vision loss at an early age with severe retinal degeneration and complete blindness by early adulthood, and ophthalmoscopic evidence of advanced retinal degeneration by 1 year of age. The disease is caused by a mutation in the *PDE6B* gene, with clinical abnormalities similar to what is found in rcd1-affected Irish Setters, and rcd1a affected Sloughis and Spanish Water Dogs. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Barnett KC. Hereditary cataract in the dog. *J Small Anim Pract*. 1978;19:109-120. PMID: 642468

3. Barnett KC. The diagnosis and differential diagnosis of cataract in the dog. *J Small Anim Pract*. 1985;26:305-316.

4. Kijas JW, Zanger B, Miller B, et al. Cloning of the canine ABCA4 gene and evaluation in canine cone-rod dystrophies and progressive retinal atrophies. *Mol Vis*. 2004;10:223-232. PMID: 15064680

5. Miyadera K, Acland GM, Aguirre GD. Genetic and phenotypic variations of inherited retinal diseases in dogs: the power of within- and across-breed studies. *Mamm Genome*. 2012;23:40-61. PMID: 22065099

6. Goldstein O, Mezey JG, Schweitzer P, et al. IQCB1 and PDE6B mutations cause similar early onset retinal degenerations in two closely related terrier dog breeds. *Invest Ophthalmol*. 2013;54:7005-7019. PMID: 24045995

OCULAR DISORDERS REPORT
AMERICAN STAFFORDSHIRE TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	726		99		35	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	2	0.3%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	34	4.7%	2	2.0%	2	5.7%
CORNEA							
70.210	PANNUS	1	0.1%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	1	0.1%	1	1.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.1%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	1	1.0%	0	0.0%
93.120	IRIS CYST	1	0.1%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.1%	1	1.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	30	4.1%	2	2.0%	3	8.6%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.3%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	28	3.9%	5	5.1%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.1%	1	1.0%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.3%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.3%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.1%	3	3.0%	1	2.9%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	1.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	1.0%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	4	0.6%	1	1.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	3	0.4%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	4	0.6%	1	1.0%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	1.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	2.0%	1	2.9%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.1%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.3%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***20***	***2.8%***	***11***	***11.1%***	***2***	***5.7%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.3%	0	0.0%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	2	0.3%	0	0.0%	1	2.9%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	8	1.1%	0	0.0%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2	0.3%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.4%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	8	1.1%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	30	4.1%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	8	1.1%	5	5.1%	1	2.9%
NORMAL							
.000	NORMAL GLOBE	620	85.4%	82	82.8%	28	80.0%

AMERICAN WATER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
AMERICAN WATER SPANIEL

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,050		126		32	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	0.2%	0	0.0%	0	0.0%
10.000	GLAUCOMA	3	0.3%	0	0.0%	0	0.0%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	2	0.2%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	7	0.7%	1	0.8%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	2	0.2%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	336	32.0%	55	43.7%	10	31.3%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	0	0.0%	1	3.1%
CORNEA							
70.220	PIGMENTARY KERATITIS	1	0.1%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	5	0.5%	2	1.6%	0	0.0%
UVEA							
93.120	IRIS CYST	1	0.1%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	2	0.2%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	11	1.0%	1	0.8%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.1%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.2%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	6	0.6%	4	3.2%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	5	0.5%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	38	3.6%	8	6.3%	2	6.3%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	5	0.5%	1	0.8%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	7	0.7%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.2%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	6	0.6%	9	7.1%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	2	0.2%	1	0.8%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.3%	2	1.6%	2	6.3%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	7	0.7%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	11	1.0%	4	3.2%	2	6.3%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	6	0.6%	1	0.8%	1	3.1%
100.316	INCIPIENT CATARACT, NUCLEUS	1	0.1%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.1%	1	0.8%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.8%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.1%	0	0.0%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.8%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	2	0.2%	6	4.8%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.1%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	0	0.0%	1	0.8%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***60***	***5.7%***	***27***	***21.4%***	***5***	***15.6%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.2%	0	0.0%	0	0.0%
110.135	PHPV/ PTVL	0	0.0%	1	0.8%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	0	0.0%	1	3.1%
110.320	VITREOUS DEGENERATION SYNERESIS	0	0.0%	2	1.6%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	8	0.8%	0	0.0%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
AMERICAN WATER SPANIEL

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,050 #	 %	2016-2020 126 #	 %	2021 32 #	 %
RETINA Continued						
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	5	0.5%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.1%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	2	1.6%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	5	0.5%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	18	1.7%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	0.2%	7	5.6%	1	3.1%
NORMAL						
.000 NORMAL GLOBE	659	62.8%	50	39.7%	17	53.1%

ANATOLIAN SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ANATOLIAN SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ANATOLIAN SHEPHERD

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	35		29		1	
	Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE							
.110	MICROPHTHALMIA	1	2.9%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	2.9%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	5.7%	3	10.3%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	3.4%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	3	10.3%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	2.9%	1	3.4%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***1***	***2.9%***	***5***	***17.2%***	***0***	***0.0%***
OTHER							
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	5.7%	0	0.0%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	29	82.9%	26	89.7%	1	100.0%

ARMENIAN GAMPR

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ARMENIAN GAMPR breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ARMENIAN GAMPR

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2		2		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	2	100.0%	2	100.0%	0	

AUSTRALIAN CATTLE DOG

(Queensland Heeler or Blue Heeler)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Glaucoma	Not defined	2	NO	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	3, 4	NO	Mutation in the *ADAMTS17* gene
E.	Retinal atrophy (*prcd*)	Autosomal recessive	5, 6	NO	Mutation in the *prcd* gene
F.	Retinal atrophy - rod-cone dysplasia type 4	Autosomal recessive	1	NO	Mutation in the *C2orf71* gene

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy).

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

E. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that one form of PRA in the Australian Cattle Dog is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. However in the Australian Cattle Dog the phenotype can be very variable in the age of onset. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

Other forms of retinal degeneration that are not PRCD are recognized in the breed. The currently available genetic test will not detect these other forms of PRA.

F. Retinal atrophy - rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified also in the Australian Cattle Dog breed. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is available. The test is accurate only for this mutation and is of no value in identifying other forms of PRA.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, MacKay EO. Prevalence of the breed-related glaucomas in pure-bred dogs in North America. *Vet Ophthalmol*. 2004;7:97-111. PMID: 14982589

3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384. PMID: 22050825

4. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci*. 2010;51:4716-4721. PMID: 20375329

5. Dekomien G, Epplen JT. Exclusion of the PDE6A gene for generalised progressive retinal atrophy in 11 breeds of dog. *Anim Genet*. 2000;31:135-139. PMID: 10782214

6. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT
AUSTRALIAN CATTLE DOG

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	4,629		557		109	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	0	0.0%	1	0.2%	1	0.9%
EYELIDS							
22.000	ECTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	15	0.3%	2	0.4%	0	0.0%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	1	0.2%	0	0.0%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	2	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	2	0.0%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	23	0.5%	5	0.9%	1	0.9%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.1%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	11	0.2%	2	0.4%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	42	0.9%	6	1.1%	3	2.8%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.0%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.1%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	6	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	3	0.5%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.0%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	1	0.0%	2	0.4%	1	0.9%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	3	0.1%	0	0.0%	0	0.0%
97.120	COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	35	0.8%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	284	6.1%	30	5.4%	8	7.3%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	48	1.0%	12	2.2%	5	4.6%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	38	0.8%	6	1.1%	1	0.9%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	19	0.4%	2	0.4%	1	0.9%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	7	0.2%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	22	0.5%	18	3.2%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.1%	1	0.2%	1	0.9%
100.307	PUNCTATE CATARACT, CAPSULAR	5	0.1%	1	0.2%	1	0.9%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	45	1.0%	14	2.5%	1	0.9%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	70	1.5%	4	0.7%	1	0.9%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	51	1.1%	7	1.3%	1	0.9%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	3	0.1%	4	0.7%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	18	0.4%	2	0.4%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	5	0.1%	3	0.5%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	4	0.1%	4	0.7%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	3	0.5%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	3	0.5%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	0.4%	0	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	3	0.5%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	2	0.4%	0	0.0%

OCULAR DISORDERS REPORT
AUSTRALIAN CATTLE DOG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 4,629 #	 %	Year Examined: 2016-2020 Total # Dogs: 557 #	 %	Year Examined: 2021 Total # Dogs: 109 #	 %
LENS Continued						
100.328 Y-SUTURE TIP OPACITIES	5	0.1%	14	2.5%	9	8.3%
100.330 GENERALIZED/ COMPLETE CATARACT	22	0.5%	2	0.4%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.2%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.1%	1	0.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***404***	***8.7%***	***108***	***19.4%***	***21***	***19.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	8	0.2%	0	0.0%	0	0.0%
110.135 PHPV/ PTVL	1	0.0%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	12	0.3%	2	0.4%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	37	0.8%	2	0.4%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	12	0.3%	3	0.5%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.0%	1	0.2%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	251	5.4%	7	1.3%	1	0.9%
120.400 RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.1%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	2	0.4%	1	0.9%
120.960 RETINOPATHY	1	0.0%	7	1.3%	0	0.0%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.2%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	2	0.0%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	20	0.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	126	2.7%	1	0.2%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	32	0.7%	45	8.1%	4	3.7%
NORMAL						
.000 NORMAL GLOBE	3,812	82.4%	423	75.9%	87	79.8%

AUSTRALIAN KELPIE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Cataract	Not defined	1	NO	
B.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	2	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

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OCULAR DISORDERS REPORT
AUSTRALIAN KELPIE

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	225		21		2	
	Diagnostic Name	#	%	#	%	#	%
CORNEA							
70.700	CORNEAL DYSTROPHY	1	0.4%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	0.4%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	4.8%	0	0.0%
93.810	UVEAL MELANOMA	3	1.3%	0	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.4%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	5	2.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	28	12.4%	5	23.8%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	8	3.6%	1	4.8%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	8	3.6%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.4%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	1	4.8%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.4%	3	14.3%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	9	4.0%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	7	3.1%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.9%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.4%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.4%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***43***	***19.1%***	***5***	***23.8%***	***0***	***0.0%***
VITREOUS							
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.9%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	1	0.4%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	5	2.2%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	11	4.9%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	7	3.1%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	8	3.6%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.4%	1	4.8%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	171	76.0%	14	66.7%	2	100.0%

AUSTRALIAN KOOLIE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	1	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
AUSTRALIAN KOOLIE

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2		6		4	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	0	0.0%	2	50.0%
NORMAL						
.000 NORMAL GLOBE	2	100.0%	6	100.0%	2	50.0%

AUSTRALIAN LABRADOODLE

(Labradoodle, Australian Cobber Dog)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1, 4	Breeder option	
C.	Persistent pupillary membranes - iris to iris - lens pigment foci no strands	 Not defined Not defined	 1 1	 Breeder option Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 5-9	NO	Mutation of the *prcd* gene
G.	Day blindness/retinal degeneration	Autosomal recessive	1, 10	NO	Mutation has not been published
H.	Retinal dysplasia - folds	Presumed autosomal recessive	1, 11-20	NO (Breeder option with Normal DNA test)	Mutation of the *COL9A3* gene
I.	Retinal dysplasia - geographic/ detached (without skeletal defects)	Presumed autosomal recessive	1, 11-21	NO	
J.	Retinal dysplasia - folds/geographic/ detached (with skeletal defects)	Autosomal recessive with incomplete dominance for the eyes	1, 11-21	NO	Mutation of the *COL9A3* gene
K.	Limbal melanoma	Not defined	22	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral. In Labrador Retrievers in Europe, one form of corneal dystrophy has been shown to be caused by accumulations of glycosaminoglycans in the corneal stroma. This form of corneal dystrophy is caused by a mutation in the CHST6 gene.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

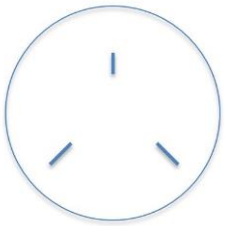
A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The most frequently reported cataracts in the Labradoodle (Australian) are bilateral or unilateral, focal, posterior polar (posterior cortical)/subcapsular cataracts, which usually present between 1-3 years of age. These are generally stationary or very slowly progressive and generally do not interfere with vision. It has been suggested that these cataracts are inherited as dominant with incomplete penetrance, but definitive breeding studies are still required to verify this hypothesis.

A second type of cataract is a progressive cortical cataract which may involve the entire lens. It is not clear whether this is a distinct entity, or an aberrant form of the posterior polar cataract.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Labradoodle is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

G. Achromatopsia Type 2 (ACHM – Type 2)

A congenital form of day blindness. Visual deficits become apparent between 8-10 weeks of age. Normal vision is present in low light conditions. Clinical examination is normal. Cone responses are absent on an electroretinogram. The causative genetic mutation of the *CNGA3* gene (3nt deletion in exon 7). A DNA test is available.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness.

In the Labrador Retriever, the presence of retinal folds may be seen in the heterozygous state described in “R” below, thus the recommendation against breeding.

The breeding advice for Labrador Retrievers and Samoyeds diagnosed with "retinal dysplasia - folds" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog, showing that it is not a carrier of the *COL9A3* mutation.

I. Retinal dysplasia - geographic, detached without skeletal defects

Abnormal development of the retina present at birth; however, in the Golden Retriever, Labrador Retriever, and German Shepherd Dog it has been demonstrated that the geographic form of retinal dysplasia may not be apparent before dogs are 10 weeks of age.

Retinal dysplasia - geographic: Any irregularly shaped area of abnormal retinal development containing both areas of thinning and areas of elevation representing folds and retinal disorganization.

Retinal dysplasia - detached: Severe retinal disorganization associated with separation (detachment) of the retina.

These two forms are associated with vision impairment or blindness. Retinal dysplasia is known to be inherited in many breeds. The genetic relationship between the three forms of retinal dysplasia is not known for all breeds

In Europe, this condition has been documented as an autosomal recessive condition and results in early retinal detachment and blindness. Lens and corneal opacities can also be present, but skeletal abnormalities (see below) are not present. The condition of generalized retinal dysplasia with retinal detachment but without skeletal abnormalities has been reported primarily in Europe, and is rarely if ever seen in the United States.

In the United States, the milder forms of retinal dysplasia (folds/geographic) are seen in Labradors. These may represent the heterozygous form of the condition in which the homozygote also displays skeletal malformations (see “R” below) or it may represent a genetically distinct entity with an undetermined mode of inheritance. It is not possible clinically to make this distinction. Thus, Labradors with any form of retinal dysplasia should not be used for breeding.

J. Retinal dysplasia - folds or detachment with skeletal defects

This condition is also known as oculo-skeletal dysplasia (OSD) or dwarfism with retinal dysplasia type 1 (DRD1) in the Labrador Retriever. A similar condition, DRD2, occurs in the Samoyed. The condition is autosomal recessive and homozygous affected dogs have shortened

forelimbs (“downhill” conformation) with valgus deformity. They have severe ocular defects including cataract, retinal folds/multifocal retinal dysplasia, vitreal degeneration and retinal detachment. The ocular abnormalities result in blindness in most dogs. Heterozygous dogs can have either a normal ocular exam or have multiple retinal folds, vitreal membranes, or vitreal degeneration suggesting a semi-dominant mechanism with respect to the eyes. It is important to note that generally the retinal folds present in heterozygous dogs tend to cluster around the major superior blood vessels of the central tapetal region. The condition is caused by a 1 base pair insertion of *COL9A3.* A DNA test is available.

K. Limbal melanoma

Most limbal melanomas are really epibulbar melanocytomas, but there is a possibility of an extension of an intraocular melanoma extending outward and presenting as a limbal melanoma. An epibulbar melanocytoma originates from the superficial pigment lining the limbus and the lesion may eventually extend into the eye. Metastasis has not been documented and the mass is characterized by large epithelioid cells. The lesion presents as a subconjunctival smooth mass most commonly in the dorsolateral limbal region and extends later into the cornea and posterior on the sclera. Breed predisposition has been noted in the German Shepherd, Labrador and Golden Retriever.

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OCULAR DISORDERS REPORT
AUSTRALIAN LABRADOODLE

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	8,447		17,833		4,946	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	6	0.1%	3	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	0	0.0%	2	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	5	0.1%	4	0.0%	5	0.1%
22.000	ECTROPION, UNSPECIFIED	2	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	121	1.4%	405	2.3%	79	1.6%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	9	0.1%	43	0.2%	15	0.3%
40.910	KERATOCONJUNCTIVITIS SICCA	0	0.0%	2	0.0%	1	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	5	0.1%	5	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	1	0.0%	1	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	162	1.9%	332	1.9%	46	0.9%
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	7	0.0%	3	0.1%
93.120	IRIS CYST	0	0.0%	1	0.0%	0	0.0%
93.150	IRIS COLOBOMA	2	0.0%	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	552	6.5%	1,381	7.7%	345	7.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	30	0.4%	22	0.1%	6	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.0%	7	0.0%	2	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	174	2.1%	643	3.6%	271	5.5%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	0	0.0%	11	0.1%	1	0.0%
93.810	UVEAL MELANOMA	3	0.0%	2	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	3	0.0%	2	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	2	0.0%	0	0.0%	1	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	168	2.0%	469	2.6%	105	2.1%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	55	0.7%	147	0.8%	28	0.6%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	28	0.3%	62	0.3%	12	0.2%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	5	0.1%	25	0.1%	1	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	11	0.1%	19	0.1%	4	0.1%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	58	0.7%	150	0.8%	11	0.2%
100.306	PUNCTATE CATARACT, NUCLEUS	13	0.2%	42	0.2%	8	0.2%
100.307	PUNCTATE CATARACT, CAPSULAR	79	0.9%	179	1.0%	34	0.7%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	19	0.2%	32	0.2%	9	0.2%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	23	0.3%	25	0.1%	21	0.4%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	4	0.0%	20	0.1%	8	0.2%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.0%	6	0.0%	2	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	11	0.1%	37	0.2%	8	0.2%
100.316	INCIPIENT CATARACT, NUCLEUS	4	0.0%	43	0.2%	3	0.1%
100.317	INCIPIENT CATARACT, CAPSULAR	9	0.1%	49	0.3%	25	0.5%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	5	0.1%	10	0.1%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	10	0.1%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	2	0.0%	4	0.0%	1	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	2	0.0%	1	0.0%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	7	0.1%	19	0.1%	2	0.0%

OCULAR DISORDERS REPORT
AUSTRALIAN LABRADOODLE

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 8,447 #	 %	2016-2020 17,833 #	 %	2021 4,946 #	 %
LENS Continued						
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	3	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	34	0.4%	163	0.9%	65	1.3%
100.330 GENERALIZED/ COMPLETE CATARACT	22	0.3%	4	0.0%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	2	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	0	0.0%	5	0.0%	3	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***393***	***4.7%***	***1,052***	***5.9%***	***242***	***4.9%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	14	0.2%	78	0.4%	39	0.8%
110.135 PHPV/ PTVL	6	0.1%	8	0.0%	5	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	7	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	15	0.2%	17	0.1%	1	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	68	0.8%	109	0.6%	35	0.7%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	8	0.1%	2	0.0%	1	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	0	0.0%	2	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	2	0.0%	0	0.0%
120.960 RETINOPATHY	12	0.1%	5	0.0%	1	0.0%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	0	0.0%	1	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	28	0.3%	39	0.2%	6	0.1%
130.120 OPTIC NERVE HYPOPLASIA	2	0.0%	10	0.1%	0	0.0%
130.150 OPTIC DISC COLOBOMA	0	0.0%	10	0.1%	7	0.1%
OTHER						
900.100 OTHER, NOT INHERITED	13	0.2%	26	0.1%	3	0.1%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	179	2.1%	723	4.1%	163	3.3%
NORMAL						
.000 NORMAL GLOBE	5,046	59.7%	13,715	76.9%	3,868	78.2%

AUSTRALIAN SHEPHERD

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Microphthalmia with multiple ocular defects	Presumed autosomal recessive with incomplete penetrance	1-6	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
D.	Iris coloboma	Not defined	1	NO	
E.	Iris hypoplasia	Not defined	1	Breeder option	
F.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
G.	Cataract	Autosomal co-dominant	1, 7,8	NO	Mutation in the *HSF4* gene
H.	Y-suture tip opacity	Not defined	1	Breeder option	
I.	Vitreous degeneration	Not defined	1	Breeder option	
J.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
K.	Retinal atrophy (*prcd)*	Autosomal recessive	1, 9, 10	NO	Mutation in the *prcd* gene
L.	Cone degeneration - day blindness	Autosomal recessive	16	NO	Mutation in the *CNGB3* gene
M.	Multifocal retinopathy - *cmr1*	Autosomal recessive	16	Breeder option	Mutation in the *BEST1* gene
N.	Retinal dysplasia - folds	Not defined	1	Breeder option	

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
O.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	1, 12-15	NO	Mutation in the *NHEJ1* gene
P.	Coloboma/staphyloma without microphthalmia	Not defined	1	NO	
Q.	Micropapilla	Not defined	1	Breeder option	

Description and Comments

A. Microphthalmia with multiple ocular defects

Microphthalmia is a congenital defect characterized by a small eye with associated defects of the cornea, iris (coloboma), anterior chamber, lens (cataract) and/or retina (dysplasia). In the Australian Shepherd, microphthalmia has long been suspected to be associated with merle coat coloration but a definitive genetic relationship has not been established. The eyes of affected homozygous merle (usually white) dogs have extreme forms of this entity and are usually blind at birth. Affected heterozygous merle-coated dogs demonstrate less severe manifestations.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Iris coloboma

A congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue, commonly (though not exclusively) located at the 6 o'clock position

associated with failure of closure of the optic fissure. A partial-thickness defect in iris tissue should be recorded as iris hypoplasia on the OFA form.

E. Iris hypoplasia

A congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as a partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the OFA form.

F. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

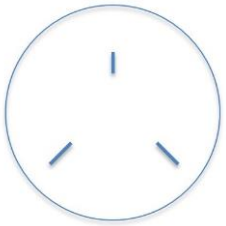
G. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Australian Shepherd, a mutation in *HSF4* (heat shock transcription factor 4), the HSF4-2 mutation, has been shown to increase the likelihood of cataract formation. The mutation is inherited in a co-dominant manner. Dogs with one copy of the mutation develop bilateral posterior cataracts and homozygotes develop a nuclear cataract that typically progresses to a mature cataract. A DNA test is available for this mutation. Other genetic factors can contribute to cataract formation in this breed and will not be detected by this test.

H. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest

version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

I. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

J. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

K. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Australian Shepherd is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

L. Cone degeneration - day blindness or hemeralopia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Affected puppies develop day-blindness, color blindness, and photophobia between 8 and 12 weeks of age. Affected dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. Genetically, the condition results from a mutation in the *CNGB3* gene. A DNA test is available.

M. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multi-focal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff.

N. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

O. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

P. Coloboma/staphyloma (unassociated with microphthalmia)

A coloboma is a congenital defect which may affect the iris, choroid or optic disc. Iris colobomas are seen as notches in the pupillary margin. Scleral ectasia is defined as a

congenital thinning and secondary distention of the sclera; when lined by uveal tissue it is called a staphyloma. These may be anteriorly located, apparent as a bulge beneath the upper eyelid or posteriorly located, requiring visualization with an ophthalmoscope. These conditions may or may not be genetically related to the same anomalies seen associated with microphthalmia (entity "A" above).

Q. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment.

Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. It may be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

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OCULAR DISORDERS REPORT
AUSTRALIAN SHEPHERD

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	96,525		23,753		5,245	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	92	0.1%	16	0.1%	4	0.1%
10.000	GLAUCOMA	8	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.110	EYELID DERMOID	1	0.0%	0	0.0%	0	0.0%
20.140	ECTOPIC CILIA	5	0.0%	0	0.0%	1	0.0%
20.160	MACROPALPEBRAL FISSURE	4	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	15	0.0%	1	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	6	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	1,580	1.6%	318	1.3%	78	1.5%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	5	0.0%	7	0.0%	4	0.1%
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	0	0.0%	0	0.0%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	0	0.0%	1	0.0%	0	0.0%
51.100	THIRD EYELID CARTILAGE ANOMALY	4	0.0%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.0%	1	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	8	0.0%	1	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	1	0.0%	1	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	432	0.4%	168	0.7%	22	0.4%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	14	0.0%	2	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	209	0.2%	154	0.6%	44	0.8%
93.120	IRIS CYST	35	0.0%	6	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1,433	1.5%	228	1.0%	41	0.8%
93.170	ANTERIOR CHAMBER CYST	4	0.0%	0	0.0%	0	0.0%
93.180	IIRIS SPHINCTER DYSPLASIA	8	0.0%	21	0.1%	3	0.1%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	4,608	4.8%	1,642	6.9%	426	8.1%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	87	0.1%	18	0.1%	7	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	43	0.0%	6	0.0%	1	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	92	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	25	0.0%	24	0.1%	9	0.2%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	22	0.0%	6	0.0%	0	0.0%
93.810	UVEAL MELANOMA	8	0.0%	1	0.0%	1	0.0%
95.120	CILIARY BODY CYST	0	0.0%	1	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	16	0.0%	11	0.0%	2	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	152	0.2%	34	0.1%	8	0.2%
97.120	COLOBOMA	96	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	169	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2,314	2.4%	460	1.9%	98	1.9%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	289	0.3%	121	0.5%	26	0.5%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	337	0.3%	79	0.3%	10	0.2%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	94	0.1%	49	0.2%	3	0.1%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	37	0.0%	9	0.0%	3	0.1%

OCULAR DISORDERS REPORT
AUSTRALIAN SHEPHERD

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 96,525 #	 %	2016-2020 23,753 #	 %	2021 5,245 #	 %
LENS Continued						
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	275	0.3%	165	0.7%	13	0.2%
100.306 PUNCTATE CATARACT, NUCLEUS	207	0.2%	100	0.4%	21	0.4%
100.307 PUNCTATE CATARACT, CAPSULAR	117	0.1%	86	0.4%	16	0.3%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	310	0.3%	76	0.3%	12	0.2%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	749	0.8%	83	0.3%	12	0.2%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	193	0.2%	31	0.1%	4	0.1%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	25	0.0%	3	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	152	0.2%	27	0.1%	1	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	209	0.2%	38	0.2%	9	0.2%
100.317 INCIPIENT CATARACT, CAPSULAR	115	0.1%	34	0.1%	8	0.2%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	7	0.0%	19	0.1%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	17	0.0%	30	0.1%	4	0.1%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	2	0.0%	8	0.0%	0	0.0%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.0%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	5	0.0%	1	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	6	0.0%	7	0.0%	2	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	1	0.0%	4	0.0%	1	0.0%
100.328 Y-SUTURE TIP OPACITIES	54	0.1%	116	0.5%	34	0.6%
100.330 GENERALIZED/ COMPLETE CATARACT	232	0.2%	10	0.0%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	0	0.0%	1	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	18	0.0%	1	0.0%	1	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***3,598***	***3.7%***	***1,101***	***4.6%***	***181***	***3.5%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	507	0.5%	125	0.5%	51	1.0%
110.135 PHPV/ PTVL	108	0.1%	16	0.1%	1	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	42	0.0%	11	0.0%	7	0.1%
110.320 VITREOUS DEGENERATION SYNERESIS	217	0.2%	47	0.2%	14	0.3%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	924	1.0%	213	0.9%	30	0.6%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	45	0.0%	4	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	9	0.0%	3	0.0%	1	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	134	0.1%	4	0.0%	1	0.0%
120.400 RETINAL HEMORRHAGE	13	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	61	0.1%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	10	0.0%	8	0.0%	3	0.1%
120.960 RETINOPATHY	8	0.0%	10	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	200	0.2%	97	0.4%	28	0.5%
130.120 OPTIC NERVE HYPOPLASIA	114	0.1%	20	0.1%	2	0.0%
130.150 OPTIC DISC COLOBOMA	154	0.2%	24	0.1%	2	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	545	0.6%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	1,262	1.3%	31	0.1%	3	0.1%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	560	0.6%	462	1.9%	89	1.7%
NORMAL						
.000 NORMAL GLOBE	84,553	87.6%	19,739	83.1%	4,338	82.7%

AUSTRALIAN STUMPY TAIL CATTLE DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Retinal atrophy (*prcd*)	Autosomal recessive	1	NO	Mutation in the *prcd* gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Australian Stumpy Tail Cattle Dog is *prcd*, which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Australian Stumpy Tail Cattle Dog. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006 Nov;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT
AUSTRALIAN STUMPY TAIL CATTLE DOG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 44 #	 %	Year Examined: 2016-2020 Total # Dogs: 2 #	 %	Year Examined: 2021 Total # Dogs: 5 #	 %
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	4.5%	0	0.0%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	2.3%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	2.3%	0	0.0%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	1	2.3%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	2	4.5%	0	0.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	2	4.5%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	1	2.3%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***8***	***18.2%***	***0***	***0.0%***	***0***	***0.0%***
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	1	2.3%	0	0.0%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	2.3%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	6.8%	0	0.0%	0	0.0%
OTHER						
900.100 OTHER, NOT INHERITED	1	2.3%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	2.3%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	38	86.4%	2	100.0%	5	100.0%

AUSTRALIAN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
B.	Cataract	Not defined	1	NO

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
AUSTRALIAN TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	842		214		42	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
10.000 GLAUCOMA	1	0.1%	0	0.0%	0	0.0%
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	2	0.2%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	3	0.4%	0	0.0%	0	0.0%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	0	0.0%	1	0.5%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	0	0.0%	1	0.5%	0	0.0%
70.700 CORNEAL DYSTROPHY	4	0.5%	1	0.5%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	38	4.5%	18	8.4%	3	7.1%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.1%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.4%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	5	0.6%	12	5.6%	2	4.8%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	1	0.5%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	2	0.2%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	28	3.3%	11	5.1%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	6	0.7%	3	1.4%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	3	0.4%	0	0.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.2%	1	0.5%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	3	0.4%	1	0.5%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	2	0.2%	0	0.0%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	0.1%	0	0.0%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	5	0.6%	4	1.9%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	4	0.5%	2	0.9%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	5	0.6%	1	0.5%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	1	0.1%	0	0.0%	1	2.4%
100.317 INCIPIENT CATARACT, CAPSULAR	1	0.1%	1	0.5%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.1%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	0.5%	1	2.4%
100.330 GENERALIZED/ COMPLETE CATARACT	8	1.0%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***46***	***5.5%***	***14***	***6.5%***	***2***	***4.8%***
VITREOUS						
110.320 VITREOUS DEGENERATION SYNERESIS	3	0.4%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	3	0.4%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.4%	0	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	1	0.1%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	4	0.5%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	8	1.0%	2	0.9%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	0.4%	8	3.7%	3	7.1%

OCULAR DISORDERS REPORT
AUSTRALIAN TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	842		214		42	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	737	87.5%	167	78.0%	33	78.6%

AZAWAKH

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AZAWAKH breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AZAWAKH

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	10		10		1	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	10.0%	0	0.0%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	10.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***10.0%***	***0***	***0.0%***	***0***	***0.0%***
OTHER						
900.000 OTHER, UNSPECIFIED	1	10.0%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	9	90.0%	10	100.0%	1	100.0%

BARBET

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent Pupillary Membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Y suture tip opacity	Not defined	1	Breeder option	
E.	Retinal atrophy (*prcd*)	Autosomal recessive	2	NO	Mutation in the *prcd* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

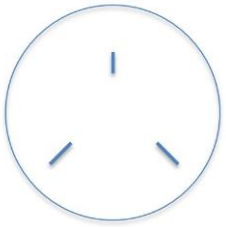
C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume

cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Barbet is *prcd*, which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006 Nov;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT
BARBET

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	155		184		51	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	10	6.5%	6	3.3%	5	9.8%
CORNEA						
70.700 CORNEAL DYSTROPHY	0	0.0%	1	0.5%	0	0.0%
UVEA						
93.110 IRIS HYPOPLASIA	0	0.0%	0	0.0%	1	2.0%
93.120 IRIS CYST	0	0.0%	1	0.5%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	0	0.0%	1	0.5%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	4	2.6%	4	2.2%	1	2.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	4	2.6%	5	2.7%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	1	0.6%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	20	12.9%	18	9.8%	1	2.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	3	1.9%	6	3.3%	1	2.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.6%	0	0.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	3	1.9%	1	0.5%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.5%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.6%	4	2.2%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	2	1.3%	2	1.1%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	2	1.3%	2	1.1%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	4	2.2%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	2	1.1%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.5%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.5%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	0	0.0%	1	0.5%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	1	0.6%	1	0.5%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	3	1.9%	8	4.3%	2	3.9%
100.330 GENERALIZED/ COMPLETE CATARACT	0	0.0%	1	0.5%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***16***	***10.3%***	***35***	***19.0%***	***3***	***5.9%***
VITREOUS						
110.320 VITREOUS DEGENERATION SYNERESIS	0	0.0%	1	0.5%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	1	0.6%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	0	0.0%	2	1.1%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.5%	0	0.0%
120.960 RETINOPATHY	0	0.0%	3	1.6%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	2	1.1%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	2	1.3%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	0	0.0%	2	1.1%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	5	3.2%	7	3.8%	2	3.9%
NORMAL						
.000 NORMAL GLOBE	126	81.3%	136	73.9%	42	82.4%

BASENJI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
B.	Corneal dystrophy - endothelial	Not defined	1	NO	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1, 2-9	Breeder option	
	- iris to cornea	Not defined	1	NO	
	- iris to lens	Not defined	1	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
	- endothelial opacity/no strands	Not defined	1	NO	
D.	Cataract	Not defined	1	NO	
E.	Y suture tip opacity	Not defined	1	Breeder option	
F.	Retinal atrophy - generalized	Not defined	1, 6, 7	NO	
	- Bas_PRA1	Autosomal recessive	1, 6, 7	NO	Mutation in the S-antigen (*SAG)*
G.	Optic nerve coloboma	Not defined	2	NO	

Description and Comments

A. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Corneal dystrophy - endothelial

Corneal endothelial dystrophy is an abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision. This usually does not occur until the animal is older. In the Basenji, this condition is less common than corneal endothelial disease caused by attachment of persistent pupillary membranes.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Basenji, this is a particularly significant problem with many cases reported where the strands bridge between the iris and the cornea resulting in localized corneal opacities which may cause vision impairment. This has also been associated with optic nerve coloboma (see "G" below).

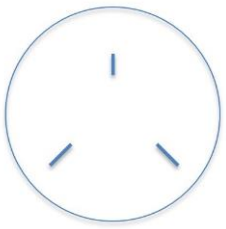
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or "highlighted" or "more dense") distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a "peace sign" as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the "Lens" section of the CAER form. The newest version of the form (3/16/21) has boxes that say, "posterior Y-suture tip opacities" which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures" AND ALSO MARK "suspect not inherited/significance unknown" (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: "E2" or "posterior suture tip opacities." This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

Bas_PRA1

A specific mutation has been located in the S-antigen (*SAG)* gene that causes a late onset form of retinal degeneration in the Basenji. The condition is inherited in an autosomal recessive fashion. Initial thinning of the retina evidenced by irregular hypo and hyper-reflectivity of the tapetal fundus is typically noted at 5 years of age with retinal vascular attenuation noted by 6-7 years of age. Clinically the disease closely resembles *prcd*-PRA. The retinal degeneration progresses gradually and ultimately results in complete vision loss. This mutation is responsible for the majority, but not all cases of PRA within the Basenji breed.

G. Optic nerve coloboma

A congenital cavity in the optic nerve which, if large, may cause blindness or vision impairment.

In the Basenji, this condition has been associated with persistent pupillary membranes (see “C” above).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Barnett KC and Knight CG. Persistent pupillary membrane and associated defects in the Basenji. *Vet Rec*. 1969 Aug 30;85:242-248. PMID: 4980462

3. Roberts SR and Bistner SI. Persistent pupillary membrane in Basenji dogs. *J Am Vet Med Assoc*. 1968 Sep 1;153:533-542. PMID: 5691151

4. Mason TA. Persistent pupillary membrane in the Basenji. *Aust Vet J*. 1976 Aug;52:343-344. PMID: 985254

5. Bistner SI, Rubin LF and Roberts SR. A review of persistent pupillary membranes in the Basenji dog. *J Am Anim Hosp Assoc*. 1971;7:143.

6. Priester W. Canine progressive retinal atrophy: Occurrence by age, breed, and sex. *American Journal of Veterinary Research*. 1974;35:571-574.

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OCULAR DISORDERS REPORT
BASENJI

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 10,460 #	 %	Year Examined: 2016-2020 Total # Dogs: 1,632 #	 %	Year Examined: 2021 Total # Dogs: 300 #	 %
GLOBE						
.110 MICROPHTHALMIA	8	0.1%	1	0.1%	0	0.0%
EYELIDS						
20.160 MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	6	0.1%	0	0.0%	1	0.3%
22.000 ECTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	61	0.6%	13	0.8%	3	1.0%
CORNEA						
70.210 PANNUS	2	0.0%	0	0.0%	0	0.0%
70.220 PIGMENTARY KERATITIS	2	0.0%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	314	3.0%	41	2.5%	8	2.7%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	242	2.3%	13	0.8%	4	1.3%
UVEA						
90.250 PIGMENTARY UVEITIS	1	0.0%	0	0.0%	0	0.0%
93.110 IRIS HYPOPLASIA	0	0.0%	1	0.1%	1	0.3%
93.120 IRIS CYST	2	0.0%	0	0.0%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	18	0.2%	0	0.0%	0	0.0%
93.150 IRIS COLOBOMA	9	0.1%	0	0.0%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	0	0.0%	6	0.4%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	5,267	50.4%	1,073	65.7%	175	58.3%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	449	4.3%	38	2.3%	21	7.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1,100	10.5%	127	7.8%	21	7.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	40	0.4%	7	0.4%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	14	0.1%	24	1.5%	13	4.3%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	175	1.7%	152	9.3%	33	11.0%
93.810 UVEAL MELANOMA	0	0.0%	1	0.1%	0	0.0%
97.150 CHORIORETINAL COLOBOMA, CONGENITAL	1	0.0%	0	0.0%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
97.120 COLOBOMA	13	0.1%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	47	0.4%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	463	4.4%	52	3.2%	13	4.3%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	47	0.4%	9	0.6%	3	1.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	22	0.2%	9	0.6%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	10	0.1%	1	0.1%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	5	0.0%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	76	0.7%	37	2.3%	6	2.0%
100.306 PUNCTATE CATARACT, NUCLEUS	16	0.2%	15	0.9%	4	1.3%
100.307 PUNCTATE CATARACT, CAPSULAR	66	0.6%	30	1.8%	2	0.7%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	30	0.3%	5	0.3%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	27	0.3%	8	0.5%	1	0.3%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	17	0.2%	4	0.2%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	3	0.0%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	30	0.3%	7	0.4%	1	0.3%
100.316 INCIPIENT CATARACT, NUCLEUS	22	0.2%	2	0.1%	1	0.3%
100.317 INCIPIENT CATARACT, CAPSULAR	23	0.2%	5	0.3%	2	0.7%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	9	0.1%	25	1.5%	5	1.7%

OCULAR DISORDERS REPORT
BASENJI

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 10,460 #	 %	Year Examined: 2016-2020 Total # Dogs: 1,632 #	 %	Year Examined: 2021 Total # Dogs: 300 #	 %
LENS Continued						
100.330 GENERALIZED/ COMPLETE CATARACT	22	0.2%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	9	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***472***	***4.5%***	***158***	***9.7%***	***25***	***8.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	9	0.1%	5	0.3%	1	0.3%
110.135 PHPV/ PTVL	8	0.1%	1	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	5	0.0%	2	0.1%	1	0.3%
110.320 VITREOUS DEGENERATION SYNERESIS	25	0.2%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	20	0.2%	4	0.2%	1	0.3%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	19	0.2%	1	0.1%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	4	0.0%	1	0.1%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	379	3.6%	2	0.1%	1	0.3%
120.400 RETINAL HEMORRHAGE	5	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	7	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	9	0.1%	4	0.2%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	3	0.0%	0	0.0%	1	0.3%
130.150 OPTIC DISC COLOBOMA	99	0.9%	9	0.6%	2	0.7%
OTHER						
900.000 OTHER, UNSPECIFIED	78	0.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	223	2.1%	6	0.4%	1	0.3%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	259	2.5%	45	2.8%	10	3.3%
NORMAL						
.000 NORMAL GLOBE	4,131	39.5%	375	23.0%	74	24.7%

BASSET FAUVE DE BRETAGNE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma - POAG	Autosomal recessive	2-8	NO	Mutation in the *ADAMTS17* gene
B.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

In the Basset Fauve de Bretagne, both closed angle (PCAG) and open angle (POAG) forms of glaucoma are present. Some Basset Fauve de Bretagnes have an abnormality of the iridocorneal angle termed goniodysgenesis. This abnormality is not visible during routine ophthalmologic examination using an indirect ophthalmoscope or a slit-lamp microscope. There appears to be an association between goniodysgenesis and glaucoma, but the mechanism by which the angle defect results in glaucoma has not been determined. It is suspected that mild to severe anterior uveitis impairs outflow of aqueous through the small perforations that are present in the sheet of tissue in the iridocorneal angle; this results in a secondary and often irreversible rise in intraocular pressure that causes blindness.

The inheritance of PCAG and goniodysgenesis in the Basset Fauve de Bretagne are not known. Until the inheritance is determined, control should be directed to removing dogs from breeding that have glaucoma and have goniodysgenesis, as well as those dogs that produce progeny affected with glaucoma. Three genetic loci, *COL1A2, RAB22A,* and *NEB,* have been implicated as possible contributors to the development of PCAG in the Basset Fauve de Bretagne. One is an autosomal recessive missense mutation of a nebulin (NEB) residue on chromosome 19. Because 33% of unaffected animals were homozygous for the risk allele, it was hypothesized that modifying factors may be present. A genetic test is not yet available for PCAG.

POAG in the Basset Fauve de Bretagne is caused by a 19 base pair deletion in exon 2 of *ADAMTS17.* This deletion alters the reading frame and is suspected to cause a truncated

protein. The trait shows an autosomal recessive mode of inheritance. A DNA test is available.

B. Persistent pupillary membranes (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Ahram DF, Cook AC, Kecova H, et al. Identification of genetic loci associated with primary angle-closure glaucoma in the basset hound. *Mol Vis*. 2014;20:497-510. PMID: 24791135

3. Bedford PG. The aetiology of primary glaucoma in the dog. *J Small Anim Pract*. 1975;16:217-239. PMID: 1142747

4. Bedford PGC. A gonioscopic study of the iridocorneal angle in the English and America breeds of Cocker Spaniel and the Basset Hound. *J Small Anim Pract*. 1977;18:631-642. PMID: 604666

5. Slater MR, Erb HN. Effects of risk factors and prophylactic treatment on primary glaucoma in the dog. *J Am Vet Med Assoc*. 1986;188:1028-1030. PMID: 3710885

6. Martin CL, Wyman M. Glaucoma in the Basset Hound. *J Am Vet Med Assoc*. 1968;153:1320-1327. PMID: 5748475

7. Oliver JA, Forman OP, Pettitt L, et al. Two independent mutations in ADAMTS17 are associated with primary open angle glaucoma in the Basset Hound and Basset Fauve de Bretagne breeds of dog. *PloS one*. 2015;10:e0140436. PMID: 26474315

8. Ahram DF, Grozdanic SD, Kecova H, et al. Variants in Nebulin (NEB) Are Linked to the Development of Familial Primary Angle Closure Glaucoma in Basset Hounds. *PloS one*. 2015;10:e0126660. PMID: 25938837

9. Jeanes EC, Oliver JAC, Ricketts SL, Gould DJ, Mellersh CS. Glaucoma-causing *ADAMTS17* mutations are also reproducibly associated with height in two domestic dog breeds: selection for short stature may have contributed to increased prevalence of glaucoma. Canine Genet Epidemiol. 2019 May 17;6:5. doi: 10.1186/s40575-019-0071-6. PMID: 31131111; PMCID: PMC6524303.

OCULAR DISORDERS REPORT
BASSET FAUVE DE BRETAGNE

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	43		77		17	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
10.000	GLAUCOMA	2	4.7%	0	0.0%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	0	0.0%	1	1.3%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	0	0.0%	0	0.0%	1	5.9%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	2	4.7%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	13	30.2%	9	11.7%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	5	11.6%	4	5.2%	1	5.9%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	2.3%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	3	3.9%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	2.3%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	2.3%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	1.3%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	1	1.3%	1	5.9%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	4.7%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	2.6%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***5***	***11.6%***	***7***	***9.1%***	***1***	***5.9%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	1	1.3%	0	0.0%
OTHER							
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	7.0%	3	3.9%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	23	53.5%	60	77.9%	15	88.2%

BASSET HOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma - POAG	Autosomal recessive	1-10	NO	Mutation in the *ADAMTS17* gene
B.	Entropion	Not defined	1	Breeder option	
C.	Ectropion	Not defined	1, 11	Breeder option	
D.	Distichiasis	Not defined	1	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
F.	Cataract	Not defined	1	NO	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

In the Basset Hound, both closed angle (PCAG) and open angle (POAG) forms of glaucoma are present. Some Basset Hounds have an abnormality of the iridocorneal angle termed goniodysgenesis. This abnormality is not visible during routine ophthalmologic examination using an indirect ophthalmoscope or a slit-lamp microscope. There appears to be an association between goniodysgenesis and glaucoma, but the mechanism by which the angle defect results in glaucoma has not been determined. It is suspected that mild to severe anterior uveitis impairs outflow of aqueous through the small perforations that are present in the sheet of tissue in the iridocorneal angle; this results in a secondary and often irreversible rise in intraocular pressure that causes blindness.

The inheritance of PCAG and goniodysgenesis in the Basset Hound are not known. Until the inheritance is determined, control should be directed to removing dogs from breeding that have glaucoma and have goniodysgenesis, as well as those dogs that produce progeny affected with glaucoma. Three genetic loci, *COL1A2, RAB22A,* and *NEB,* have been implicated as possible contributors to the development of PCAG in the Basset Hound. One is an autosomal recessive missense mutation of a nebulin (NEB) residue on chromosome

19. Because 33% of unaffected animals were homozygous for the risk allele, it was hypothesized that modifying factors may be present. A genetic test is not yet available for PCAG.

POAG in the Basset Hound is caused by a 19 base pair deletion in exon 2 of *ADAMTS17.* This deletion alters the reading frame and is suspected to cause a truncated protein. The trait shows an autosomal recessive mode of inheritance. A DNA test is available.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

In the Basset Hound, ectropion is associated with an exceptionally large palpebral fissure (macroblepharon) and laxity of the canthal structures. Central lower lid ectropion is often associated with entropion of the adjacent lid segment. This causes severe ocular irritation.

It is acknowledged that factors other than genetics may play a role or be the cause of entropion and/or ectropion. However, when non-genetic factors can be ruled out, selection should be directed to a more normal head conformation that minimizes or eliminates the likelihood of the defects.

D. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume

cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Ahram DF, Cook AC, Kecova H, et al. Identification of genetic loci associated with primary angle-closure glaucoma in the basset hound. *Mol Vis*. 2014;20:497-510. PMID: 24791135

3. Bedford PG. The aetiology of primary glaucoma in the dog. *J Small Anim Pract*. 1975;16:217-239. PMID: 1142747

4. Bedford PGC. A gonioscopic study of the iridocorneal angle in the English and America breeds of Cocker Spaniel and the Bassest Hound. *J Small Anim Pract*. 1977;18:631-642. PMID: 604666

5. Slater MR, Erb HN. Effects of risk factors and prophylactic treatment on primary glaucoma in the dog. *J Am Vet Med Assoc*. 1986;188:1028-1030. PMID: 3710885

6. Martin CL, Wyman M. Glaucoma in the Basset Hound. *J Am Vet Med Assoc*. 1968;153:1320-1327. PMID: 5748475

7. Oliver JA, Forman OP, Pettitt L, et al. Two independent mutations in ADAMTS17 are associated with primary open angle glaucoma in the Basset Hound and Basset Fauve de Bretagne breeds of dog. *PloS one*. 2015;10:e0140436. PMID: 26474315

8. Ahram DF, Grozdanic SD, Kecova H, et al. Variants in Nebulin (NEB) Are Linked to the Development of Familial Primary Angle Closure Glaucoma in Basset Hounds. *PloS one*. 2015;10:e0126660. PMID: 25938837

9. Oliver JAC, Ricketts SL, Kuehn MH, Mellersh CS. Primary closed angle glaucoma in the Basset Hound: Genetic investigations using genome-wide association and RNA sequencing strategies. Mol Vis. 2019 Feb 8;25:93-105. PMID: 30820145

10. Jeanes EC, Oliver JAC, Ricketts SL, Gould DJ, Mellersh CS. Glaucoma-causing *ADAMTS17* mutations are also reproducibly associated with height in two domestic dog breeds: selection for short stature may have contributed to increased prevalence of glaucoma. Canine Genet Epidemiol. 2019 May 17;6:5. doi: 10.1186/s40575-019-0071-6. PMID: 31131111; PMCID: PMC6524303

11. Priester WA. Congenital ocular defects in cattle, horses, cats, and dogs. *J Am Vet Med Assoc*. 1972;160:1504-1511. PMID: 4623843

OCULAR DISORDERS REPORT
BASSET HOUND

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,799		171		20	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.1%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	17	0.9%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	20	1.1%	7	4.1%	1	5.0%
22.000	ECTROPION, UNSPECIFIED	126	7.0%	20	11.7%	3	15.0%
25.110	DISTICHIASIS	25	1.4%	1	0.6%	0	0.0%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	0	0.0%	1	5.0%
40.910	KERATOCONJUNCTIVITIS SICCA	6	0.3%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	20	1.1%	2	1.2%	1	5.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	9	0.5%	3	1.8%	0	0.0%
CORNEA							
70.210	PANNUS	3	0.2%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	3	0.2%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	4	0.2%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	5	0.3%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	4	0.2%	0	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.1%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	0.6%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	49	2.7%	7	4.1%	1	5.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	11	0.6%	2	1.2%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	28	1.6%	1	0.6%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.2%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	6	0.3%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	52	2.9%	10	5.8%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	19	1.1%	1	0.6%	1	5.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	9	0.5%	1	0.6%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	5	0.3%	1	0.6%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.2%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	7	0.4%	3	1.8%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	4	0.2%	2	1.2%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	9	0.5%	3	1.8%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	7	0.4%	1	0.6%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	13	0.7%	1	0.6%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.1%	1	0.6%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	3	0.2%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	4	0.2%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	4	0.2%	3	1.8%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.6%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	2	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
BASSET HOUND

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,799 #	 %	2016-2020 171 #	 %	2021 20 #	 %
LENS Continued						
100.327 INCOMPLETE CATARACT, CAPSULAR	1	0.1%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	0.6%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	5	0.3%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***104***	***5.8%***	***19***	***11.1%***	***1***	***5.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	7	0.4%	0	0.0%	0	0.0%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	3	0.2%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	11	0.6%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	0.1%	0	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	1	0.1%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	1	0.1%	2	1.2%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	19	1.1%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	43	2.4%	7	4.1%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	98	5.4%	8	4.7%	1	5.0%
NORMAL						
.000 NORMAL GLOBE	1,385	77.0%	108	63.2%	14	70.0%

BAVARIAN MOUNTAIN SCENT HOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BAVARIAN MOUNTAIN SCENT HOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BAVARIAN MOUNTAIN SCENT HOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2		50		15	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	1	2.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	3	6.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	2	100.0%	46	92.0%	15	100.0%

BEAGLE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmia with multiple ocular defects	See below	1, 2	NO	
B.	Glaucoma – POAG	Presumed autosomal recessive	3-17	NO	Mutation in the *ADAMTS10* gene
C.	Distichiasis	Not defined	1	Breeder option	
D.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
E.	Corneal dystrophy - epithelial/stromal	Not defined	18-23	Breeder option	
E.	Cataract	Not defined	1, 24, 25	NO	
E.	Tapetal degeneration	Presumed autosomal recessive	26-29	Breeder option	
H.	Retinal dysplasia - folds	Not defined	1	Breeder option	
I.	Congenital stationary night blindness	Autosomal recessive	30,31	NO	Mutation in the *LRIT3* gene

Description and Comments

A. Microphthalmia with multiple congenital ocular defects

A developmental anomaly in which the eyeball is abnormally small. This is often associated with other ocular malformations, including defects of the cornea, anterior chamber, lens, and/or retina.

In the Beagle, the condition may be present unilaterally or bilaterally and is characterized by a small globe and associated ocular defects which are variable. Several forms of the condition, all apparently different, are recognized:

1) In one study, complete lens opacities were noted by 5-6 months of age; the severity of the cataract correlated closely with the extent of microphthalmia. Severely microphthalmic eyes also had multiple retinal folds. The disorder appeared to be inherited; the exact mode was

not fully defined, although an X-linked disorder could not be ruled out.

2) A different form of microphthalmia is recognized in association with microphakia and persistent pupillary membrane (PPM). Based on a limited pedigree of one cross, a dominant inheritance was proposed; heterozygotes have PPM and microphakia/cataract and homozygous affected show microphthalmia and multiple congenital ocular anomalies.

3) A third form of microphthalmia is recognized in the breed. This condition is usually unilateral and the fellow eye is normal. The mode of inheritance has not been defined, but autosomal recessive inheritance is suspected.

B. Glaucoma

Glaucoma is an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

Primary open angle glaucoma is present in the breed, and extensive breeding studies have demonstrated its inheritance as autosomal recessive. By one year of age, the intraocular pressure (IOP) is elevated, but the filtration angle is open (early glaucoma). Animals with moderate glaucoma show sustained elevations of IOP, focal disinsertions of the lens zonules and focal closures of the iridocorneal angle. Later the globe enlarges, the lens luxates and the eyes become blind and show the effects of chronic glaucoma. The causative mutation in *ADAMTS10* causes an arginine for glycine substitution at position 661. A DNA test is available.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

E. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

In the Beagle, corneal dystrophy has been described as an oval opacity located at the junction at the middle and inferior thirds of the cornea. The opacities are caused by accumulation of cholesterol and other lipids within the cornea. Progression was noted with

possible vision impairment.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Several different types of cataract (anterior capsular, posterior cortical, other) have been reported in the Beagle, but the mode of inheritance of the defects is unknown. When one considers that this breed, particularly the laboratory-bred Beagle, has been the subject of extensive ophthalmological examination, the relatively low incidence of cataracts is surprising.

G. Tapetal degeneration

The tapetum lucidum is a modified choroidal structure present in the eyes of many animals that have good night vision. In Beagles there is a recessively inherited defect of the tapetal layer. Absence of this layer is determined by ophthalmoscopy which shows that the fundus has a uniform reddish coloration. The degeneration of the tapetum occurs as a result of abnormal postnatal development of this structure. The degeneration of the tapetum does not affect vision and does not result in functional or structural damage to the retina. As such, the condition probably represents an insignificant inherited variation of no functional significance.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

I. Congenital stationary night blindness (CSNB)

A non-progressive retinal disease characterized by night blindness; day vision is normal. This condition is very rare and has only been found to date in a research colony in Japan. The condition is inherited in an autosomal recessive manner. Affected dogs had normal retinas on clinical examination, but no detectable rod photoreceptor responses with an electroretinogram (ERG). A DNA test is available.

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OCULAR DISORDERS REPORT
BEAGLE

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,624		451		155	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	4	0.2%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	3	0.2%	3	0.7%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	293	18.0%	81	18.0%	22	14.2%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	4	0.2%	8	1.8%	1	0.6%
40.910	KERATOCONJUNCTIVITIS SICCA	3	0.2%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.1%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	10	0.6%	1	0.2%	0	0.0%
CORNEA							
70.220	PIGMENTARY KERATITIS	1	0.1%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	6	0.4%	1	0.2%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.1%	0	0.0%	1	0.6%
UVEA							
93.120	IRIS CYST	1	0.1%	3	0.7%	0	0.0%
93.150	IRIS COLOBOMA	0	0.0%	1	0.2%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.1%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	20	1.2%	4	0.9%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.2%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	1	0.2%	0	0.0%
95.120	CILIARY BODY CYST	0	0.0%	2	0.4%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	9	0.6%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	46	2.8%	14	3.1%	3	1.9%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	12	0.7%	3	0.7%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	6	0.4%	1	0.2%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.1%	2	0.4%	1	0.6%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	3	0.7%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	5	0.3%	2	0.4%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	2	0.4%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.2%	2	0.4%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	3	0.2%	2	0.4%	3	1.9%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	14	0.9%	0	0.0%	2	1.3%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	6	0.4%	3	0.7%	1	0.6%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	4	0.2%	1	0.2%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.1%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	0	0.0%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.2%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	1	0.2%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	19	1.2%	1	0.2%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***90***	***5.5%***	***24***	***5.3%***	***7***	***4.5%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
BEAGLE

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,624 #	 %	Year Examined: 2016-2020 Total # Dogs: 451 #	 %	Year Examined: 2021 Total # Dogs: 155 #	 %
VITREOUS Continued						
110.135 PHPV/ PTVL	1	0.1%	1	0.2%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	4	0.2%	2	0.4%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	33	2.0%	3	0.7%	2	1.3%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	6	0.4%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	8	0.5%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.1%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	4	0.2%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	18	1.1%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	44	2.7%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	25	1.5%	17	3.8%	6	3.9%
NORMAL						
.000 NORMAL GLOBE	1,199	73.8%	320	71.0%	125	80.6%

BEARDED COLLIE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Y suture tip opacity	Not defined	1		
F.	Retinal dysplasia - folds	Not defined	1	Breeder option	
G.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	1-3	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

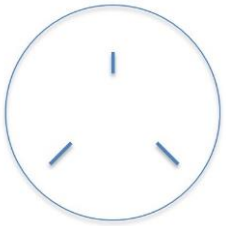
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached), which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

G. Choroidal hypoplasia (Collie Eye Anomaly)
- Staphyloma/coloboma
- Retinal detachment
- Retinal hemorrhage
- Optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Genome Res*. 2007 Nov;17:1562-1571. PMID: 17916641

3. Lowe JK, Kukekova AV, Kirkness EF, et al. Linkage mapping of the primary disease locus for collie eye anomaly. *Genomics*. 2003;82:86-95. PMID: 12809679

OCULAR DISORDERS REPORT
BEARDED COLLIE

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	3,776		461		79	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	0.1%	0	0.0%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	25	0.7%	7	1.5%	1	1.3%
CORNEA							
70.700	CORNEAL DYSTROPHY	49	1.3%	5	1.1%	1	1.3%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.0%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	6	0.2%	1	0.2%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	0.2%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	154	4.1%	18	3.9%	5	6.3%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	9	0.2%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.1%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	3	0.7%	0	0.0%
95.120	CILIARY BODY CYST	3	0.1%	0	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	22	0.6%	0	0.0%	4	5.1%
97.120	COLOBOMA	4	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	12	0.3%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	374	9.9%	56	12.1%	9	11.4%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	48	1.3%	19	4.1%	4	5.1%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	15	0.4%	4	0.9%	1	1.3%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	32	0.8%	8	1.7%	1	1.3%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	5	0.1%	1	0.2%	1	1.3%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	28	0.7%	21	4.6%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	8	0.2%	2	0.4%	1	1.3%
100.307	PUNCTATE CATARACT, CAPSULAR	12	0.3%	16	3.5%	2	2.5%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	38	1.0%	3	0.7%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	33	0.9%	4	0.9%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	24	0.6%	6	1.3%	2	2.5%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	3	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	10	0.3%	4	0.9%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	13	0.3%	5	1.1%	1	1.3%
100.317	INCIPIENT CATARACT, CAPSULAR	9	0.2%	4	0.9%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.1%	1	0.2%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.2%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	2	0.4%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	8	0.2%	20	4.3%	4	5.1%
100.330	GENERALIZED/ COMPLETE CATARACT	5	0.1%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	6	0.2%	1	0.2%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***305***	***8.1%***	***121***	***26.2%***	***17***	***21.5%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	6	0.2%	0	0.0%	1	1.3%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	6	0.2%	1	0.2%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	52	1.4%	0	0.0%	4	5.1%

OCULAR DISORDERS REPORT
BEARDED COLLIE

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	3,776		461		79	
	Diagnostic Name	#	%	#	%	#	%
RETINA Continued							
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.0%	2	0.4%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	8	0.2%	0	0.0%	0	0.0%
120.960	RETINOPATHY	2	0.1%	0	0.0%	0	0.0%
OPTIC NERVE							
130.150	OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	37	1.0%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	73	1.9%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	26	0.7%	30	6.5%	4	5.1%
NORMAL							
.000	NORMAL GLOBE	3,048	80.7%	319	69.2%	50	63.3%

BEAUCERON

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
C.	Cataracts	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens

completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BEAUCERON

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	128		403		147	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.8%	0	0.0%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	1	0.8%	5	1.2%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	0	0.0%	1	0.2%	0	0.0%
CORNEA							
70.210	PANNUS	1	0.8%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	0	0.0%	2	0.5%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	2	1.6%	12	3.0%	3	2.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	0.2%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	6	4.7%	28	6.9%	12	8.2%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	2.3%	14	3.5%	4	2.7%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.8%	2	0.5%	1	0.7%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.8%	1	0.2%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	3	2.3%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	6	1.5%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.8%	4	1.0%	4	2.7%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	3	0.7%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.2%	1	0.7%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	0	0.0%	1	0.7%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	2	1.6%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	1	0.8%	1	0.2%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	1	0.2%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.2%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	2	1.6%	1	0.2%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	0	0.0%	2	0.5%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***11***	***8.6%***	***21***	***5.2%***	***7***	***4.8%***
VITREOUS							
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.2%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	6	4.7%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	0	0.0%	4	1.0%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.8%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	3	2.3%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	3.1%	16	4.0%	3	2.0%
NORMAL							
.000	NORMAL GLOBE	104	81.3%	322	79.9%	123	83.7%

BEDLINGTON TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Imperforate lacrimal punctum	Not defined	2	Breeder option
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
D.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

B. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Barnett KC. Imperforate and micro-lachrymal puncta in the dog. *J Small Anim Pract*. 1979 Aug;20:481-490. PMID: 513659

OCULAR DISORDERS REPORT
BEDLINGTON TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,592		269		102	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	4	0.3%	1	0.4%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	2	0.1%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	2	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	127	8.0%	12	4.5%	5	4.9%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	11	0.7%	4	1.5%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	0	0.0%	0	0.0%
CORNEA							
70.220	PIGMENTARY KERATITIS	1	0.1%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	7	0.4%	0	0.0%	1	1.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	122	7.7%	39	14.5%	14	13.7%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.1%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.3%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	3	0.2%	0	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	13	0.8%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	114	7.2%	20	7.4%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	13	0.8%	5	1.9%	2	2.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	4	0.3%	1	0.4%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	12	0.8%	4	1.5%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.2%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	24	1.5%	18	6.7%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	2	0.1%	1	0.4%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	6	0.4%	3	1.1%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	38	2.4%	1	0.4%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	18	1.1%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	32	2.0%	0	0.0%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	4	0.3%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	9	0.6%	0	0.0%	1	1.0%
100.316	INCIPIENT CATARACT, NUCLEUS	4	0.3%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.1%	0	0.0%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	4	0.3%	3	1.1%	1	1.0%
100.330	GENERALIZED/ COMPLETE CATARACT	14	0.9%	2	0.7%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***203***	***12.8%***	***38***	***14.1%***	***4***	***3.9%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	0	0.0%	2	2.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	5	0.3%	1	0.4%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	8	0.5%	2	0.7%	0	0.0%

OCULAR DISORDERS REPORT
BEDLINGTON TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,592 #	 %	2016-2020 269 #	 %	2021 102 #	 %
RETINA Continued						
120.190 RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.2%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.1%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	2	0.7%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	5	0.3%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	13	0.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	34	2.1%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	16	1.0%	9	3.3%	2	2.0%
NORMAL						
.000 NORMAL GLOBE	1,188	74.6%	184	68.4%	77	75.5%

BELGIAN LAEKENOIS

There are 4 varieties of Belgian Shepherd- the Groenendael, Laekenois, Malinois and Tervuren. In Europe these varieties may be interbred and are not considered genetically distinct, thus it is likely that the same genetic diseases exist in all four. In the United States the Groenendael (known as the Belgian Sheepdog), Malinois, Tervuren and Laekenois are recognized as separate breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Cataracts	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BELGIAN LAEKENOIS

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 153 #	 %	Year Examined: 2016-2020 Total # Dogs: 54 #	 %	Year Examined: 2021 Total # Dogs: 23 #	 %
EYELIDS						
25.110 DISTICHIASIS	5	3.3%	0	0.0%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	0	0.0%	2	3.7%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	1	0.7%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	0.7%	2	3.7%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	1.9%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	16	10.5%	2	3.7%	2	8.7%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.7%	1	1.9%	1	4.3%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.9%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.7%	0	0.0%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.7%	0	0.0%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	1.9%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	0.7%	0	0.0%	1	4.3%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	2	3.7%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.9%	2	8.7%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.7%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	0	0.0%	1	4.3%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.9%	1	4.3%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***5***	***3.3%***	***7***	***13.0%***	***6***	***26.1%***
VITREOUS						
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.7%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	4	2.6%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	6	3.9%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	0	0.0%	1	1.9%	2	8.7%
120.960 RETINOPATHY	0	0.0%	0	0.0%	1	4.3%
OTHER						
900.000 OTHER, UNSPECIFIED	4	2.6%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	4	2.6%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	1.3%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	125	81.7%	45	83.3%	16	69.6%

BELGIAN MALINOIS

There are 4 varieties of Belgian Shepherd- the Groenendael, Laekenois, Malinois and Tervuren. In Europe these varieties may be interbred and are not considered genetically distinct, thus it is likely that the same genetic diseases exist in all four. In the United States the Groenendael (known as the Belgian Sheepdog), Malinois, Tervuren and Laekenois are recognized as separate breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Belgian Malinois, cataract most often occurs as a non-progressive, triangular opacity in the posterior cortex.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BELGIAN MALINOIS

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2,582		888		228	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
.110 MICROPHTHALMIA	2	0.1%	0	0.0%	0	0.0%
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	0	0.0%	1	0.1%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	2	0.1%	1	0.1%	1	0.4%
NICTITANS						
50.210 PLASMOMA/ ATYPICAL PANNUS	0	0.0%	1	0.1%	0	0.0%
51.100 THIRD EYELID CARTILAGE ANOMALY	0	0.0%	3	0.3%	0	0.0%
CORNEA						
70.210 PANNUS	10	0.4%	1	0.1%	1	0.4%
70.220 PIGMENTARY KERATITIS	1	0.0%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	16	0.6%	3	0.3%	1	0.4%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	2	0.1%	0	0.0%	0	0.0%
UVEA						
93.120 IRIS CYST	9	0.3%	0	0.0%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	1	0.0%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	30	1.2%	20	2.3%	4	1.8%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	0	0.0%	1	0.4%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	3	0.3%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.0%	0	0.0%	0	0.0%
FUNDUS						
97.120 COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	3	0.1%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	112	4.3%	49	5.5%	11	4.8%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	19	0.7%	21	2.4%	6	2.6%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	13	0.5%	2	0.2%	3	1.3%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.2%	2	0.2%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	6	0.2%	3	0.3%	2	0.9%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	19	0.7%	10	1.1%	1	0.4%
100.306 PUNCTATE CATARACT, NUCLEUS	6	0.2%	7	0.8%	2	0.9%
100.307 PUNCTATE CATARACT, CAPSULAR	4	0.2%	8	0.9%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	12	0.5%	9	1.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	21	0.8%	8	0.9%	2	0.9%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	6	0.2%	2	0.2%	1	0.4%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	8	0.3%	1	0.1%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	9	0.3%	1	0.1%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	16	0.6%	6	0.7%	1	0.4%
100.317 INCIPIENT CATARACT, CAPSULAR	2	0.1%	2	0.2%	1	0.4%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.1%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.1%	1	0.4%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	6	0.2%	9	1.0%	2	0.9%
100.330 GENERALIZED/ COMPLETE CATARACT	6	0.2%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***161***	***6.2%***	***94***	***10.6%***	***22***	***9.6%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.0%	2	0.2%	1	0.4%
110.135 PHPV/ PTVL	2	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
BELGIAN MALINOIS

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,582 #	 %	2016-2020 888 #	 %	2021 228 #	 %
VITREOUS Continued						
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	16	0.6%	6	0.7%	2	0.9%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	22	0.9%	4	0.5%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	6	0.2%	1	0.1%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	13	0.5%	1	0.1%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	4	0.2%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	3	0.3%	0	0.0%
120.960 RETINOPATHY	1	0.0%	3	0.3%	0	0.0%
OPTIC NERVE						
130.150 OPTIC DISC COLOBOMA	1	0.0%	1	0.1%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	21	0.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	78	3.0%	1	0.1%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	24	0.9%	45	5.1%	9	3.9%
NORMAL						
.000 NORMAL GLOBE	2,291	88.7%	743	83.7%	191	83.8%

BELGIAN SHEEPDOG

(BELGIAN SHEPHERD-GROENENDAEL)

There are 4 varieties of Belgian Shepherd- the Groenendael, Laekenois, Malinois and Tervuren. In Europe these varieties may be interbred and are not considered genetically distinct, thus it is likely that the same genetic diseases exist in all four. In the United States the Groenendael (known as the Belgian Sheepdog), Malinois, Tervuren and Laekenois are recognized as separate breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Chronic superficial keratitis/pannus	Not defined	1	NO
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
C.	Cataract	Not defined	1	NO
D.	Achiasmic optic nerves with nystagmus	Autosomal recessive	2	NO

Description and Comments

A. Chronic superficial keratitis/pannus

A bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation follows the vascularization. If severe, vision impairment occurs. Pannus may be associated with plasma cell infiltration of the nictitans.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Belgian Sheepdog, cataract most often occurs as a non-progressive, triangular opacity in the posterior cortex.

D. Achiasmatic optic nerves with nystagmus

Achiasmatic optic nerves with nystagmus have been described in a small family of black Belgian Sheepdogs. Congenital nystagmus is the clinical sign most commonly noted. All retinal ganglion cell axons extend directly into the ipsilateral optic disc with no chiasmal decussation. No optic nerve hypoplasia/micropapilla was noted in the animals studied and reported.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Hogan D and Williams RW. Analysis of the retinas and optic nerves of achiasmatic Belgian sheepdogs. *The Journal of comparative neurology.* 1995 Feb 13;352:367-380.

OCULAR DISORDERS REPORT
BELGIAN SHEEPDOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	5,648		953		208	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
10.000 GLAUCOMA	1	0.0%	0	0.0%	0	0.0%
EYELIDS						
22.000 ECTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	11	0.2%	3	0.3%	0	0.0%
NICTITANS						
50.210 PLASMOMA/ ATYPICAL PANNUS	2	0.0%	7	0.7%	0	0.0%
51.100 THIRD EYELID CARTILAGE ANOMALY	3	0.1%	1	0.1%	0	0.0%
CORNEA						
70.210 PANNUS	49	0.9%	18	1.9%	2	1.0%
70.220 PIGMENTARY KERATITIS	3	0.1%	4	0.4%	2	1.0%
70.700 CORNEAL DYSTROPHY	32	0.6%	5	0.5%	1	0.5%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	1	0.0%	0	0.0%	0	0.0%
UVEA						
93.120 IRIS CYST	3	0.1%	1	0.1%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	0	0.0%	1	0.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	408	7.2%	83	8.7%	13	6.3%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	3	0.1%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	4	0.1%	2	0.2%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	5	0.1%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	9	0.2%	7	0.7%	1	0.5%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	3	0.1%	0	0.0%	0	0.0%
95.120 CILIARY BODY CYST	0	0.0%	1	0.1%	0	0.0%
97.150 CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	1	0.1%	0	0.0%
FUNDUS						
97.120 COLOBOMA	2	0.0%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	13	0.2%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	199	3.5%	40	4.2%	4	1.9%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	29	0.5%	18	1.9%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	45	0.8%	10	1.0%	2	1.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	5	0.1%	0	0.0%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	4	0.1%	2	0.2%	1	0.5%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	18	0.3%	6	0.6%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	6	0.1%	3	0.3%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	11	0.2%	13	1.4%	2	1.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	26	0.5%	2	0.2%	2	1.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	60	1.1%	7	0.7%	3	1.4%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	12	0.2%	2	0.2%	1	0.5%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	4	0.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	14	0.2%	2	0.2%	2	1.0%
100.316 INCIPIENT CATARACT, NUCLEUS	11	0.2%	0	0.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	6	0.1%	2	0.2%	2	1.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	2	0.2%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	2	0.2%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	5	0.1%	6	0.6%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	7	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
BELGIAN SHEEPDOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	5,648		953		208	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	0	0.0%	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***278***	***4.9%***	***77***	***8.1%***	***15***	***7.2%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	3	0.1%	0	0.0%	1	0.5%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	2	0.0%	2	0.2%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	37	0.7%	2	0.2%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	6	0.1%	1	0.1%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	4	0.1%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	1	0.1%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	28	0.5%	6	0.6%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	12	0.2%	2	0.2%	0	0.0%
130.150 OPTIC DISC COLOBOMA	5	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	54	1.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	112	2.0%	1	0.1%	1	0.5%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	44	0.8%	50	5.2%	11	5.3%
NORMAL						
.000 NORMAL GLOBE	4,847	85.8%	709	74.4%	168	80.8%

BELGIAN TERVUREN

There are 4 varieties of Belgian Shepherd- the Groenendael, Laekenois, Malinois and Tervuren. In Europe these varieties may be interbred and are not considered genetically distinct, thus it is likely that the same genetic diseases exist in all four. In the United States the Groenendael (known as the Belgian Sheepdog), Malinois, Tervuren and Laekenois are recognized as separate breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Chronic superficial keratitis/pannus	Not defined	1, 2	NO
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Micropapilla	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Chronic superficial keratitis/pannus

A bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation follows the vascularization. If severe, vision impairment occurs. Pannus may be associated with plasma cell infiltration of the nictitans.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to

lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Belgian Tervuren, cataract most often occurs as a non-progressive, triangular opacity in the posterior cortex.

E. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. It may be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Chavkin MJ, Roberts SM, Salman MD, et al. Risk factors for development of chronic superficial keratitis in dogs. *J Am Vet Med Assoc*. 1994 May 15;204:1630-1634.

OCULAR DISORDERS REPORT
BELGIAN TERVUREN

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	12,539		1,873		399	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	4	0.0%	0	0.0%	0	0.0%
10.000	GLAUCOMA	1	0.0%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	3	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	116	0.9%	8	0.4%	1	0.3%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	2	0.0%	0	0.0%	1	0.3%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	5	0.0%	6	0.3%	2	0.5%
51.100	THIRD EYELID CARTILAGE ANOMALY	18	0.1%	3	0.2%	2	0.5%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	87	0.7%	26	1.4%	1	0.3%
70.220	PIGMENTARY KERATITIS	6	0.0%	3	0.2%	2	0.5%
70.700	CORNEAL DYSTROPHY	69	0.6%	8	0.4%	3	0.8%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	7	0.1%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	15	0.1%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	2	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	933	7.4%	219	11.7%	53	13.3%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	13	0.1%	1	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.0%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	14	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	28	0.2%	32	1.7%	8	2.0%
93.810	UVEAL MELANOMA	0	0.0%	2	0.1%	2	0.5%
95.120	CILIARY BODY CYST	1	0.0%	1	0.1%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
97.120	COLOBOMA	2	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	66	0.5%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	653	5.2%	141	7.5%	28	7.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	106	0.8%	81	4.3%	12	3.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	96	0.8%	28	1.5%	5	1.3%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	20	0.2%	6	0.3%	1	0.3%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	6	0.0%	8	0.4%	4	1.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	44	0.4%	10	0.5%	1	0.3%
100.306	PUNCTATE CATARACT, NUCLEUS	7	0.1%	11	0.6%	3	0.8%
100.307	PUNCTATE CATARACT, CAPSULAR	36	0.3%	33	1.8%	5	1.3%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	61	0.5%	17	0.9%	2	0.5%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	130	1.0%	34	1.8%	6	1.5%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	20	0.2%	10	0.5%	2	0.5%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	6	0.0%	1	0.1%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	27	0.2%	5	0.3%	2	0.5%
100.316	INCIPIENT CATARACT, NUCLEUS	3	0.0%	2	0.1%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	15	0.1%	9	0.5%	1	0.3%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	1	0.1%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	5	0.3%	1	0.3%

OCULAR DISORDERS REPORT
BELGIAN TERVUREN

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	12,539		1,873		399	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	7	0.1%	15	0.8%	2	0.5%
100.330 GENERALIZED/ COMPLETE CATARACT	12	0.1%	0	0.0%	2	0.5%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***664***	***5.3%***	***277***	***14.8%***	***49***	***12.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	9	0.1%	5	0.3%	4	1.0%
110.135 PHPV/ PTVL	3	0.0%	0	0.0%	1	0.3%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.0%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	26	0.2%	16	0.9%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	41	0.3%	3	0.2%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	11	0.1%	2	0.1%	1	0.3%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	23	0.2%	0	0.0%	1	0.3%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.0%	4	0.2%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	120	1.0%	21	1.1%	4	1.0%
130.120 OPTIC NERVE HYPOPLASIA	91	0.7%	5	0.3%	2	0.5%
130.150 OPTIC DISC COLOBOMA	4	0.0%	0	0.0%	1	0.3%
OTHER						
900.000 OTHER, UNSPECIFIED	107	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	250	2.0%	2	0.1%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	143	1.1%	120	6.4%	27	6.8%
NORMAL						
.000 NORMAL GLOBE	10,445	83.3%	1,289	68.8%	270	67.7%

BERGAMASCO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BERGAMASCO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BERGAMASCO

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	4		11		1	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
CORNEA						
70.700 CORNEAL DYSTROPHY	1	25.0%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	3	75.0%	11	100.0%	1	100.0%

BERGER DE PYRENEES

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BERGER DE PYRENEES breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BERGER DES PYRENEES

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 0 #	%	2016-2020 13 #	%	2021 0 #	%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0		2	15.4%	0	
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0		1	7.7%	0	
NORMAL						
.000 NORMAL GLOBE	0		10	76.9%	0	

BERGER PICARD
(PICARDY SHEPHERD, PICARDIE)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Nictitans cartilage anomaly/eversion	Not defined	1	Breeder option
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
E.	Cataract	Not defined	1	NO
F.	Y suture tip opacity	Not defined	1	Breeder option
G.	Retinal atrophy - generalized	Not defined	1	NO
H.	Retinal dysplasia - folds	Not defined	1	Breeder option
I.	Retinopathy	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Nictitans cartilage anomaly/eversion

A scroll-like curling of the cartilage of the third eyelid, usually everting the margin. This condition may occur in one or both eyes and may cause mild ocular irritation.

C. Corneal dystrophy- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

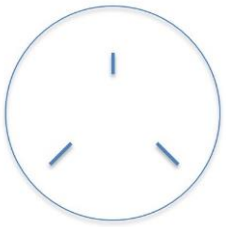
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

G. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality is also known as progressive retinal atrophy or PRA, and may be detected by electroretinogram (not part of a routine eye screening examination) before there are detectable funduscopic changes seen by ophthalmoscopy. There are multiple genetic types of PRA including the rod cone dysplasias described elsewhere.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

I. Retinopathy

A lesion similar to canine multifocal retinopathy has been noted in the Berger Picard. The lesions initially appear as multifocal sub-retinal fluid elevations that over time may become hyper-reflective lesions.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BERGER PICARD

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	789		776		147	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	0	0.0%	1	0.1%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	64	8.1%	46	5.9%	11	7.5%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	2	0.3%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	14	1.8%	17	2.2%	3	2.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	0	0.0%	2	0.3%	1	0.7%
CORNEA							
70.700	CORNEAL DYSTROPHY	11	1.4%	19	2.4%	4	2.7%
UVEA							
90.250	PIGMENTARY UVEITIS	1	0.1%	0	0.0%	0	0.0%
93.120	IRIS CYST	2	0.3%	1	0.1%	0	0.0%
93.150	IRIS COLOBOMA	0	0.0%	1	0.1%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	3	0.4%	0	0.0%
93.180	IIRIS SPHINCTER DYSPLASIA	0	0.0%	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	199	25.2%	95	12.2%	5	3.4%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	1	0.1%	1	0.7%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
93.810	UVEAL MELANOMA	1	0.1%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	0	0.0%	1	0.1%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	93	11.8%	81	10.4%	8	5.4%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.1%	15	1.9%	2	1.4%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	3	0.4%	5	0.6%	1	0.7%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.3%	2	0.3%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	3	0.4%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	52	6.6%	67	8.6%	5	3.4%
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.6%	3	0.4%	1	0.7%
100.307	PUNCTATE CATARACT, CAPSULAR	8	1.0%	13	1.7%	1	0.7%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.1%	6	0.8%	1	0.7%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	5	0.6%	9	1.2%	3	2.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.3%	3	0.4%	1	0.7%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	13	1.6%	16	2.1%	2	1.4%
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	2	0.3%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.1%	3	0.4%	1	0.7%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	3	0.4%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.4%	3	0.4%	0	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.1%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.1%	0	0.0%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.1%	1	0.7%
100.328	Y-SUTURE TIP OPACITIES	38	4.8%	73	9.4%	18	12.2%
100.330	GENERALIZED/ COMPLETE CATARACT	0	0.0%	1	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***136***	***17.2%***	***229***	***29.5%***	***37***	***25.2%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	5	0.6%	4	0.5%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	1	0.1%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	159	20.2%	82	10.6%	8	5.4%

OCULAR DISORDERS REPORT
BERGER PICARD

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 789 #	%	2016-2020 776 #	%	2021 147 #	%
RETINA Continued						
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	7	0.9%	4	0.5%	2	1.4%
120.190 RETINAL DYSPLASIA, DETACHED	0	0.0%	1	0.1%	1	0.7%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	14	1.8%	17	2.2%	4	2.7%
120.960 RETINOPATHY	34	4.3%	35	4.5%	2	1.4%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.1%	3	2.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	2	0.3%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	0	0.0%	0	0.0%	1	0.7%
130.150 OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	25	3.2%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	13	1.6%	10	1.3%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	35	4.4%	46	5.9%	8	5.4%
NORMAL						
.000 NORMAL GLOBE	343	43.5%	404	52.1%	79	53.7%

BERNESE MOUNTAIN DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
D.	Cataract	Not defined	1	NO
E.	Retinal atrophy - generalized	Not defined	1, 2	NO

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

In the Bernese Mountain Dog, one French report found the early onset retinopathy to be functionally and electroretinographically similar to the retinal dystrophy (congenital stationary night blindness) seen in the Briard.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Chaudieu G and Molon-Noblot S. Early retinopathy in the Bernese Mountain Dog in France: preliminary observations. *Vet Ophthalmol*. 2004 May-Jun;7:175-184.

OCULAR DISORDERS REPORT
BERNESE MOUNTAIN DOG

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	15,944		3,390		661	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	6	0.0%	1	0.0%	0	0.0%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	25	0.2%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	239	1.5%	41	1.2%	14	2.1%
22.000	ECTROPION, UNSPECIFIED	103	0.6%	16	0.5%	2	0.3%
25.110	DISTICHIASIS	141	0.9%	46	1.4%	4	0.6%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	0	0.0%	0	0.0%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	0	0.0%	0	0.0%	1	0.2%
51.100	THIRD EYELID CARTILAGE ANOMALY	40	0.3%	5	0.1%	2	0.3%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	2	0.1%	0	0.0%
CORNEA							
70.210	PANNUS	2	0.0%	1	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	63	0.4%	13	0.4%	3	0.5%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.0%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
93.120	IRIS CYST	49	0.3%	3	0.1%	1	0.2%
93.150	IRIS COLOBOMA	8	0.1%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	3	0.0%	3	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	591	3.7%	163	4.8%	31	4.7%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	14	0.1%	5	0.1%	1	0.2%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	0.0%	5	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	5	0.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	16	0.1%	30	0.9%	7	1.1%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	9	0.1%	3	0.1%	1	0.2%
95.120	CILIARY BODY CYST	0	0.0%	2	0.1%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	6	0.0%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	958	6.0%	165	4.9%	30	4.5%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	135	0.8%	84	2.5%	13	2.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	96	0.6%	26	0.8%	5	0.8%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	49	0.3%	20	0.6%	5	0.8%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	19	0.1%	9	0.3%	2	0.3%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	36	0.2%	16	0.5%	1	0.2%
100.306	PUNCTATE CATARACT, NUCLEUS	38	0.2%	24	0.7%	4	0.6%
100.307	PUNCTATE CATARACT, CAPSULAR	40	0.3%	37	1.1%	9	1.4%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	56	0.4%	16	0.5%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	174	1.1%	18	0.5%	7	1.1%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	101	0.6%	24	0.7%	2	0.3%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	9	0.1%	2	0.1%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	30	0.2%	4	0.1%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	31	0.2%	14	0.4%	3	0.5%
100.317	INCIPIENT CATARACT, CAPSULAR	51	0.3%	18	0.5%	2	0.3%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	4	0.1%	0	0.0%

OCULAR DISORDERS REPORT
BERNESE MOUNTAIN DOG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 15,944 #	%	2016-2020 3,390 #	%	2021 661 #	%
LENS Continued						
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	4	0.0%	1	0.0%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	2	0.0%	2	0.1%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	10	0.3%	2	0.3%
100.327 INCOMPLETE CATARACT, CAPSULAR	1	0.0%	3	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	4	0.0%	7	0.2%	4	0.6%
100.330 GENERALIZED/ COMPLETE CATARACT	28	0.2%	1	0.0%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	2	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	9	0.1%	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***911***	***5.7%***	***343***	***10.1%***	***59***	***8.9%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	26	0.2%	8	0.2%	5	0.8%
110.135 PHPV/ PTVL	9	0.1%	3	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	7	0.0%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	22	0.1%	1	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	34	0.2%	10	0.3%	2	0.3%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	8	0.1%	1	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	3	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	51	0.3%	0	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	2	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.0%	0	0.0%
120.960 RETINOPATHY	3	0.0%	9	0.3%	1	0.2%
OPTIC NERVE						
130.110 MICROPAPILLA	19	0.1%	9	0.3%	2	0.3%
130.120 OPTIC NERVE HYPOPLASIA	30	0.2%	6	0.2%	1	0.2%
130.150 OPTIC DISC COLOBOMA	21	0.1%	1	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	193	1.2%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	454	2.8%	5	0.1%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	148	0.9%	137	4.0%	16	2.4%
NORMAL						
.000 NORMAL GLOBE	13,691	85.9%	2,674	78.9%	533	80.6%

BICHON FRISE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Distichiasis	Not defined	1	Breeder option
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
E.	Cataract	Not defined	1-3	NO
F.	Y suture tip opacity	Not defined	1	Breeder option
G.	Vitreous degeneration	Not defined	1	Breeder option
H.	Persistent hyaloid artery remnant	Not defined	1	Breeder option

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Bichon Frise, many of these strands bridge between the iris and cornea where they may be associated with corneal opacities and vision impairment.

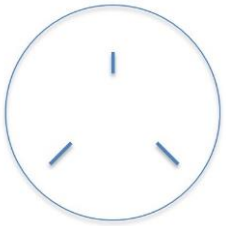
E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The range in age of animals affected with cataracts in one study was 1-2 years to 9-10 years old, with the peak age of 3 years old. The cataracts involved all regions of the lens, but in age groups of 2-4 years old, the predominant regions affected were the posterior cortex, and the anterior and posterior cortices combined. The earliest abnormalities usually consisted of small punctate opacities in the paracentral posterior cortex, independent of the posterior lens sutures.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts -

which would either be breeder option or failing.

G. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

H. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, Wallace MR, Andrew SE, et al. Cataracts in the Bichon Frise. *Vet Ophthalmol*. 2003 Mar;6:3-9.

3. Schmidt GM and Vainisi SJ. Retrospective study of prophylactic random transscleral retinopexy in the Bichon Frise with cataract. *Vet Ophthalmol*. 2004 Sep-Oct;7:307-310.

OCULAR DISORDERS REPORT
BICHON FRISE

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	9,835		1,689		363	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	2	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	7	0.1%	19	1.1%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	347	3.5%	80	4.7%	14	3.9%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	2	0.1%	1	0.3%
40.910	KERATOCONJUNCTIVITIS SICCA	2	0.0%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.0%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	0	0.0%	3	0.2%	0	0.0%
CORNEA							
70.210	PANNUS	2	0.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	2	0.0%	2	0.1%	1	0.3%
70.700	CORNEAL DYSTROPHY	339	3.4%	64	3.8%	12	3.3%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	5	0.1%	2	0.1%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	2	0.0%	0	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	4	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	223	2.3%	62	3.7%	20	5.5%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	13	0.1%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	31	0.3%	1	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	8	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.0%	6	0.4%	1	0.3%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	8	0.1%	2	0.1%	1	0.3%
FUNDUS							
97.120	COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	23	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	534	5.4%	78	4.6%	3	0.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	130	1.3%	39	2.3%	4	1.1%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	89	0.9%	14	0.8%	4	1.1%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	15	0.2%	7	0.4%	1	0.3%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	9	0.1%	4	0.2%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	44	0.4%	20	1.2%	1	0.3%
100.306	PUNCTATE CATARACT, NUCLEUS	16	0.2%	11	0.7%	1	0.3%
100.307	PUNCTATE CATARACT, CAPSULAR	21	0.2%	17	1.0%	1	0.3%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	84	0.9%	14	0.8%	2	0.6%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	216	2.2%	19	1.1%	5	1.4%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	33	0.3%	8	0.5%	1	0.3%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.0%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	47	0.5%	3	0.2%	1	0.3%
100.316	INCIPIENT CATARACT, NUCLEUS	9	0.1%	2	0.1%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	13	0.1%	6	0.4%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	4	0.2%	1	0.3%

OCULAR DISORDERS REPORT
BICHON FRISE

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 9,835 #	 %	Year Examined: 2016-2020 Total # Dogs: 1,689 #	 %	Year Examined: 2021 Total # Dogs: 363 #	 %
LENS Continued						
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.0%	3	0.2%	2	0.6%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	0.3%
100.328 Y-SUTURE TIP OPACITIES	5	0.1%	30	1.8%	4	1.1%
100.330 GENERALIZED/ COMPLETE CATARACT	147	1.5%	2	0.1%	1	0.3%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	4	0.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***906***	***9.2%***	***203***	***12.0%***	***30***	***8.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	20	0.2%	18	1.1%	1	0.3%
110.135 PHPV/ PTVL	3	0.0%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	7	0.1%	8	0.5%	2	0.6%
110.320 VITREOUS DEGENERATION SYNERESIS	92	0.9%	34	2.0%	2	0.6%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	67	0.7%	6	0.4%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	3	0.0%	1	0.1%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	58	0.6%	2	0.1%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.0%	3	0.2%	1	0.3%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.0%	1	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	10	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	39	0.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	145	1.5%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	64	0.7%	90	5.3%	8	2.2%
NORMAL						
.000 NORMAL GLOBE	8,105	82.4%	1,216	72.0%	291	80.2%

Biewer Terrier

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST AVAILABLE
A.	Retinal atrophy (*prcd*)	Autosomal recessive	1	NO	Mutation in the *prcd* gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. A DNA test is available.

References

1. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
BIEWER TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	59		110		121	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	1	1.7%	3	2.7%	3	2.5%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	0	0.0%	2	1.7%
CORNEA						
70.700 CORNEAL DYSTROPHY	0	0.0%	1	0.9%	1	0.8%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	7	11.9%	3	2.7%	13	10.7%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	0.9%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	3.4%	0	0.0%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	0	0.0%	1	0.9%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	1	1.7%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	6.8%	0	0.0%	2	1.7%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.9%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	4	6.8%	0	0.0%	1	0.8%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	0.8%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	0	0.0%	1	0.8%
100.330 GENERALIZED/ COMPLETE CATARACT	0	0.0%	1	0.9%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.9%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***4***	***6.8%***	***3***	***2.7%***	***3***	***2.5%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	1.7%	0	0.0%	1	0.8%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	0	0.0%	2	1.8%	0	0.0%
120.960 RETINOPATHY	0	0.0%	0	0.0%	1	0.8%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	0	0.0%	1	0.8%
130.150 OPTIC DISC COLOBOMA	1	1.7%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1	1.7%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	49	83.1%	98	89.1%	97	80.2%

BLACK AND TAN COONHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Cataract	Not defined	1	NO
B.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BLACK AND TAN COONHOUND

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	543		171		19	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.2%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	3	0.6%	1	0.6%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	6	1.1%	1	0.6%	0	0.0%
25.110	DISTICHIASIS	6	1.1%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	2	0.4%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.2%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	2	0.4%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	0	0.0%	0	0.0%	1	5.3%
UVEA							
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	0.6%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	5	0.9%	0	0.0%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	3	0.6%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	2	1.2%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	7	1.3%	2	1.2%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.2%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	42	7.7%	8	4.7%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	6	1.1%	1	0.6%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.2%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.2%	1	0.6%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	3	1.8%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.4%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	7	1.3%	1	0.6%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.2%	5	2.9%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.2%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	5	0.9%	1	0.6%	2	10.5%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.2%	1	0.6%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	3	0.6%	1	0.6%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	1	0.6%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.2%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	0.6%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	3	0.6%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***32***	***5.9%***	***16***	***9.4%***	***2***	***10.5%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	1	0.6%	0	0.0%
110.135	PHPV/ PTVL	1	0.2%	0	0.0%	1	5.3%
110.320	VITREOUS DEGENERATION SYNERESIS	1	0.2%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	25	4.6%	47	27.5%	1	5.3%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	0.6%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	2	0.4%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	11	2.0%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	0.6%	7	4.1%	2	10.5%

OCULAR DISORDERS REPORT
BLACK AND TAN COONHOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	543		171		19	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	430	79.2%	103	60.2%	14	73.7%

BLACK RUSSIAN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Retinal atrophy (*prcd*)	Autosomal recessive	2	NO	Mutation in the *prcd* gene
E.	POANV (polyneuropathy, ocular abnormalities neuronal vacuolation) - Microphthalmia - Cataracts -PPM (iris to iris)	Autosomal recessive	3	NO	Mutation in the *RAB3GAP1: c.743delC* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes

of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. A DNA test is available.

E. POANV- Polyneuropathy with ocular abnormalities and neuronal vacuolation

An autosomal recessive condition resulting in juvenile polyneuropathy that presents as laryngeal paralysis and weakness. Patients have concurrent ophthalmic abnormalities including microphthalmia, incomplete cataracts (primarily nuclear) and iris-to-iris PPMs. Neuronal vacuolation was identified on histopathology. Affected dogs were found to be homozygous for the RAB3GAP1: c.743delC mutation. Patients with this variant are not reported to survive past 6 months.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

3. Mhlanga-Mutangadura T, Johnson GJ, Schnabel RD, et al. A mutation in the Warburg syndrome gene, RAB3GAP1, causes a similar syndrome with polyneuropathy and neuronal vacuolation in Black Russian Terrier dogs. Neurobiology of Disease. 2016;86:75-85.

OCULAR DISORDERS REPORT
BLACK RUSSIAN TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	565		309		74	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	5	0.9%	3	1.0%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	4	0.7%	0	0.0%	1	1.4%
25.110 DISTICHIASIS	5	0.9%	6	1.9%	0	0.0%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	1	0.2%	0	0.0%	0	0.0%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.2%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	2	0.4%	3	1.0%	1	1.4%
UVEA						
93.110 IRIS HYPOPLASIA	1	0.2%	0	0.0%	0	0.0%
93.120 IRIS CYST	3	0.5%	1	0.3%	0	0.0%
93.150 IRIS COLOBOMA	1	0.2%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	10	1.8%	11	3.6%	2	2.7%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.2%	1	0.3%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.2%	3	1.0%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.2%	0	0.0%	0	0.0%
93.810 UVEAL MELANOMA	0	0.0%	1	0.3%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	27	4.8%	24	7.8%	3	4.1%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	7	1.2%	15	4.9%	1	1.4%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	7	1.2%	2	0.6%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.2%	0	0.0%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.2%	1	0.3%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.4%	3	1.0%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	1	0.2%	0	0.0%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	0.2%	6	1.9%	1	1.4%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	3	0.5%	9	2.9%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	9	1.6%	5	1.6%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.2%	0	0.0%	1	1.4%
100.316 INCIPIENT CATARACT, NUCLEUS	1	0.2%	0	0.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	0	0.0%	2	0.6%	1	1.4%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.3%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	6	1.1%	0	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	2	0.6%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	2	0.6%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***40***	***7.1%***	***48***	***15.5%***	***4***	***5.4%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	1	0.3%	2	2.7%
110.320 VITREOUS DEGENERATION SYNERESIS	2	0.4%	0	0.0%	1	1.4%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	1	0.2%	2	0.6%	1	1.4%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.3%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.2%	0	0.0%	2	2.7%
130.120 OPTIC NERVE HYPOPLASIA	0	0.0%	0	0.0%	2	2.7%
OTHER						
900.000 OTHER, UNSPECIFIED	12	2.1%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	8	1.4%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	1.2%	6	1.9%	1	1.4%

OCULAR DISORDERS REPORT
BLACK RUSSIAN TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	565		309		74	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	493	87.3%	237	76.7%	61	82.4%

BLOODHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Ectropion	Not defined	1	Breeder option
B.	Entropion	Not defined	1	Breeder option
C.	Persistent pupillary membranes - iris to cornea	Not defined	1	NO
D.	Cataract	Not defined	1	NO
E.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comment

A. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely

(diffuse) or in a localized region.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BLOODHOUND

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	573		56		41	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.2%	0	0.0%	1	2.4%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	75	13.1%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	128	22.3%	4	7.1%	4	9.8%
22.000	ECTROPION, UNSPECIFIED	149	26.0%	9	16.1%	4	9.8%
25.110	DISTICHIASIS	9	1.6%	2	3.6%	0	0.0%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	3	0.5%	0	0.0%	1	2.4%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.2%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	6	1.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	5	0.9%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	3	0.5%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	0	0.0%	0	0.0%	1	2.4%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.3%	1	1.8%	0	0.0%
UVEA							
93.120	IRIS CYST	0	0.0%	0	0.0%	1	2.4%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	17	3.0%	1	1.8%	6	14.6%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	5	0.9%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	38	6.6%	1	1.8%	1	2.4%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	3	0.5%	0	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.2%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	1	0.2%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	1	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	14	2.4%	2	3.6%	2	4.9%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	10	1.7%	0	0.0%	1	2.4%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.2%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.5%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	2	0.3%	1	1.8%	1	2.4%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	16	2.8%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	6	1.0%	0	0.0%	1	2.4%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	3	0.5%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	4	0.7%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	4	0.7%	2	3.6%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.2%	0	0.0%	2	4.9%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.3%	0	0.0%	1	2.4%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.2%	0	0.0%	0	0.0%
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.2%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***56***	***9.8%***	***3***	***5.4%***	***6***	***14.6%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.2%	0	0.0%	0	0.0%
110.135	PHPV/ PTVL	1	0.2%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	1	0.2%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	33	5.8%	2	3.6%	2	4.9%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.2%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
BLOODHOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	573		56		41	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
RETINA Continued						
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.2%	0	0.0%	0	0.0%
OPTIC NERVE						
130.150 OPTIC DISC COLOBOMA	1	0.2%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	5	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	12	2.1%	0	0.0%	1	2.4%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	11	1.9%	3	5.4%	2	4.9%
NORMAL						
.000 NORMAL GLOBE	258	45.0%	35	62.5%	18	43.9%

BLUE LACY

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BLUE LACY breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BLUE LACY

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	3		3		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	3	100.0%	3	100.0%	0	

BLUE MOUNTAIN SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BLUE MOUNTAIN SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BLUE MOUNTAIN SHEPHERD

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	1	100.0%	0		0	

BLUETICK COONHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BLUETICK COONHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BLUETICK COONHOUND

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	26		44		2	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
22.000	ECTROPION, UNSPECIFIED	1	3.8%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	1	2.3%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	3.8%	1	2.3%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	3.8%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2	7.7%	1	2.3%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	2.3%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	3	11.5%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	1	3.8%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	4.5%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	21	80.8%	39	88.6%	2	100.0%

BOERBOEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST
A.	Multifocal retinopathy	Autosomal recessive	2, 3	Breeder option	Mutation in *CNGB3* gene
B.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multi-focal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous sub-retinal fluid or accumulation of sub-retinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

B. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Yeh CY, Goldstein O, Kukekova AV, Holley D, Knollinger AM, Huson HJ, Pearce-Kelling SE, Acland GM, Komáromy AM. Genomic deletion of CNGB3 is identical by descent in multiple canine breeds and causes achromatopsia. BMC Genet. 2013 Apr 20;14:27. doi: 10.1186/1471-2156-14-27. PMID: 23601474

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OCULAR DISORDERS REPORT
BOERBOEL

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 22 #	 %	2016-2020 68 #	 %	2021 16 #	 %
EYELIDS						
20.160 MACROPALPEBRAL FISSURE	1	4.5%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	0	0.0%	3	4.4%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	1	4.5%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	3	13.6%	1	1.5%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	0	0.0%	1	1.5%	0	0.0%
70.700 CORNEAL DYSTROPHY	0	0.0%	1	1.5%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	0	0.0%	1	1.5%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	4.5%	0	0.0%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	1.5%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	2	2.9%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	0	0.0%	1	6.3%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	4.5%	1	1.5%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	0	0.0%	0	0.0%	1	6.3%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	9.1%	2	2.9%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	1	1.5%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.5%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	4.5%	1	1.5%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	1	4.5%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.5%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	1.5%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	0	0.0%	1	1.5%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	1.5%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2***	***9.1%***	***7***	***10.3%***	***0***	***0.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	2	2.9%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	0	0.0%	5	7.4%	2	12.5%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	4.5%	0	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	1	1.5%	0	0.0%
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	5	7.4%	1	6.3%
NORMAL						
.000 NORMAL GLOBE	15	68.2%	48	70.6%	13	81.3%

BOLOGNESE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Retinal atrophy (*prcd)*	Autosomal recessive	2	NO	Mutation in the *prcd* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
BOLOGNESE

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	708		118		15	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	3	0.4%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	106	15.0%	4	3.4%	1	6.7%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	2	0.3%	0	0.0%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA	2	0.3%	0	0.0%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	2	0.3%	1	0.8%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	14	2.0%	2	1.7%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	99	14.0%	27	22.9%	2	13.3%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	0.8%	0	0.0%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.6%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	18	2.5%	2	1.7%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	0.8%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	0.8%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	2	0.3%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	2	0.3%	0	0.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	3	0.4%	0	0.0%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.8%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	7	1.0%	0	0.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	1	0.1%	1	0.8%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	4	0.6%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***20***	***2.8%***	***4***	***3.4%***	***0***	***0.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	1	0.8%	0	0.0%
110.135 PHPV/ PTVL	0	0.0%	1	0.8%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	5	0.7%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	9	1.3%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	6	0.8%	0	0.0%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	0.8%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.1%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	19	2.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	20	2.8%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	1.0%	2	1.7%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	515	72.7%	79	66.9%	12	80.0%

BORDER COLLIE

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma – POAG	Autosomal recessive	2, 3	NO	Mutation in the *ADAMTS17* gene
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Y suture tip opacity	Not defined	1	Breeder option	
F.	Lens luxation	Autosomal recessive	1, 3	NO	Mutation in the *ADAMTS17* gene
G.	Retinal atrophy - generalized	Suggested X-linked	1, 5	NO	
H.	Choroidal hypoplasia (Collie Eye Anomaly) - optic Nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/coloboma	Autosomal recessive	6-8	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

POAG in the Border Collie is caused by a 19 base pair deletion in exon 2 of *ADAMTS17.* This deletion alters the reading frame and is suspected to cause a truncated protein. The

trait shows an autosomal recessive mode of inheritance. A DNA test is available.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

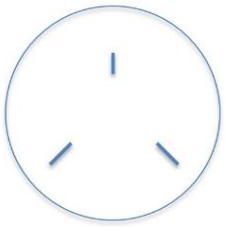
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness.

G. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

H. Choroidal hypoplasia (Collie Eye Anomaly)
- Staphyloma/coloboma
- Retinal detachment
- Retinal hemorrhage
- Optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Foster SJ, Curtis R, Barnett KC. Primary lens luxation in the Border Collie. J Small Anim Pract. 1986;27:1-6.

3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. Veterinary Ophthalmology 2011;14:378-384.

4. Jeanes EC, Oliver JAC, Ricketts SL, Gould DJ, Mellersh CS. Glaucoma-causing *ADAMTS17* mutations are also reproducibly associated with height in two domestic dog breeds: selection for short stature may have contributed to increased prevalence of glaucoma. Canine Genet Epidemiol. 2019 May 17;6:5. doi: 10.1186/s40575-019-0071-6. PMID: 31131111; PMCID: PMC6524303

5. Vilboux T, Chaudieu G, Jeannin P, et al. Progressive retinal atrophy in the Border Collie: a new XLPRA. *BMC Vet Res*. 2008;4:10.

6. Bedford PG. Collie eye anomaly in the Border Collie. *Vet Rec*. 1982;111:34-35.

7. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Gen Res*. 2007;17:1562-1571.

8. Lowe JK, Kukekova AV, Kirkness EF, et al. Linkage mapping of the primary disease locus for collie eye anomaly. *Genomics*. 2003;82:86-95.

OCULAR DISORDERS REPORT
BORDER COLLIE

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		25,592		2,988		634	
Diagnostic Name		#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	13	0.1%	1	0.0%	0	0.0%
10.000	GLAUCOMA	1	0.0%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	2	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	122	0.5%	17	0.6%	2	0.3%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	0	0.0%	1	0.0%	0	0.0%
51.100	THIRD EYELID CARTILAGE ANOMALY	5	0.0%	2	0.1%	0	0.0%
CORNEA							
70.210	PANNUS	17	0.1%	5	0.2%	2	0.3%
70.220	PIGMENTARY KERATITIS	1	0.0%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	197	0.8%	48	1.6%	10	1.6%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.0%	1	0.0%	0	0.0%
UVEA							
90.250	PIGMENTARY UVEITIS	1	0.0%	0	0.0%	0	0.0%
93.110	IRIS HYPOPLASIA	1	0.0%	1	0.0%	1	0.2%
93.120	IRIS CYST	8	0.0%	1	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	8	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1,591	6.2%	221	7.4%	44	6.9%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	31	0.1%	8	0.3%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	34	0.1%	1	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	15	0.1%	1	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	8	0.0%	13	0.4%	2	0.3%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	3	0.0%	4	0.1%	0	0.0%
93.810	UVEAL MELANOMA	0	0.0%	1	0.0%	0	0.0%
95.120	CILIARY BODY CYST	1	0.0%	1	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	2	0.0%	1	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	431	1.7%	40	1.3%	2	0.3%
97.120	COLOBOMA	48	0.2%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	57	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1,199	4.7%	167	5.6%	34	5.4%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	141	0.6%	48	1.6%	6	0.9%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	72	0.3%	20	0.7%	3	0.5%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	53	0.2%	17	0.6%	2	0.3%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	6	0.0%	4	0.1%	1	0.2%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	171	0.7%	97	3.2%	8	1.3%
100.306	PUNCTATE CATARACT, NUCLEUS	37	0.1%	22	0.7%	4	0.6%
100.307	PUNCTATE CATARACT, CAPSULAR	49	0.2%	34	1.1%	8	1.3%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	139	0.5%	18	0.6%	2	0.3%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	102	0.4%	17	0.6%	4	0.6%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	122	0.5%	22	0.7%	6	0.9%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	14	0.1%	1	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	57	0.2%	22	0.7%	10	1.6%
100.316	INCIPIENT CATARACT, NUCLEUS	26	0.1%	15	0.5%	1	0.2%

OCULAR DISORDERS REPORT
BORDER COLLIE

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 25,592 #	 %	2016-2020 2,988 #	 %	2021 634 #	 %
LENS Continued						
100.317 INCIPIENT CATARACT, CAPSULAR	27	0.1%	9	0.3%	1	0.2%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	4	0.0%	11	0.4%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.0%	8	0.3%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	2	0.0%	3	0.1%	1	0.2%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	1	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	5	0.2%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	2	0.0%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	44	0.2%	96	3.2%	18	2.8%
100.330 GENERALIZED/ COMPLETE CATARACT	29	0.1%	1	0.0%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	14	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,157***	***4.5%***	***472***	***15.8%***	***75***	***11.8%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	66	0.3%	3	0.1%	1	0.2%
110.135 PHPV/ PTVL	19	0.1%	1	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	13	0.1%	6	0.2%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	152	0.6%	21	0.7%	5	0.8%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	196	0.8%	17	0.6%	1	0.2%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	16	0.1%	1	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	226	0.9%	18	0.6%	0	0.0%
120.400 RETINAL HEMORRHAGE	6	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	18	0.1%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.0%	0	0.0%
120.960 RETINOPATHY	15	0.1%	8	0.3%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	19	0.1%	4	0.1%	2	0.3%
130.120 OPTIC NERVE HYPOPLASIA	18	0.1%	1	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	91	0.4%	6	0.2%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	214	0.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	607	2.4%	1	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	212	0.8%	142	4.8%	52	8.2%
NORMAL						
.000 NORMAL GLOBE	21,401	83.6%	2,163	72.4%	466	73.5%

BORDER TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO
C.	Y suture tip opacity	Not defined	1	Breeder option

Description and Comments

A. Persistent pupillary membranes (PPMs)

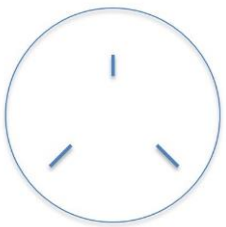
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BORDER TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	5,870		1,637		330	
Diagnostic Name	#	%	#	%	#	%
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	3	0.1%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	44	0.7%	11	0.7%	3	0.9%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	2	0.1%	1	0.3%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	0	0.0%	0	0.0%	1	0.3%
70.700 CORNEAL DYSTROPHY	12	0.2%	4	0.2%	0	0.0%
UVEA						
93.120 IRIS CYST	1	0.0%	0	0.0%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	154	2.6%	69	4.2%	10	3.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.0%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.1%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.0%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.0%	1	0.1%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.0%	0	0.0%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
97.120 COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	9	0.2%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	359	6.1%	151	9.2%	17	5.2%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	57	1.0%	47	2.9%	8	2.4%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	27	0.5%	19	1.2%	2	0.6%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	27	0.5%	13	0.8%	1	0.3%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	6	0.1%	4	0.2%	1	0.3%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	53	0.9%	84	5.1%	2	0.6%
100.306 PUNCTATE CATARACT, NUCLEUS	8	0.1%	4	0.2%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	20	0.3%	24	1.5%	2	0.6%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	61	1.0%	24	1.5%	5	1.5%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	49	0.8%	17	1.0%	5	1.5%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	65	1.1%	31	1.9%	3	0.9%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.0%	2	0.1%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	13	0.2%	11	0.7%	1	0.3%
100.316 INCIPIENT CATARACT, NUCLEUS	14	0.2%	1	0.1%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	9	0.2%	4	0.2%	2	0.6%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	3	0.1%	7	0.4%	1	0.3%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	4	0.1%	7	0.4%	1	0.3%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	2	0.0%	4	0.2%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	0	0.0%	1	0.3%
100.327 INCOMPLETE CATARACT, CAPSULAR	1	0.0%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	28	0.5%	97	5.9%	19	5.8%
100.330 GENERALIZED/ COMPLETE CATARACT	19	0.3%	3	0.2%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.0%	2	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
BORDER TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	5,870		1,637		330	
	Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued							
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***479***	***8.2%***	***405***	***24.7%***	***54***	***16.4%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	5	0.1%	5	0.3%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	12	0.2%	5	0.3%	2	0.6%
110.320	VITREOUS DEGENERATION SYNERESIS	49	0.8%	14	0.9%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	12	0.2%	5	0.3%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	8	0.1%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	11	0.2%	2	0.1%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960	RETINOPATHY	0	0.0%	5	0.3%	0	0.0%
OPTIC NERVE							
130.110	MICROPAPILLA	0	0.0%	1	0.1%	1	0.3%
130.120	OPTIC NERVE HYPOPLASIA	1	0.0%	1	0.1%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	56	1.0%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	125	2.1%	5	0.3%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	52	0.9%	79	4.8%	5	1.5%
NORMAL							
.000	NORMAL GLOBE	5,213	88.8%	1,220	74.5%	265	80.3%

BORZOI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO
C.	Retinopathy	Not defined	1, 2	Breeder option

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Retinopathy

Patchy focal unilateral or bilateral hyper reflective tapetal lesions most frequently peripheral but occasionally central around a pigmented spot, usually non progressive. Not usually present prior to 3 months of age but usually present by 18 months of age.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Storey ES, Grahn BH and Alcorn J. Multifocal chorioretinal lesions in Borzoi dogs. *Vet Ophthalmol*. 2005 Sep-Oct;8:337-347.

OCULAR DISORDERS REPORT
BORZOI

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	3,280		974		295	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	7	0.2%	0	0.0%	1	0.3%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	9	0.3%	2	0.2%	0	0.0%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	0	0.0%	1	0.1%	2	0.7%
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.0%	2	0.2%	1	0.3%
CORNEA							
70.210	PANNUS	17	0.5%	2	0.2%	2	0.7%
70.220	PIGMENTARY KERATITIS	0	0.0%	2	0.2%	0	0.0%
70.700	CORNEAL DYSTROPHY	16	0.5%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.0%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	5	0.2%	2	0.2%	1	0.3%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	2	0.2%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	71	2.2%	10	1.0%	7	2.4%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	6	0.2%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	11	0.3%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	3	0.3%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.0%	1	0.1%	0	0.0%
93.810	UVEAL MELANOMA	0	0.0%	5	0.5%	0	0.0%
95.120	CILIARY BODY CYST	1	0.0%	0	0.0%	1	0.3%
LENS							
100.200	CATARACT, UNSPECIFIED	2	0.1%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	102	3.1%	24	2.5%	12	4.1%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	10	0.3%	5	0.5%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	11	0.3%	4	0.4%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	3	0.3%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	10	0.3%	8	0.8%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.0%	2	0.2%	2	0.7%
100.307	PUNCTATE CATARACT, CAPSULAR	7	0.2%	8	0.8%	8	2.7%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	12	0.4%	4	0.4%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	18	0.5%	1	0.1%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	4	0.1%	3	0.3%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	3	0.1%	0	0.0%	1	0.3%
100.317	INCIPIENT CATARACT, CAPSULAR	7	0.2%	4	0.4%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	0	0.0%	1	0.3%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	0	0.0%	2	0.7%
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.0%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	3	0.1%	7	0.7%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	7	0.2%	1	0.1%	0	0.0%
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.1%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	4	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***102***	***3.1%***	***51***	***5.2%***	***14***	***4.7%***

OCULAR DISORDERS REPORT
BORZOI

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 3,280 #	 %	2016-2020 974 #	 %	2021 295 #	 %
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	12	0.4%	2	0.2%	0	0.0%
110.135 PHPV/ PTVL	11	0.3%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	4	0.4%	1	0.3%
110.320 VITREOUS DEGENERATION SYNERESIS	7	0.2%	3	0.3%	1	0.3%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	8	0.2%	2	0.2%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	8	0.2%	2	0.2%	1	0.3%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	25	0.8%	3	0.3%	1	0.3%
120.400 RETINAL HEMORRHAGE	2	0.1%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	5	0.2%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	2	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	18	0.5%	24	2.5%	10	3.4%
OPTIC NERVE						
130.110 MICROPAPILLA	10	0.3%	8	0.8%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	14	0.4%	2	0.2%	0	0.0%
130.150 OPTIC DISC COLOBOMA	3	0.1%	1	0.1%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	44	1.3%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	109	3.3%	1	0.1%	1	0.3%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	68	2.1%	76	7.8%	21	7.1%
NORMAL						
.000 NORMAL GLOBE	2,852	87.0%	799	82.0%	244	82.7%

BOSTON TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma	Not defined	1-3	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
D.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
E.	Corneal dystrophy - endothelial	Not defined	1, 4	NO	
F.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
G.	Cataract	Autosomal recessive	1, 5-9	NO	Mutation in the *HSF4* gene (*HSF4-1*)
H.	Vitreous degeneration	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine screening exam for certification.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

D. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral

E. Corneal dystrophy – endothelial

Corneal endothelial dystrophy is an abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision. This usually does not occur until the animal is older.

In the Boston Terrier, this is a primary degenerative endothelial disease leading to progressive and permanent corneal edema. It is not known if this disease is an inherited disorder. There is no sex predilection. The condition is observed in older dogs, 6 to 13 years of age with a mean of 9.5 years. The corneal edema starts asymptomatically in the dorsal temporal corneal quadrant of one eye and slowly progresses medially, eventually involving the entire cornea. Typically, it becomes bilateral. In the later stages, discomfort, intracorneal bullae with subsequent ulceration and keratoconus may develop.

F. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally during the first three months of life. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

G. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The Boston Terrier has at least two distinct forms of inherited cataract. One type has an onset before 6 months of age with rapid progression to complete opacity prior to 2 years old. The early onset cataract is inherited as an autosomal recessive mutation in the *HSF4* gene (*HSF4-1*). A DNA test is available. A second type of cataract occurs after 4-5 years of age with variable progression. The genetic mutation responsible for this cataract is not yet known.

H. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

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4. Martin CL, Dice PF. Corneal Endothelial Dystrophy in the Dog. *J Am Anim Hosp Assoc*. 1982;18:327-336.

5. Curtis R. Late-onset cataract in the Boston terrier. *Vet Rec*. 1984;115:577-578.

6. Barnett KC. The diagnosis and differential diagnosis of cataract in the dog. *J Small Anim Pract*. 1985;26:305-316.

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8. Mellersh CS, Graves KT, McLaughlin B, et al. Mutation in HSF4 associated with early but not late-onset hereditary cataract in the Boston Terrier. *J Hered*. 2007;98:531-533.

9. Mellersh CS, Pettitt L, Forman OP, et al. Identification of mutations in HSF4 in dogs of three different breeds with hereditary cataracts. *Vet Ophthalmol*. 2006;9:369-378.

OCULAR DISORDERS REPORT
BOSTON TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	13,510		3,691		1,069	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	0.0%	3	0.1%	0	0.0%
10.000	GLAUCOMA	1	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	5	0.0%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	12	0.1%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	41	0.3%	17	0.5%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	2	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	462	3.4%	111	3.0%	36	3.4%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	29	0.2%	68	1.8%	31	2.9%
40.910	KERATOCONJUNCTIVITIS SICCA	9	0.1%	5	0.1%	0	0.0%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	0	0.0%	3	0.1%	0	0.0%
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.0%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	9	0.1%	4	0.1%	1	0.1%
CORNEA							
70.210	PANNUS	1	0.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	18	0.1%	8	0.2%	1	0.1%
70.700	CORNEAL DYSTROPHY	325	2.4%	70	1.9%	26	2.4%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	26	0.2%	3	0.1%	1	0.1%
UVEA							
93.110	IRIS HYPOPLASIA	5	0.0%	3	0.1%	0	0.0%
93.120	IRIS CYST	24	0.2%	2	0.1%	0	0.0%
93.150	IRIS COLOBOMA	7	0.1%	1	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	3	0.0%	6	0.2%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	498	3.7%	161	4.4%	30	2.8%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	12	0.1%	4	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	0.0%	1	0.0%	2	0.2%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	8	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.0%	0	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	0	0.0%	2	0.1%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	0	0.0%	10	0.3%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	2	0.0%	3	0.1%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	81	0.6%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	311	2.3%	78	2.1%	17	1.6%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	180	1.3%	63	1.7%	12	1.1%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	47	0.3%	20	0.5%	2	0.2%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	77	0.6%	24	0.7%	9	0.8%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	37	0.3%	17	0.5%	7	0.7%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	28	0.2%	8	0.2%	3	0.3%
100.306	PUNCTATE CATARACT, NUCLEUS	13	0.1%	5	0.1%	1	0.1%
100.307	PUNCTATE CATARACT, CAPSULAR	30	0.2%	33	0.9%	2	0.2%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	640	4.7%	127	3.4%	33	3.1%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	157	1.2%	26	0.7%	7	0.7%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	293	2.2%	45	1.2%	10	0.9%

OCULAR DISORDERS REPORT
BOSTON TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 13,510 #	 %	2016-2020 3,691 #	 %	2021 1,069 #	 %
LENS Continued						
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	83	0.6%	14	0.4%	2	0.2%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	34	0.3%	5	0.1%	1	0.1%
100.316 INCIPIENT CATARACT, NUCLEUS	18	0.1%	6	0.2%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	17	0.1%	4	0.1%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	28	0.2%	53	1.4%	10	0.9%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	13	0.1%	18	0.5%	5	0.5%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	18	0.1%	9	0.2%	2	0.2%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	2	0.0%	1	0.0%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	2	0.1%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	10	0.1%	8	0.2%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	93	0.7%	8	0.2%	2	0.2%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.0%	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	13	0.1%	5	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,901***	***14.1%***	***499***	***13.5%***	***108***	***10.1%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	44	0.3%	20	0.5%	12	1.1%
110.135 PHPV/ PTVL	9	0.1%	4	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	41	0.3%	7	0.2%	1	0.1%
110.320 VITREOUS DEGENERATION SYNERESIS	141	1.0%	27	0.7%	3	0.3%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	34	0.3%	5	0.1%	2	0.2%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	12	0.1%	5	0.1%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	4	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	11	0.1%	0	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	3	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	2	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	3	0.0%	2	0.1%	1	0.1%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	2	0.0%	1	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	0	0.0%	1	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	165	1.2%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	380	2.8%	3	0.1%	3	0.3%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	174	1.3%	207	5.6%	47	4.4%
NORMAL						
.000 NORMAL GLOBE	10,928	80.9%	2,764	74.9%	828	77.5%

BOUVIER DES FLANDRES

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	1-3	NO
B.	Uveal cysts	Not defined	1	Breeder option
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Y-suture tip opacity	Not defined	1	Breeder option
F.	Persistent hyperplastic primary vitreous/Persistent hyperplastic tunica vasculosa lentis (PHPV/PHTVL)	Not defined	1, 4	NO

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine screening exam for certification.

In this breed, primary glaucoma is associated with narrowed iridocorneal angles and various degrees of congenital angle malformations varying from mild to severe. Dysplastic pectinate ligaments and subsequent narrowed angles are similar to those described in the Basset Hound and American and English Cocker Spaniels. The occurrence of glaucoma is related to the most severe abnormalities of the pectinate ligaments. The relationship between glaucoma development and the anomaly of the pectinate ligament is not clear.

A recent study evaluated risk factors for development of glaucoma in the Bouvier des Flandres. A narrow angle with dysplastic pectinate ligaments on gonioscopy and/or presence of a narrow or closed ciliary cleft on high resolution ultrasound were associated with development of primary glaucoma in the breed.

B. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

This disorder may be observed in any breed but retriever breeds tend to be predisposed. There is usually no effect on vision unless the cysts are heavily clustered and impinge on the pupillary area. Less frequently, the cysts may rupture and adhere to the cornea or anterior lens capsule. Multiple cysts may occlude the iridocorneal angle and cause glaucoma.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

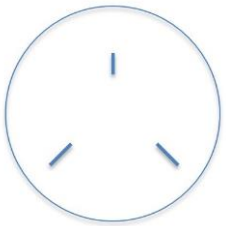
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by

drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Persistent hyperplastic primary vitreous (PHPV)/Persistent hyperplastic tunica vasculosa lentis (PHTVL)

Persistent hyperplastic primary vitreous is a congenital defect resulting from abnormalities in the development and regression of the hyaloid artery (the primary vitreous) and the interaction of this blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with persistent hyperplastic tunica vasculosa lentis which results from failure of regression of the embryologic vascular network which surrounds the developing lens.

In the Bouvier des Flandres, the condition is associated with retinal dysplasia and detachment, optic nerve hypoplasia, lenticonus, cataract and congenital blindness.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. van der Linde-Sipman JS. Dysplasia of the pectinate ligament and primary glaucoma in the Bouvier des Flandres dog. *Vet Pathol*. 1987;24:201-206.

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4. Van Rensburg IBJ, Petrick S, Van der Lagt J, et al. Multiple inherited eye anomalies including persistent hyperplastic tunica vasculosa lentis in the Bouvier des Flanders. *Prog Vet Comp Ophthal.* 1992;2: 193

OCULAR DISORDERS REPORT
BOUVIER DES FLANDRES

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	5,021		837		158	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
10.000	GLAUCOMA	1	0.0%	1	0.1%	0	0.0%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	28	0.6%	4	0.5%	2	1.3%
22.000	ECTROPION, UNSPECIFIED	6	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	42	0.8%	6	0.7%	0	0.0%
CORNEA							
70.210	PANNUS	1	0.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	1	0.0%	1	0.1%	0	0.0%
70.700	CORNEAL DYSTROPHY	31	0.6%	2	0.2%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.1%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	12	0.2%	6	0.7%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	2	0.2%	0	0.0%
93.180	IIRIS SPHINCTER DYSPLASIA	0	0.0%	1	0.1%	1	0.6%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	418	8.3%	82	9.8%	16	10.1%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	11	0.2%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	0.1%	1	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	7	0.1%	1	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	16	0.3%	13	1.6%	2	1.3%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.0%	0	0.0%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	5	0.1%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	414	8.2%	96	11.5%	22	13.9%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	53	1.1%	31	3.7%	9	5.7%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	42	0.8%	8	1.0%	1	0.6%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.1%	3	0.4%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	8	0.2%	7	0.8%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	50	1.0%	34	4.1%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	16	0.3%	11	1.3%	4	2.5%
100.307	PUNCTATE CATARACT, CAPSULAR	29	0.6%	17	2.0%	7	4.4%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	19	0.4%	7	0.8%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	99	2.0%	15	1.8%	4	2.5%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	21	0.4%	5	0.6%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.1%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	24	0.5%	5	0.6%	1	0.6%
100.316	INCIPIENT CATARACT, NUCLEUS	32	0.6%	9	1.1%	1	0.6%
100.317	INCIPIENT CATARACT, CAPSULAR	15	0.3%	7	0.8%	1	0.6%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	4	0.5%	2	1.3%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	4	0.1%	2	0.2%	1	0.6%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	0	0.0%	1	0.6%
100.326	INCOMPLETE CATARACT, NUCLEUS	2	0.0%	1	0.1%	1	0.6%
100.328	Y-SUTURE TIP OPACITIES	23	0.5%	47	5.6%	17	10.8%
100.330	GENERALIZED/ COMPLETE CATARACT	31	0.6%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.0%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***479***	***9.5%***	***214***	***25.6%***	***50***	***31.6%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	8	0.2%	7	0.8%	0	0.0%

OCULAR DISORDERS REPORT
BOUVIER DES FLANDRES

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	5,021		837		158	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
VITREOUS Continued						
110.135 PHPV/ PTVL	6	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	10	0.2%	2	0.2%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	35	0.7%	1	0.1%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	3	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	14	0.3%	0	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	1	0.1%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	2	0.0%	1	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	3	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	64	1.3%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	136	2.7%	2	0.2%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	145	2.9%	44	5.3%	8	5.1%
NORMAL						
.000 NORMAL GLOBE	3,909	77.9%	547	65.4%	101	63.9%

BOXER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Ectropion	Not defined	1	Breeder option
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
D.	Corneal dystrophy - epithelial erosion	Not defined	1-4	Breeder option
E.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

In the Boxer, because there is significant clinical disease associated with the abnormal hairs, breeding affected animals should be discouraged.

B. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Corneal dystrophy - epithelial erosion

A general group of corneal ulcerative conditions (e.g. erosions, indolent or persistent ulcers, epithelial bonding defects) is recognized as a common problem in older Boxers (as well as other older animals). It has been commonly referred to as Boxer corneal ulceration. Animals

that are affected are usually 7-8 years of age or older. The ulceration can be a very difficult lesion to heal, and it is often recurrent. The chronic form stimulates eventual scarring, with vascularization, fibrosis and pigmentation of the lesion site. The lesion can cause vision impairment.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Roberts SR. Superficial indolent ulcer in the cornea of Boxer dogs. *J Small Anim Pract.* 1965;6:111.

3. Gelatt KN and Samuelson DA. Recurrent corneal erosions and epithelial dystrophy in the Boxer dog. *J Am Anim Hosp Assoc*. 1982;18:453.

4. Kirschner SE, Niyo Y and Betts DM. Idiopathic persistent corneal erosions: clinical and pathological findings in 18 dogs. *J Am Anim Hosp Assoc*. 1989;25:84.

OCULAR DISORDERS REPORT
BOXER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,664		240		57	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	5	0.3%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	3	0.2%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	9	0.5%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	4	0.2%	3	1.3%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	61	3.7%	9	3.8%	1	1.8%
25.110	DISTICHIASIS	198	11.9%	33	13.8%	2	3.5%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.1%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	1	0.1%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	1	0.1%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	141	8.5%	15	6.3%	7	12.3%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.1%	1	0.4%	0	0.0%
UVEA							
93.120	IRIS CYST	1	0.1%	1	0.4%	0	0.0%
93.150	IRIS COLOBOMA	1	0.1%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	4	0.2%	0	0.0%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	3	0.2%	1	0.4%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	8	0.5%	4	1.7%	1	1.8%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.1%	4	1.7%	1	1.8%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	3	0.2%	2	0.8%	1	1.8%
LENS							
100.200	CATARACT, UNSPECIFIED	4	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	40	2.4%	12	5.0%	1	1.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	3	0.2%	1	0.4%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.4%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.1%	2	0.8%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.2%	0	0.0%	1	1.8%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.1%	2	0.8%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	2	0.1%	1	0.4%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	2	0.1%	2	0.8%	1	1.8%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	15	0.9%	6	2.5%	2	3.5%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	2	0.1%	1	0.4%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	7	0.4%	0	0.0%	1	1.8%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	2	0.1%	3	1.3%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.1%	2	0.8%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	1	0.4%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.1%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	2	0.8%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	7	0.4%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***59***	***3.5%***	***24***	***10.0%***	***5***	***8.8%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.1%	1	0.4%	0	0.0%

OCULAR DISORDERS REPORT
BOXER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,664 #	 %	2016-2020 240 #	 %	2021 57 #	 %
VITREOUS Continued						
110.135 PHPV/ PTVL	1	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	0	0.0%	1	1.8%
110.320 VITREOUS DEGENERATION SYNERESIS	11	0.7%	1	0.4%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	5	0.3%	0	0.0%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	2	0.8%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.2%	0	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	1	0.1%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.1%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	3	0.2%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	13	0.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	44	2.6%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	18	1.1%	14	5.8%	5	8.8%
NORMAL						
.000 NORMAL GLOBE	1,217	73.1%	162	67.5%	39	68.4%

BOYKIN SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
F.	Retinal dysplasia - folds	Not defined	1	Breeder option	
G.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	1, 2	NO	Mutation in the *NHEJ1 gene*

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

G. Choroidal hypoplasia (Collie Eye Anomaly)
- Staphyloma/coloboma
- Retinal detachment
- Retinal hemorrhage
- Optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee, 1999 and/or Data from OFA All-Breeds Report, 1991-1998.

2. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Genome Res*. 2007 Nov;17:1562-1571.

OCULAR DISORDERS REPORT
BOYKIN SPANIEL

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	3,413		1,675		409	
Diagnostic Name	#	%	#	%	#	%
GLOBE						
.110 MICROPHTHALMIA	1	0.0%	1	0.1%	0	0.0%
EYELIDS						
20.160 MACROPALPEBRAL FISSURE	2	0.1%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	1	0.0%	1	0.1%	0	0.0%
25.110 DISTICHIASIS	436	12.8%	249	14.9%	58	14.2%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	3	0.2%	1	0.2%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	1	0.0%	1	0.1%	0	0.0%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	0.0%
CORNEA						
70.210 PANNUS	1	0.0%	0	0.0%	0	0.0%
70.220 PIGMENTARY KERATITIS	4	0.1%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	53	1.6%	17	1.0%	5	1.2%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	1	0.0%	0	0.0%	0	0.0%
UVEA						
93.110 IRIS HYPOPLASIA	2	0.1%	4	0.2%	0	0.0%
93.120 IRIS CYST	1	0.0%	0	0.0%	1	0.2%
93.150 IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.180 IIRIS SPHINCTER DYSPLASIA	0	0.0%	0	0.0%	1	0.2%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	85	2.5%	49	2.9%	5	1.2%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.1%	0	0.0%	1	0.2%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.1%	1	0.1%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.1%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	10	0.3%	28	1.7%	6	1.5%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	0	0.0%	1	0.1%	1	0.2%
97.150 CHORIORETINAL COLOBOMA, CONGENITAL	1	0.0%	1	0.1%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	48	1.4%	8	0.5%	2	0.5%
97.120 COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	7	0.2%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	185	5.4%	153	9.1%	27	6.6%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	23	0.7%	77	4.6%	12	2.9%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	46	1.3%	16	1.0%	6	1.5%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	8	0.2%	3	0.2%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	8	0.2%	4	0.2%	1	0.2%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	20	0.6%	22	1.3%	2	0.5%
100.306 PUNCTATE CATARACT, NUCLEUS	15	0.4%	37	2.2%	5	1.2%
100.307 PUNCTATE CATARACT, CAPSULAR	15	0.4%	58	3.5%	6	1.5%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	17	0.5%	9	0.5%	3	0.7%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	39	1.1%	37	2.2%	10	2.4%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	6	0.2%	4	0.2%	2	0.5%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	5	0.1%	5	0.3%	1	0.2%
100.316 INCIPIENT CATARACT, NUCLEUS	11	0.3%	6	0.4%	3	0.7%
100.317 INCIPIENT CATARACT, CAPSULAR	8	0.2%	21	1.3%	1	0.2%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	3	0.2%	0	0.0%

OCULAR DISORDERS REPORT
BOYKIN SPANIEL

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 3,413 #	 %	Year Examined: 2016-2020 Total # Dogs: 1,675 #	 %	Year Examined: 2021 Total # Dogs: 409 #	 %
LENS Continued						
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	3	0.2%	1	0.2%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	3	0.2%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.1%	1	0.2%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.1%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	6	0.2%	18	1.1%	6	1.5%
100.330 GENERALIZED/ COMPLETE CATARACT	10	0.3%	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***246***	***7.2%***	***330***	***19.7%***	***60***	***14.7%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	26	0.8%	36	2.1%	9	2.2%
110.135 PHPV/ PTVL	3	0.1%	3	0.2%	1	0.2%
110.320 VITREOUS DEGENERATION SYNERESIS	5	0.1%	5	0.3%	1	0.2%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	63	1.8%	18	1.1%	1	0.2%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	9	0.3%	0	0.0%	3	0.7%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.0%	1	0.1%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	30	0.9%	3	0.2%	0	0.0%
120.400 RETINAL HEMORRHAGE	2	0.1%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	2	0.1%	0	0.0%
120.960 RETINOPATHY	13	0.4%	3	0.2%	2	0.5%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	4	0.1%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	23	0.7%	15	0.9%	3	0.7%
OTHER						
900.000 OTHER, UNSPECIFIED	73	2.1%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	79	2.3%	11	0.7%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	46	1.3%	100	6.0%	26	6.4%
NORMAL						
.000 NORMAL GLOBE	2,601	76.2%	1,035	61.8%	268	65.5%

BOZ SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BOZ SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BOZ SHEPHERD

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	1	100.0%	0		0	

BRACCO ITALIANO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BRACCO ITALIANO

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	115		86		22	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	1	0.9%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	4	3.5%	7	8.1%	3	13.6%
25.110	DISTICHIASIS	9	7.8%	10	11.6%	1	4.5%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.9%	1	1.2%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.9%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	2	1.7%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	2	2.3%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	10	8.7%	4	4.7%	1	4.5%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	3	2.6%	0	0.0%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	4	3.5%	1	1.2%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.9%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	1.7%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	2	2.3%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.9%	2	2.3%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	8	7.0%	1	1.2%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	3	2.6%	1	1.2%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	1.2%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	2	1.7%	1	1.2%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	2	1.7%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	0.9%	1	1.2%	2	9.1%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***27***	***23.5%***	***10***	***11.6%***	***2***	***9.1%***
VITREOUS							
110.135	PHPV/ PTVL	1	0.9%	1	1.2%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	0	0.0%	2	2.3%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	6	5.2%	4	4.7%	0	0.0%
120.960	RETINOPATHY	1	0.9%	1	1.2%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	2	1.7%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	3	2.6%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.9%	4	4.7%	1	4.5%
NORMAL							
.000	NORMAL GLOBE	75	65.2%	55	64.0%	14	63.6%

BRAQUE D’AUVERGNE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BRAQUE D’AUVERGNE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BRAQUE D'AUVERGNE

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	18		28		2	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
.110 MICROPHTHALMIA	0	0.0%	1	3.6%	0	0.0%
EYELIDS						
25.110 DISTICHIASIS	0	0.0%	1	3.6%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	5.6%	4	14.3%	1	50.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	3.6%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	1	3.6%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	16.7%	4	14.3%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	5.6%	2	7.1%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	3.6%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	5.6%	1	3.6%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	1	5.6%	1	3.6%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	3.6%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	1	5.6%	1	3.6%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***4***	***22.2%***	***7***	***25.0%***	***0***	***0.0%***
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	0	0.0%	1	3.6%	0	0.0%
OTHER						
900.100 OTHER, NOT INHERITED	0	0.0%	1	3.6%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	4	14.3%	2	100.0%
NORMAL						
.000 NORMAL GLOBE	14	77.8%	13	46.4%	0	0.0%

BRAQUE DU BOURBONNAIS

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BRAQUE DU BOURBONNAIS breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BRAQUE DU BOURBONNAIS

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	6		1		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	6	100.0%	1	100.0%	0	

BRAQUE FRANCAIS

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BRAQUE FRANCAIS

Diagnostic Name		Year Examined: 1991-2016 Total # Dogs: 32 #	 %	Year Examined: 2016-2020 Total # Dogs: 65 #	 %	Year Examined: 2021 Total # Dogs: 14 #	 %
EYELIDS							
25.110	DISTICHIASIS	2	6.3%	1	1.5%	1	7.1%
UVEA							
93.120	IRIS CYST	0	0.0%	1	1.5%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	1	1.5%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	3	4.6%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	12.5%	4	6.2%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	3.1%	2	3.1%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	3	4.6%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	1	1.5%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1	3.1%	0	0.0%	1	7.1%
100.317	INCIPIENT CATARACT, CAPSULAR	2	6.3%	1	1.5%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	2	3.1%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	1.5%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	1.5%	1	7.1%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***4***	***12.5%***	***11***	***16.9%***	***2***	***14.3%***
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	0	0.0%	0	0.0%	1	7.1%
OTHER							
900.100	OTHER, NOT INHERITED	0	0.0%	0	0.0%	2	14.3%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	9.4%	6	9.2%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	24	75.0%	48	73.8%	9	64.3%

BRAQUE FRANCAIS PYRENEES

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BRAQUE FRANCAIS PYRENEES breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BRAQUE FRANCAIS PYRENEES

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		4		14		3	
Diagnostic Name		**#**	**%**	**#**	**%**	**#**	**%**
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	1	7.1%	1	33.3%
LENS							
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	1	7.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***0***	***0.0%***	***1***	***7.1%***	***0***	***0.0%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	1	7.1%	0	0.0%
OTHER							
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	7.1%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	3	75.0%	11	78.6%	2	66.7%

BRAZILIAN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Multifocal retinopathy	Autosomal recessive	1-3	Breeder option	Mutation in the *CNGB3* gene

Description and Comments

A**.** Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (cmr1) is characterized by numerous distinct (i.e. multi-focal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Brazilian Terrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Yeh CY, Goldstein O, Kukekova AV, Holley D, Knollinger AM, Huson HJ, Pearce-Kelling SE, Acland GM, Komáromy AM. Genomic deletion of CNGB3 is identical by descent in multiple canine breeds and causes achromatopsia. BMC Genet. 2013 Apr 20;14:27. doi: 10.1186/1471-2156-14-27. PMID: 23601474

2. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

3. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016

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Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650; PMCID: PMC4985128.

OCULAR DISORDERS REPORT
BRAZILIAN TERRIER

There are no statistics available for this breed

BRIARD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1 1	Breeder option Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Retinal dystrophy formerly Congenital stationary night blindness (*CSNB*)	Autosomal recessive	1-3	NO	Mutation in the *RPE65* gene

Description and Comments

A. Corneal dystrophy- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal dystrophy formerly Congenital stationary night blindness (*CSNB*)

A non-progressive retinal function defect characterized primarily by night blindness; day vision is normal to severely compromised. CSNB is an autosomal recessive trait caused by a mutation in the RPE65 gene. The condition is detected by 5-6 weeks of age, after the postnatal maturation of the retina is completed. Nystagmus is present in some dogs, particularly in those having night blindness and severely compromised day vision. Ophthalmoscopic examination shows no abnormalities. Abnormalities in serum lipids (mild hypercholesterolemia) and elevated arachidonic acid have been noted in some animals. The ERG results are specific and diagnostic for the disorder. ERG testing is essential to distinguish this disorder from more central visual pathway defects which may appear clinically similar.

The gene mutation RPE65 has been identified. This is the same mutation as causes Leber's congenital amaurosis, also sometimes called juvenile retinitis pigmentosa (RP), in humans. A DNA test is available.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Das, R. G., et al. (2019). "Genome-wide association study and whole-genome sequencing identify a deletion in LRIT3 associated with canine congenital stationary night blindness." Sci Rep 9(1): 14166. PMID: 31578364

3. Veske A, Nilsson SE, Narfström K, Gal A. Retinal dystrophy of Swedish briard/briard-beagle dogs is due to a 4-bp deletion in RPE65. Genomics. 1999 Apr 1;57(1):57-61. doi: 10.1006/geno.1999.5754. PMID: 10191083.

OCULAR DISORDERS REPORT
BRIARD

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2,223		202		59	
Diagnostic Name	#	%	#	%	#	%
GLOBE						
10.000 GLAUCOMA	1	0.0%	0	0.0%	0	0.0%
EYELIDS						
20.140 ECTOPIC CILIA	1	0.0%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	9	0.4%	2	1.0%	1	1.7%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	2	0.1%	0	0.0%	0	0.0%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	2	0.1%	1	0.5%	0	0.0%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	2	0.1%	0	0.0%	0	0.0%
CORNEA						
70.210 PANNUS	1	0.0%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	31	1.4%	7	3.5%	0	0.0%
UVEA						
93.120 IRIS CYST	10	0.4%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	20	0.9%	9	4.5%	2	3.4%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.1%	1	0.5%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.1%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.1%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	7	0.3%	7	3.5%	1	1.7%
FUNDUS						
97.120 COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	9	0.4%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	71	3.2%	10	5.0%	1	1.7%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	7	0.3%	2	1.0%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	3	0.1%	0	0.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.0%	1	0.5%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.1%	5	2.5%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	6	0.3%	1	0.5%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	4	0.2%	7	3.5%	1	1.7%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	6	0.3%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	9	0.4%	0	0.0%	1	1.7%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	6	0.3%	1	0.5%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	3	0.1%	2	1.0%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	4	2.0%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	3	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***64***	***2.9%***	***23***	***11.4%***	***2***	***3.4%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.0%	0	0.0%	0	0.0%
110.135 PHPV/ PTVL	3	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	2	0.1%	1	0.5%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	7	0.3%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
BRIARD

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,223 #	 %	2016-2020 202 #	 %	2021 59 #	 %
RETINA Continued						
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	0.0%	0	0.0%	1	1.7%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.0%	0	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	3	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	37	1.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	58	2.6%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	32	1.4%	8	4.0%	4	6.8%
NORMAL						
.000 NORMAL GLOBE	2,037	91.6%	161	79.7%	50	84.7%

BRITTANY

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membrane			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
C.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membrane (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The exact frequency and significance of cataracts in the Brittany is not known, although it is probably low.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BRITTANY

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,250 #	 %	Year Examined: 2016-2020 Total # Dogs: 861 #	 %	Year Examined: 2021 Total # Dogs: 187 #	 %
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	0	0.0%	0	0.0%	1	0.5%
25.110 DISTICHIASIS	55	2.4%	14	1.6%	1	0.5%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	0	0.0%	1	0.5%
40.910 KERATOCONJUNCTIVITIS SICCA	1	0.0%	0	0.0%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	2	0.1%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	5	0.2%	2	0.2%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	3	0.1%	0	0.0%	0	0.0%
UVEA						
93.120 IRIS CYST	1	0.0%	0	0.0%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	0	0.0%	1	0.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	33	1.5%	15	1.7%	2	1.1%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.1%	1	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	9	0.4%	18	2.1%	4	2.1%
LENS						
100.200 CATARACT, UNSPECIFIED	10	0.4%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	94	4.2%	44	5.1%	9	4.8%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	18	0.8%	15	1.7%	4	2.1%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	30	1.3%	12	1.4%	3	1.6%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	3	0.1%	4	0.5%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.0%	1	0.1%	1	0.5%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	7	0.3%	6	0.7%	1	0.5%
100.306 PUNCTATE CATARACT, NUCLEUS	4	0.2%	9	1.0%	1	0.5%
100.307 PUNCTATE CATARACT, CAPSULAR	11	0.5%	12	1.4%	2	1.1%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	10	0.4%	9	1.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	36	1.6%	21	2.4%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	13	0.6%	0	0.0%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	9	0.4%	3	0.3%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	7	0.3%	3	0.3%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	5	0.2%	4	0.5%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	0	0.0%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	0	0.0%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	1	0.0%	3	0.3%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.0%	3	0.3%	2	1.1%
100.330 GENERALIZED/ COMPLETE CATARACT	4	0.2%	0	0.0%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.1%	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***175***	***7.8%***	***106***	***12.3%***	***14***	***7.5%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	3	0.1%	7	0.8%	0	0.0%
110.135 PHPV/ PTVL	1	0.0%	1	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	4	0.5%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	14	0.6%	5	0.6%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	7	0.3%	3	0.3%	0	0.0%

OCULAR DISORDERS REPORT
BRITTANY

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,250 #	 %	2016-2020 861 #	 %	2021 187 #	 %
RETINA Continued						
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	6	0.3%	3	0.3%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	21	0.9%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.1%	1	0.1%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	17	0.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	61	2.7%	2	0.2%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	17	0.8%	47	5.5%	9	4.8%
NORMAL						
.000 NORMAL GLOBE	1,951	86.7%	670	77.8%	161	86.1%

BRUSSELS GRIFFON

	DISORDER	INHERITANCE	REFERENCES	BREEDING ADVICE	Genetic Test Available
A.	Exposure keratopathy syndrome	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Lens luxation	Autosomal recessive	1	NO	
F.	Vitreous degeneration	Not defined	1, 2	Breeder option	
G.	Retinal atrophy - generalized	Not defined	3	NO	Mutation in the *prcd* gene
H.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Exposure keratopathy syndrome

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded;

breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness.

F. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

G. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Krishnan, H., et al. (2020). "Vitreous degeneration and associated ocular abnormalities in the dog." Vet Ophthalmol 23(2): 219-224. PMID: 31464365.

3. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
BRUSSELS GRIFFON

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,374		344		100	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
20.140	ECTOPIC CILIA	8	0.6%	0	0.0%	2	2.0%
21.000	ENTROPION, UNSPECIFIED	3	0.2%	3	0.9%	0	0.0%
25.110	DISTICHIASIS	30	2.2%	7	2.0%	5	5.0%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	3	0.2%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	1	0.1%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	23	1.7%	5	1.5%	2	2.0%
70.700	CORNEAL DYSTROPHY	10	0.7%	3	0.9%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	2	0.1%	0	0.0%	0	0.0%
93.120	IRIS CYST	2	0.1%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	121	8.8%	36	10.5%	15	15.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.1%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.1%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	9	0.7%	12	3.5%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.3%	1	0.3%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	1	0.1%	1	0.3%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	2	0.1%	0	0.0%	0	0.0%
97.120	COLOBOMA	2	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	8	0.6%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	53	3.9%	9	2.6%	1	1.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	31	2.3%	6	1.7%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	11	0.8%	1	0.3%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	5	0.4%	2	0.6%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.2%	1	0.3%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	0.3%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	4	0.3%	0	0.0%	1	1.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	79	5.7%	8	2.3%	5	5.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	35	2.5%	2	0.6%	3	3.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	44	3.2%	2	0.6%	2	2.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	7	0.5%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	5	0.4%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	5	0.4%	0	0.0%	1	1.0%
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.1%	0	0.0%	3	3.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	4	1.2%	1	1.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.3%	1	1.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.3%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	1.0%
100.330	GENERALIZED/ COMPLETE CATARACT	29	2.1%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	8	0.6%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***270***	***19.7%***	***29***	***8.4%***	***18***	***18.0%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	9	0.7%	2	0.6%	0	0.0%
110.135	PHPV/ PTVL	2	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
BRUSSELS GRIFFON

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,374 #	 %	2016-2020 344 #	 %	2021 100 #	 %
VITREOUS Continued						
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	86	6.3%	11	3.2%	3	3.0%
110.320 VITREOUS DEGENERATION SYNERESIS	249	18.1%	23	6.7%	5	5.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	21	1.5%	14	4.1%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	13	0.9%	3	0.9%	2	2.0%
120.190 RETINAL DYSPLASIA, DETACHED	2	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	23	1.7%	1	0.3%	1	1.0%
120.400 RETINAL HEMORRHAGE	2	0.1%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	1	0.3%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	3	0.2%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	19	1.4%	1	0.3%	1	1.0%
OTHER						
900.000 OTHER, UNSPECIFIED	26	1.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	27	2.0%	2	0.6%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	21	1.5%	17	4.9%	5	5.0%
NORMAL						
.000 NORMAL GLOBE	825	60.0%	227	66.0%	65	65.0%

BULL TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BULL TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BULL TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	246		14		4	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	3	1.2%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	2	0.8%	0	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	1	0.4%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	5	2.0%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	1	0.4%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	5	2.0%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	8	3.3%	0	0.0%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	4	1.6%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	12	4.9%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.4%	0	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.4%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	6	2.4%	0	0.0%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	2	0.8%	1	7.1%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.8%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.8%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.4%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.4%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.4%	0	0.0%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.4%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.4%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.8%	2	14.3%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.4%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.4%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	3	1.2%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	7	2.8%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***18***	***7.3%***	***3***	***21.4%***	***0***	***0.0%***
VITREOUS							
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.4%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	4	1.6%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1	0.4%	0	0.0%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	7.1%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.4%	0	0.0%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.8%	0	0.0%	0	0.0%
OPTIC NERVE							
130.110	MICROPAPILLA	3	1.2%	0	0.0%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	3	1.2%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	5	2.0%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	8	3.3%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	1.2%	0	0.0%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	194	78.9%	11	78.6%	4	100.0%

BULLDOG

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Keratoconjunctivitis sicca	Not defined	1, 5	NO	
B.	Entropion	Not defined	1	Breeder option	
C.	Ectropion	Not defined	1	Breeder option	
D.	Distichiasis	Not defined	1	Breeder option	
E.	Ectopic cilia	Not defined	1	Breeder option	
F.	Prolapsed gland of third eyelid	Not defined	1, 2-4	Breeder option	
G.	Exposure/Pigmentary Keratitis	Not defined	1	Breeder option	
H.	Secondary keratitis - chronic	Not defined	1	Passes with no notation	
I.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
J.	Cataract	Not defined	1	NO	
K.	Retinal dysplasia - folds	Not defined	1	Breeder option	
L.	Multifocal retinopathy - *cmr1*	Autosomal recessive	6, 7	Breeder option	Mutation in the *BEST1* gene

Description and Comments

A. Keratoconjunctivitis sicca

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Ectropion

A conformational defect resulting in eversion of the eyelids which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

In the Bulldog, ectropion is associated with an exceptionally large palpebral fissure and laxity of the canthal structures. Central lower lid ectropion is often associated with entropion of the adjacent lid. This causes severe ocular irritation.

D. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

In the Bulldog, these abnormal eyelashes may be associated with significant clinical disease and breeding of affected animals should be discouraged.

E. Ectopic cilia

Hair emerging through the eyelid conjunctiva. Ectopic cilia occur more frequently in younger dogs and cause discomfort and corneal disease.

F. Prolapse of the gland of the third eyelid

Protrusion of the tear gland associated with the third eyelid. The mode of inheritance of this disorder is unknown. The exposed gland may become irritated and severe chronic inflammation or keratoconjunctivitis sicca/dry eye syndrome may ensue. Commonly referred to as "cherry eye."

Bulldogs were overrepresented in a study of prolapsed gland of the third eyelid. In the study, 100% of the prolapsed glands in Bulldogs occurred before 1 year of age. Bulldogs were also more likely to develop bilateral prolapsed glands that occurred either simultaneously with the first prolapse or with a short time interval between prolapses.

G. Exposure/pigmentary keratitis

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the

globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

H. Secondary keratitis - chronic

A specific designation does not exist on the CAER form for this condition. We ask examiners to mark other – unlisted conditions suspected as inherited. Then in the comments box please write secondary keratitis – chronic.

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. Often associated with entropion or a combination of entropion and ectropion.

I. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

J. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

K. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

L. Multifocal Retinopathy

A specific designation does not exist on the CAER form for this condition. We ask examiners to mark other – unlisted conditions suspected as inherited. Then in the comments box please write multifocal retinopathy.

Canine Multifocal Retinopathy type 1 (cmr1) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog. The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal

thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Barnett KC. Comparative aspects of canine hereditary eye disease. *Adv Vet Sci Comp Med*. 1976;20:39-67.

3. Morgan RV, Duddy JM, McClurg K. Prolapse of the gland of the third eyelid in the dog: A retrospective study of 89 cases (1980-1990). *J Am Anim Hosp Assoc*. 1993;29:56.

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5. Kaswan RL, Martin CL, Chapman WL, Jr. Keratoconjunctivitis sicca: histopathologic study of nictitating membrane and lacrimal glands from 28 dogs. *Am J Vet Res*. 1984;45:112-118.

6. Guziewicz KE, Slavik J, Lindauer SP et al. Molecular consequences of BEST1 gene mutations in canine multifocal retinopathy predict functional implications for human bestrophinopathies. IOVS 52(7) 2011; 4497-505.

7. Donner J, Kaukonen M, Anderson H et al. Genetic panel screening of nearly 100 mutations reveals new insights into the breed distribution of risk variants for canine hereditary disorders. PLOS One Aug 2016 11 (8): 1-18.

OCULAR DISORDERS REPORT
BULLDOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1,156		425		66	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
.110 MICROPHTHALMIA	1	0.1%	0	0.0%	1	1.5%
EYELIDS						
20.140 ECTOPIC CILIA	8	0.7%	5	1.2%	1	1.5%
20.160 MACROPALPEBRAL FISSURE	16	1.4%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	172	14.9%	65	15.3%	7	10.6%
22.000 ECTROPION, UNSPECIFIED	63	5.4%	13	3.1%	2	3.0%
25.110 DISTICHIASIS	260	22.5%	108	25.4%	11	16.7%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	4	0.3%	2	0.5%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA	2	0.2%	10	2.4%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	16	1.4%	7	1.6%	0	0.0%
CORNEA						
70.210 PANNUS	9	0.8%	4	0.9%	0	0.0%
70.220 PIGMENTARY KERATITIS	25	2.2%	8	1.9%	0	0.0%
70.700 CORNEAL DYSTROPHY	10	0.9%	2	0.5%	3	4.5%
UVEA						
93.120 IRIS CYST	8	0.7%	2	0.5%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	1	0.1%	1	0.2%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	7	0.6%	7	1.6%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.1%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.2%	0	0.0%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
95.120 CILIARY BODY CYST	2	0.2%	1	0.2%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	32	2.8%	4	0.9%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	6	0.5%	2	0.5%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.2%	0	0.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.1%	1	0.2%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	5	0.4%	2	0.5%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	0.2%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	0.1%	1	0.2%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	5	0.4%	1	0.2%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	2	0.2%	0	0.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	3	0.3%	1	0.2%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	3	0.3%	1	0.2%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	2	0.2%	0	0.0%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	0	0.0%	1	1.5%
100.328 Y-SUTURE TIP OPACITIES	4	0.3%	2	0.5%	1	1.5%
100.330 GENERALIZED/ COMPLETE CATARACT	5	0.4%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.2%	1	0.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***41***	***3.5%***	***12***	***2.8%***	***2***	***3.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	2	0.2%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	70	6.1%	20	4.7%	3	4.5%

OCULAR DISORDERS REPORT
BULLDOG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,156 #	 %	2016-2020 425 #	 %	2021 66 #	 %
RETINA Continued						
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	3	0.3%	1	0.2%	1	1.5%
120.190 RETINAL DYSPLASIA, DETACHED	2	0.2%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.1%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	0	0.0%	1	1.5%
130.120 OPTIC NERVE HYPOPLASIA	0	0.0%	0	0.0%	1	1.5%
OTHER						
900.000 OTHER, UNSPECIFIED	7	0.6%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	39	3.4%	2	0.5%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	39	3.4%	38	8.9%	1	1.5%
NORMAL						
.000 NORMAL GLOBE	673	58.2%	205	48.2%	41	62.1%

BULLMASTIFF

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Ectropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Retinal atrophy (*RHO)*	Autosomal dominant	2	NO	Mutation in the *RHO* gene
G.	Retinal dysplasia - folds	Not defined	1	Breeder option	
H.	Multifocal retinopathy - *cmr1*	Autosomal recessive	3	Breeder option	Mutation in the *BEST1* gene

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

In the Bullmastiff, the palpebral fissures may become vertical and/or shaped like a "pagoda." Entropion in the Bullmastiff is severe and may require multiple surgical corrections.

B. Ectropion

A conformational defect resulting in eversion (rolling-out) of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal atrophy - *RHO*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA in the Bullmastiff is inherited as an autosomal dominant trait. A DNA test is available.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

H. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous sub-retinal fluid, or accumulation of sub-retinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Kijas JW, Cideciyan AV, Aleman TS, et al. Naturally occurring rhodopsin mutation in the dog causes retinal dysfunction and degeneration mimicking human dominant retinitis pigmentosa. *Proc Natl Acad Sci U S A*. 2002 Apr 30;99:6328-6333.

3. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci.* 2007 May;48:1959-1967.

OCULAR DISORDERS REPORT
BULLMASTIFF

Diagnostic Name	1991-2016 #	1991-2016 %	2016-2020 #	2016-2020 %	2021 #	2021 %
Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1,631		678		146	
GLOBE						
.110 MICROPHTHALMIA	5	0.3%	0	0.0%	0	0.0%
EYELIDS						
20.160 MACROPALPEBRAL FISSURE	16	1.0%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	96	5.9%	33	4.9%	20	13.7%
22.000 ECTROPION, UNSPECIFIED	24	1.5%	10	1.5%	1	0.7%
25.110 DISTICHIASIS	42	2.6%	16	2.4%	1	0.7%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	0	0.0%	1	0.1%	0	0.0%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	1	0.1%	2	0.3%	0	0.0%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	0	0.0%	0	0.0%
CORNEA						
70.210 PANNUS	2	0.1%	0	0.0%	0	0.0%
70.220 PIGMENTARY KERATITIS	4	0.2%	3	0.4%	1	0.7%
70.700 CORNEAL DYSTROPHY	2	0.1%	1	0.1%	2	1.4%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	1	0.1%	0	0.0%	0	0.0%
UVEA						
93.120 IRIS CYST	8	0.5%	3	0.4%	1	0.7%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.1%	0	0.0%	0	0.0%
93.150 IRIS COLOBOMA	3	0.2%	1	0.1%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	0	0.0%	2	0.3%	1	0.7%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	54	3.3%	39	5.8%	7	4.8%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	9	0.6%	1	0.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	23	1.4%	5	0.7%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.1%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	6	0.4%	1	0.1%	1	0.7%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	3	0.2%	5	0.7%	0	0.0%
95.120 CILIARY BODY CYST	1	0.1%	0	0.0%	0	0.0%
97.150 CHORIORETINAL COLOBOMA, CONGENITAL	1	0.1%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	51	3.1%	17	2.5%	2	1.4%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	8	0.5%	6	0.9%	1	0.7%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	4	0.2%	2	0.3%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	3	0.2%	1	0.1%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	3	0.2%	4	0.6%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	1	0.1%	1	0.1%	1	0.7%
100.307 PUNCTATE CATARACT, CAPSULAR	2	0.1%	2	0.3%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	11	0.7%	5	0.7%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	13	0.8%	4	0.6%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	10	0.6%	4	0.6%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.1%	1	0.1%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	4	0.2%	3	0.4%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	1	0.1%	1	0.1%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	0	0.0%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.2%	1	0.1%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
BULLMASTIFF

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,631 #	 %	2016-2020 678 #	 %	2021 146 #	 %
LENS Continued						
100.328 Y-SUTURE TIP OPACITIES	2	0.1%	4	0.6%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	7	0.4%	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***78***	***4.8%***	***40***	***5.9%***	***2***	***1.4%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	2	0.3%	0	0.0%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	2	0.1%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	74	4.5%	47	6.9%	1	0.7%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	3	0.2%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.2%	0	0.0%	0	0.0%
120.960 RETINOPATHY	4	0.2%	3	0.4%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	7	0.4%	1	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	6	0.4%	2	0.3%	0	0.0%
130.150 OPTIC DISC COLOBOMA	2	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	25	1.5%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	42	2.6%	3	0.4%	2	1.4%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	19	1.2%	28	4.1%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	1,250	76.6%	484	71.4%	113	77.4%

CA DE BOU

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CA DE BOU breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CA DE BOU

There are no statistics available for this breed

CAIRN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Ocular melanosis with and without glaucoma	Presumed autosomal dominant	1, 2	NO
B.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
	- endothelial opacity/no strands	Not defined	1	NO
C.	Cataract	Not defined	1	NO
D.	Vitreous degeneration	Not defined	1	Breeder option
E.	Persistent hyaloid artery remnant	Not defined	1	Breeder option

Description and Comments

A. Ocular melanosis with and without glaucoma
(Previously ocular melanosis with secondary glaucoma, previously pigmentary glaucoma)

A proliferation of melanocytes within the uveal tract associated with an elevation in intraocular pressure. Obstruction of the aqueous outflow pathways occurs resulting in glaucoma. This condition has been identified most commonly in the Cairn Terrier. The condition is familial but the exact mode of inheritance is unknown (pedigree anaylsis has ruled out a sex-linked disorder). In the Cairn Terrier, the disease is very slowly progressive and blindness ultimately results. Some dogs develop episodes of anterior uveitis associated with the shedding of large amounts of pigment from the iris surface. There is a long pre-glaucomatous phase of the disease in which diagnosis of the condition is possible. Age of onset varies from 2-14 years.

B. Persistent pupillary membranes (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

E. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Petersen-Jones SM, Forcier J, Mentzer AL. Ocular melanosis in the Cairn Terrier: clinical description and investigation of mode of inheritance. *Vet Ophthalmol*. 2007;10 Suppl 1:63-69.

OCULAR DISORDERS REPORT
CAIRN TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	3,840		841		102	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.0%	1	0.1%	0	0.0%
10.000	GLAUCOMA	3	0.1%	0	0.0%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	14	0.4%	7	0.8%	0	0.0%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	2	0.2%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	6	0.2%	2	0.2%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.0%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	1	0.1%	0	0.0%
CORNEA							
70.210	PANNUS	1	0.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	7	0.2%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	25	0.7%	3	0.4%	1	1.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	3	0.1%	0	0.0%	0	0.0%
UVEA							
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	1	0.1%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	323	8.4%	135	16.1%	24	23.5%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	10	0.3%	5	0.6%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.1%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	23	0.6%	31	3.7%	3	2.9%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	7	0.2%	9	1.1%	0	0.0%
93.810	UVEAL MELANOMA	0	0.0%	2	0.2%	0	0.0%
93.930	OCULAR MELANOCYTOSIS	9	0.2%	0	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	2	0.1%	0	0.0%	0	0.0%
97.120	COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	11	0.3%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	224	5.8%	62	7.4%	4	3.9%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	48	1.3%	41	4.9%	1	1.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	38	1.0%	14	1.7%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	33	0.9%	12	1.4%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	10	0.3%	3	0.4%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.1%	4	0.5%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	13	0.3%	15	1.8%	2	2.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	38	1.0%	6	0.7%	2	2.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	63	1.6%	13	1.5%	1	1.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	29	0.8%	7	0.8%	1	1.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	10	0.3%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	3	0.1%	2	0.2%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	6	0.2%	1	0.1%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	11	0.3%	2	0.2%	0	0.0%

OCULAR DISORDERS REPORT
CAIRN TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 3,840 #	 %	2016-2020 841 #	 %	2021 102 #	 %
LENS Continued						
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	11	0.3%	6	0.7%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	3	0.1%	1	0.1%	0	0.0%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.1%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.1%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	2	0.1%	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.0%	1	0.1%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	34	0.9%	5	0.6%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	2	0.1%	2	0.2%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***371***	***9.7%***	***138***	***16.4%***	***7***	***6.9%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	33	0.9%	21	2.5%	1	1.0%
110.135 PHPV/ PTVL	6	0.2%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	40	1.0%	16	1.9%	2	2.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	20	0.5%	2	0.2%	2	2.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	8	0.2%	1	0.1%	1	1.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	22	0.6%	1	0.1%	0	0.0%
120.960 RETINOPATHY	1	0.0%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	3	0.1%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	8	0.2%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	11	0.3%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	76	2.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	123	3.2%	8	1.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	121	3.2%	30	3.6%	7	6.9%
NORMAL						
.000 NORMAL GLOBE	2,984	77.7%	509	60.5%	66	64.7%

CANAAN DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
B.	Cataract	Not defined	1	NO

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
CANAAN DOG

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	509		83		18	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	15	2.9%	1	1.2%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	4	0.8%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	1	0.2%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.2%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	21	4.1%	2	2.4%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.2%	0	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.2%	1	1.2%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	18	3.5%	6	7.2%	1	5.6%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.2%	2	2.4%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.4%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.2%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.6%	1	1.2%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	1.2%	1	5.6%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	2	0.4%	1	1.2%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	7	1.4%	2	2.4%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	12	2.4%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.2%	0	0.0%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.2%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	1.2%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	13	2.6%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***46***	***9.0%***	***8***	***9.6%***	***1***	***5.6%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.2%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2	0.4%	1	1.2%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	9	1.8%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	6	1.2%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	18	3.5%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	0.8%	3	3.6%	1	5.6%
NORMAL							
.000	NORMAL GLOBE	415	81.5%	69	83.1%	16	88.9%

CANADIAN ESKIMO DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
CANADIAN ESKIMO DOG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 19 #	 %	2016-2020 28 #	 %	2021 2 #	 %
CORNEA						
70.700 CORNEAL DYSTROPHY	1	5.3%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3	15.8%	6	21.4%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	3.6%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	3.6%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	5.3%	1	3.6%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***5.3%***	***2***	***7.1%***	***0***	***0.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	5.3%	0	0.0%	0	0.0%
RETINA						
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	5.3%	0	0.0%	0	0.0%
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	10.5%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	15	78.9%	20	71.4%	2	100.0%

CANE CORSO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Ectropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breed Report.

OCULAR DISORDERS REPORT
CANE CORSO

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	124		155		35	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	4	3.2%	2	1.3%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	10	8.1%	5	3.2%	0	0.0%
25.110 DISTICHIASIS	5	4.0%	10	6.5%	3	8.6%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	1	0.8%	0	0.0%	0	0.0%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	2	1.6%	1	0.6%	1	2.9%
CORNEA						
70.700 CORNEAL DYSTROPHY	1	0.8%	0	0.0%	0	0.0%
UVEA						
93.110 IRIS HYPOPLASIA	0	0.0%	1	0.6%	0	0.0%
93.120 IRIS CYST	1	0.8%	1	0.6%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	1	0.8%	1	0.6%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3	2.4%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	1	0.6%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.8%	2	1.3%	1	2.9%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	3.2%	7	4.5%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.8%	3	1.9%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.8%	2	1.3%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	3	1.9%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	1	0.8%	1	0.6%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	2	1.3%	1	2.9%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.6%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	1	0.8%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	2	1.3%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	1	0.8%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	0	0.0%	1	0.6%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***5***	***4.0%***	***14***	***9.0%***	***1***	***2.9%***
VITREOUS						
110.135 PHPV/ PTVL	1	0.8%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	0	0.0%	1	0.6%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	0	0.0%	2	1.3%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	0.6%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	0	0.0%	1	0.6%	0	0.0%
120.960 RETINOPATHY	1	0.8%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1	0.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	0	0.0%	1	0.6%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	4	2.6%	3	8.6%
NORMAL						
.000 NORMAL GLOBE	99	79.8%	122	78.7%	26	74.3%

CAO DE CASTRO LABOREIRO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CAO DE CASTRO LABOREIRO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CAO DE CASTRO LABOREIRO

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	1	100.0%	0		0	

CARDIGAN WELSH CORGI

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Retinal atrophy - rod-cone dysplasia type 3 (*rcd3*)	Presumed autosomal recessive	2-4	NO	Mutation in the *PDE6A* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin that may cause ocular irritation. Distichiasis may occur any time in the life of the dog. It is difficult to make a strong recommendation about breeding dogs with this entity. The hereditary basis is not known although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

Lens opacity which may affect one or both eyes and may involve the lens partially or completely. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies.

D. Retinal atrophy - rod-cone dysplasia type 3 (*rcd3*)

PRA in the Cardigan Welsh Corgi is an autosomal recessive trait caused by a one base pair deletion in the gene encoding the alpha subunit of cyclic GMP phosphodiesterase (rcd3). PRA begins early in life with clinical signs of night blindness and a lack of rod ERG responses is seen at 6-8 weeks of age. Dogs are completely blind by 2-3 years of age when ophthalmoscopic signs are first visible. The mutation is found in the *PDE6A* gene. A DNA test is available.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Petersen-Jones SM, Entz DD, Sargan DR. cGMP phosphodiesterase-alpha mutation causes progressive retinal atrophy in the Cardigan Welsh Corgi dog. *Invest Ophthalmol Vis Sci*. 1999;40:1637-1644.

3. Petersen-Jones SM, Entz DD. An improved DNA-based test for detection of the codon 616 mutation in the alpha cyclic GMP phosphodiesterase gene that causes progressive retinal atrophy in the Cardigan Welsh Corgi. *Vet Ophthalmol*. 2002;5:103-106.

4. Keep JM. Clinical aspects of progressive retinal atrophy in the Cardigan Welsh Corgi. *Aust Vet J*. 1972;48:197-199.

OCULAR DISORDERS REPORT
CARDIGAN WELSH CORGI

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		3,676		583		131	
Diagnostic Name		#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	0.1%	0	0.0%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	137	3.7%	22	3.8%	3	2.3%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	1	0.2%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	15	0.4%	2	0.3%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.1%	0	0.0%	1	0.8%
UVEA							
93.120	IRIS CYST	0	0.0%	0	0.0%	1	0.8%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.180	IIRIS SPHINCTER DYSPLASIA	1	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	105	2.9%	15	2.6%	1	0.8%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	3	0.1%	1	0.2%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	9	0.2%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	3	0.1%	0	0.0%	0	0.0%
97.120	COLOBOMA	2	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	15	0.4%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	108	2.9%	31	5.3%	3	2.3%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	13	0.4%	4	0.7%	1	0.8%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	11	0.3%	3	0.5%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	16	0.4%	2	0.3%	2	1.5%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	4	0.1%	1	0.2%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	7	0.2%	3	0.5%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	2	0.1%	18	3.1%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	33	0.9%	3	0.5%	1	0.8%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	18	0.5%	5	0.9%	1	0.8%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	16	0.4%	2	0.3%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	3	0.1%	1	0.2%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.1%	2	0.3%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	7	0.2%	2	0.3%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.1%	1	0.2%	1	0.8%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.2%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.2%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.2%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	3	0.1%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	8	0.2%	0	0.0%	0	0.0%
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***164***	***4.5%***	***50***	***8.6%***	***6***	***4.6%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	4	0.1%	1	0.2%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.1%	1	0.2%	0	0.0%

OCULAR DISORDERS REPORT
CARDIGAN WELSH CORGI

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	3,676		583		131	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
VITREOUS Continued						
110.320 VITREOUS DEGENERATION SYNERESIS	4	0.1%	1	0.2%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	24	0.7%	1	0.2%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	6	0.2%	1	0.2%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	9	0.2%	0	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	1	0.2%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	3	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	16	0.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	39	1.1%	1	0.2%	1	0.8%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	19	0.5%	16	2.7%	3	2.3%
NORMAL						
.000 NORMAL GLOBE	3,237	88.1%	484	83.0%	117	89.3%

CAROLINA DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CAROLINA DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CAROLINA DOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		2		2	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	0		2	100.0%	2	100.0%

CATALAN SHEEPDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CATALAN SHEEPDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CATALAN SHEEPDOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
93.150 IRIS COLOBOMA	1	100.0%	0		0	

CAUCASIAN SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CAUCASIAN SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CAUCASIAN SHEPHERD

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	8		9		2	
	Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	1	12.5%	0	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	0	0.0%	1	11.1%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	12.5%	1	11.1%	0	0.0%
LENS							
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	1	11.1%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	11.1%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	1	11.1%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	11.1%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	11.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***0***	***0.0%***	***5***	***55.6%***	***0***	***0.0%***
OTHER							
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	0	0.0%	1	50.0%
NORMAL							
.000	NORMAL GLOBE	6	75.0%	6	66.7%	1	50.0%

CAVALIER KING CHARLES SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Microphthalmia with multiple ocular defects	Not defined	1, 2	NO
B.	Keratoconjunctivitis sicca	Not defined	3	NO
C.	Congenital KCS and ichthyosiform dermatosis	Autosomal recessive	4, 5	NO
D.	Entropion	Not defined	1	Breeder option
E.	Distichiasis	Not defined	1	Breeder option
F.	Imperforate lacrimal punctum	Not defined	1	Breeder option
G.	Corneal dystrophy - epithelial/stromal	Not defined	1, 6	Breeder option
H.	Exposure/pigmentary keratitis	Not defined	1	Breeder option
I.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
J.	Cataract	Not defined	1, 2, 7	NO
K.	Y-suture tip opacity	Not defined	1	Breeder option
L.	Vitreous degeneration	Not defined	1	Breeder option
M.	Retinal dysplasia - folds	Not defined	1	Breeder option
N.	Retinal dysplasia - geographic	Not defined	1	NO

Description and Comments

A. Microphthalmia

Microphthalmia is a congenital defect characterized by a small eye often associated with other ocular malformations, including defects of the cornea, anterior chamber, lens and/or retina.

B. Keratoconjunctivitis sicca (KCS)

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

C. Congenital KCS and ichthyosiform dermatosis

A syndrome in which dogs are born with severe to absolute keratoconjunctivitis sicca (KCS) which is poorly responsive to lacrimostimulant treatment. Co-morbid congenital dermatopathy affecting haircoat, skin and footpads is severe and requires intensive life-long care. Clinical signs are so devastating that affected dogs are often euthanized.

D. Entropion

A conformational defect resulting in "in-rolling" of one or both of the eyelids, which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

E. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

F. Imperforate Lacrimal Punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

G. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral. In the Cavalier King Charles Spaniel, lesions are circular or semicircular central crystalline deposits in the anterior corneal stroma that appear between 2 and 5 years of age. It may be associated with exophthalmos and lagophthalmos common in these dogs.

H. Exposure/pigmentary keratitis

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

I. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

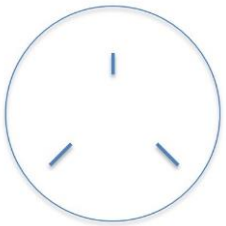
J. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Cavalier King Charles Spaniel, onset is at an early age (less than 6 months), affecting the cortex and nucleus with rapid progression to complete cataract, resulting in blindness.

K. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts -

which would either be breeder option or failing.

L. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

M. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

N. Retinal dysplasia – geographic

Abnormal development of the retina present at birth. Any irregularly shaped area of abnormal retinal development containing both areas of thinning and areas of elevation representing folds and retinal disorganization.

References

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2. Narfstrom K, Dubielzig R. Posterior lenticonus, cataracts and microphthalmia: Congenital defects in the Cavalier King Charles spaniel. *J Small Anim Pract*. 1984;25.

3. Sanchez RF, Innocent G, Mould J, et al. Canine keratoconjunctivitis sicca: disease trends in a review of 229 cases. *J Small Anim Pract*. 2007;48:211-217.

4. Hartley C, Donaldson D, Smith KC, et al. Congenital keratoconjunctivitis sicca and ichthyosiform dermatosis in 25 Cavalier King Charles spaniel dogs – part I: clinical signs, histopathology, and inheritance. *Vet Ophthalmol*. 2012;15:315-326.

5. Barnett KC. Congenital keratoconjunctivitis sicca and ichthyosiform dermatosis in the Cavalier King Charles Spaniel. *J Small Anim Pract*. 2006;47:524-528.

6. Crispin SM, Barnett KC. Dystrophy, degeneration and infiltration of the canine cornea. *J Small Anim Pract*. 1983;24:63-83.

7. Barnett KC. The diagnosis and differential diagnosis of cataract in the dog. *J Small Anim Pract*. 1985;26:305-316.

OCULAR DISORDERS REPORT
CAVALIER KING CHARLES SPANIEL

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	49,905		16,316		3,703	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	73	0.1%	22	0.1%	4	0.1%
10.000	GLAUCOMA	3	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	3	0.0%	1	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	126	0.3%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	208	0.4%	66	0.4%	18	0.5%
22.000	ECTROPION, UNSPECIFIED	10	0.0%	1	0.0%	0	0.0%
25.110	DISTICHIASIS	4,546	9.1%	1,406	8.6%	371	10.0%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	25	0.1%	54	0.3%	8	0.2%
40.910	KERATOCONJUNCTIVITIS SICCA	87	0.2%	38	0.2%	8	0.2%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	1	0.0%	1	0.0%	0	0.0%
51.100	THIRD EYELID CARTILAGE ANOMALY	6	0.0%	3	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	18	0.0%	2	0.0%	3	0.1%
CORNEA							
70.210	PANNUS	14	0.0%	5	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	245	0.5%	121	0.7%	28	0.8%
70.700	CORNEAL DYSTROPHY	4,432	8.9%	1,296	7.9%	291	7.9%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	51	0.1%	14	0.1%	1	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	4	0.0%	0	0.0%	0	0.0%
93.120	IRIS CYST	18	0.0%	4	0.0%	2	0.1%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	7	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	4	0.0%	1	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	4	0.0%	1	0.0%	0	0.0%
93.180	IIRIS SPHINCTER DYSPLASIA	0	0.0%	3	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	527	1.1%	213	1.3%	61	1.6%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	36	0.1%	5	0.0%	1	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	33	0.1%	3	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	44	0.1%	1	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	28	0.1%	43	0.3%	13	0.4%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	11	0.0%	2	0.0%	0	0.0%
95.120	CILIARY BODY CYST	0	0.0%	3	0.0%	1	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	10	0.1%	1	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	8	0.0%	2	0.0%	2	0.1%
97.120	COLOBOMA	4	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	57	0.1%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1,842	3.7%	493	3.0%	89	2.4%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	372	0.7%	256	1.6%	44	1.2%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	134	0.3%	66	0.4%	12	0.3%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	125	0.3%	70	0.4%	6	0.2%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	57	0.1%	28	0.2%	5	0.1%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	182	0.4%	126	0.8%	10	0.3%
100.306	PUNCTATE CATARACT, NUCLEUS	157	0.3%	78	0.5%	14	0.4%

OCULAR DISORDERS REPORT
CAVALIER KING CHARLES SPANIEL

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	49,905		16,316		3,703	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.307 PUNCTATE CATARACT, CAPSULAR	72	0.1%	67	0.4%	9	0.2%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	373	0.7%	133	0.8%	13	0.4%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	269	0.5%	93	0.6%	12	0.3%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	158	0.3%	49	0.3%	5	0.1%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	28	0.1%	9	0.1%	3	0.1%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	78	0.2%	31	0.2%	9	0.2%
100.316 INCIPIENT CATARACT, NUCLEUS	231	0.5%	67	0.4%	19	0.5%
100.317 INCIPIENT CATARACT, CAPSULAR	71	0.1%	30	0.2%	8	0.2%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	25	0.1%	26	0.2%	11	0.3%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	31	0.1%	45	0.3%	11	0.3%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	8	0.0%	9	0.1%	1	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	5	0.0%	2	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	17	0.0%	27	0.2%	3	0.1%
100.327 INCOMPLETE CATARACT, CAPSULAR	5	0.0%	12	0.1%	1	0.0%
100.328 Y-SUTURE TIP OPACITIES	52	0.1%	111	0.7%	45	1.2%
100.330 GENERALIZED/ COMPLETE CATARACT	218	0.4%	16	0.1%	6	0.2%
100.340 RESORBING/ HYPERMATURE CATARACT	9	0.0%	4	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	16	0.0%	2	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2,734***	***5.5%***	***1,355***	***8.3%***	***247***	***6.7%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	82	0.2%	32	0.2%	9	0.2%
110.135 PHPV/ PTVL	31	0.1%	3	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	32	0.1%	10	0.1%	3	0.1%
110.320 VITREOUS DEGENERATION SYNERESIS	193	0.4%	70	0.4%	12	0.3%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	3,627	7.3%	616	3.8%	96	2.6%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1,466	2.9%	278	1.7%	48	1.3%
120.190 RETINAL DYSPLASIA, DETACHED	164	0.3%	23	0.1%	4	0.1%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	151	0.3%	16	0.1%	5	0.1%
120.400 RETINAL HEMORRHAGE	6	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	20	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	3	0.0%	2	0.1%
120.960 RETINOPATHY	24	0.0%	35	0.2%	1	0.0%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	24	0.0%	7	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	12	0.0%	6	0.0%	1	0.0%
130.150 OPTIC DISC COLOBOMA	23	0.0%	30	0.2%	4	0.1%
OTHER						
900.000 OTHER, UNSPECIFIED	596	1.2%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	1,138	2.3%	42	0.3%	10	0.3%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	580	1.2%	772	4.7%	136	3.7%
NORMAL						
.000 NORMAL GLOBE	36,268	72.7%	11,100	68.0%	2,612	70.5%

CENTRAL ASIAN SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CENTRAL ASIAN SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CENTRAL ASIAN SHEPHERD

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	6		4		3	
	Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	16.7%	1	25.0%	1	33.3%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	16.7%	2	50.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	1	25.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	50.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***0***	***0.0%***	***3***	***75.0%***	***0***	***0.0%***
OTHER							
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	25.0%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	4	66.7%	0	0.0%	2	66.7%

CESKY TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CESKY TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CESKY TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 117 #	 %	Year Examined: 2016-2020 Total # Dogs: 19 #	 %	Year Examined: 2021 Total # Dogs: 7 #	 %
EYELIDS						
25.110 DISTICHIASIS	19	16.2%	0	0.0%	0	0.0%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.9%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	8	6.8%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3	2.6%	3	15.8%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	0	0.0%	1	14.3%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.9%	0	0.0%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	0	0.0%	0	0.0%	1	14.3%
97.150 CHORIORETINAL COLOBOMA, CONGENITAL	1	0.9%	0	0.0%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	1	0.9%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	1	0.9%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.9%	0	0.0%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.9%	0	0.0%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	2	1.7%	0	0.0%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.9%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.9%	1	5.3%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***6***	***5.1%***	***1***	***5.3%***	***0***	***0.0%***
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	8	6.8%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.9%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.9%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	4	3.4%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.9%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	79	67.5%	15	78.9%	6	85.7%

CHART POLSKI

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CHART POLSKI breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CHART POLSKI

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	7		5		1	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	0	0.0%	1	20.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	14.3%	0	0.0%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	2	28.6%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	14.3%	0	0.0%	0	0.0%
VITREOUS						
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	14.3%	0	0.0%	0	0.0%
OPTIC NERVE						
130.150 OPTIC DISC COLOBOMA	1	14.3%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	3	42.9%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	1	14.3%	4	80.0%	1	100.0%

CHESAPEAKE BAY RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Presumed incomplete dominant	1, 2	NO	
D.	Retinal atrophy (*prcd*)	Autosomal recessive	3	NO	Mutation in the *prcd* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located in the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Hereditary cataracts have been described in the Chesapeake Bay Retriever and affect the young adult dog. They appear as posterior cortical, axial, triangular opacities and the Y suture tips can be affected in both the anterior and posterior cortices. Extension of the cataract into the posterior cortex and progression to impair vision can occur. An autosomal dominant inheritance with incomplete penetrance has been proposed; however, the genetics have not been completely defined and additional studies will be required.

D. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Chesapeake Bay Retriever is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available. It is important to note than in all breeds in which a molecular diagnostic test for the disease is available, it is possible to have dogs diagnosed clinically as affected, yet the DNA test results are normal. This suggests that other genetic causes of PRA exist or that the diagnosed affected dog has an acquired disease that mimics the inherited disorder.

A second, less common form of PRA is also present in the Chesapeake Bay Retriever with ophthalmoscopic abnormalities characteristic of mid-stage disease found in dogs between 8-12 months of age. The lesions are progressive and end-stage lesions are evident by 2-3 years of age. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN. Cataracts in Chesapeake Bay retrievers. *J Am Vet Med Assoc*. 1979;175:1176-1178.

3. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT
CHESAPEAKE BAY RETRIEVER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	12,684		1,882		338	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	7	0.1%	1	0.1%	0	0.0%
10.000	GLAUCOMA	4	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	2	0.0%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	3	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	54	0.4%	4	0.2%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	7	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	913	7.2%	174	9.2%	30	8.9%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	1	0.1%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	2	0.0%	1	0.1%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	1	0.0%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	76	0.6%	14	0.7%	4	1.2%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.0%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	1	0.1%	0	0.0%
93.120	IRIS CYST	20	0.2%	8	0.4%	2	0.6%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	3	0.0%	2	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	221	1.7%	57	3.0%	11	3.3%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	11	0.1%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.0%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	14	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	41	0.3%	57	3.0%	7	2.1%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.0%	0	0.0%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	1	0.1%	0	0.0%
95.120	CILIARY BODY CYST	2	0.0%	1	0.1%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	3	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	74	0.6%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	537	4.2%	102	5.4%	14	4.1%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	58	0.5%	38	2.0%	2	0.6%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	118	0.9%	27	1.4%	2	0.6%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	41	0.3%	14	0.7%	2	0.6%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	10	0.1%	10	0.5%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	51	0.4%	11	0.6%	1	0.3%
100.306	PUNCTATE CATARACT, NUCLEUS	8	0.1%	13	0.7%	3	0.9%
100.307	PUNCTATE CATARACT, CAPSULAR	39	0.3%	38	2.0%	2	0.6%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	55	0.4%	20	1.1%	3	0.9%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	218	1.7%	39	2.1%	7	2.1%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	56	0.4%	12	0.6%	2	0.6%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	8	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	46	0.4%	8	0.4%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	22	0.2%	3	0.2%	1	0.3%

OCULAR DISORDERS REPORT
CHESAPEAKE BAY RETRIEVER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	12,684		1,882		338	
	Diagnostic Name	#	%	#	%	#	%
LENS Continued							
100.317	INCIPIENT CATARACT, CAPSULAR	23	0.2%	5	0.3%	1	0.3%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	2	0.1%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.0%	6	0.3%	1	0.3%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	4	0.2%	0	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	2	0.0%	3	0.2%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	8	0.1%	12	0.6%	1	0.3%
100.330	GENERALIZED/ COMPLETE CATARACT	43	0.3%	1	0.1%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	7	0.1%	1	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***884***	***7.0%***	***267***	***14.2%***	***28***	***8.3%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	20	0.2%	2	0.1%	0	0.0%
110.135	PHPV/ PTVL	10	0.1%	0	0.0%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	49	0.4%	15	0.8%	2	0.6%
110.320	VITREOUS DEGENERATION SYNERESIS	40	0.3%	13	0.7%	1	0.3%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	80	0.6%	7	0.4%	1	0.3%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	49	0.4%	5	0.3%	1	0.3%
120.190	RETINAL DYSPLASIA, DETACHED	2	0.0%	1	0.1%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	91	0.7%	5	0.3%	0	0.0%
120.400	RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960	RETINOPATHY	1	0.0%	10	0.5%	0	0.0%
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.1%	0	0.0%
OPTIC NERVE							
130.110	MICROPAPILLA	1	0.0%	0	0.0%	1	0.3%
130.120	OPTIC NERVE HYPOPLASIA	2	0.0%	0	0.0%	0	0.0%
130.150	OPTIC DISC COLOBOMA	2	0.0%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	127	1.0%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	331	2.6%	7	0.4%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	142	1.1%	114	6.1%	20	5.9%
NORMAL							
.000	NORMAL GLOBE	10,407	82.0%	1,307	69.4%	250	74.0%

CHIHUAHUA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - endothelial	Not defined	1, 2	NO	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Vitreous degeneration - anterior chamber	Not defined	1	Breeder option	
	- syneresis	Not defined	1	Breeder option	
F.	Retinal atrophy (*prcd*)	Autosomal recessive	3, 4	NO	Mutation in the *prcd* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - endothelial

An abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision. This usually does not occur until the animal is older.

In the Chihuahua, this is a primary degenerative endothelial disease leading to progressive and permanent corneal edema. It is suspected to be a heritable disorder. There is no sex predilection. The condition is observed in older dogs, 6 to 13 years of age with a mean of 9.5 years. The corneal edema starts asymptomatically in the dorsal temporal corneal quadrant of one eye and slowly progresses medially, eventually involving the entire cornea. Typically, it becomes bilateral. In the later stages, discomfort,

intracorneal bullae with subsequent ulceration and keratoconus may develop. Histologically, the primary endothelial disease appears slightly different from the clinically similar disorder of the Boston Terrier.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

F. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Chihuahua is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Martin CL and Dice PF. Corneal endothelial dystrophy in the dog. *J Am Anim Hosp Assoc.* 1982;18:327.

3. Hyama M, Tada N, Mitsui H, et al. Real-time PCR genotyping in assay for canine progressive rod-cone degeneration and mutant allele frequency in Toy Poodles, Chihuahuas, and Miniature Dachshunds in Japan. J Vet Med Sci 2016; 78(3): 481.

4. Downs LM, Hitti R, Pregnolato S, et al. Genetic screening for PRA-associated mutations in multiple dog breeds shows that PRA is heterogeneous within and between breeds. *Vet Ophthalmol*. 2014;17:126-130.

OCULAR DISORDERS REPORT
CHIHUAHUA

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,478		1,072		379	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.1%	1	0.1%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	3	0.2%	3	0.3%	2	0.5%
25.110	DISTICHIASIS	80	5.4%	36	3.4%	10	2.6%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	3	0.2%	3	0.3%	1	0.3%
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.1%	2	0.2%	1	0.3%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	4	0.3%	2	0.2%	0	0.0%
CORNEA							
70.220	PIGMENTARY KERATITIS	2	0.1%	4	0.4%	0	0.0%
70.700	CORNEAL DYSTROPHY	3	0.2%	3	0.3%	3	0.8%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	5	0.3%	3	0.3%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	112	7.6%	55	5.1%	17	4.5%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	4	0.3%	0	0.0%	1	0.3%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	7	0.5%	4	0.4%	3	0.8%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.1%	0	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	1	0.1%	0	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	3	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	45	3.0%	21	2.0%	7	1.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	13	0.9%	14	1.3%	1	0.3%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.1%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	3	0.2%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	3	0.2%	1	0.1%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.1%	2	0.2%	3	0.8%
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.1%	4	0.4%	1	0.3%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	26	1.8%	13	1.2%	3	0.8%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	17	1.2%	6	0.6%	3	0.8%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	7	0.5%	3	0.3%	1	0.3%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.1%	1	0.1%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	6	0.4%	3	0.3%	2	0.5%
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.1%	4	0.4%	1	0.3%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.1%	3	0.3%	1	0.3%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	0	0.0%	3	0.8%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	1	0.3%
100.326	INCOMPLETE CATARACT, NUCLEUS	2	0.1%	2	0.2%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	1	0.1%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	12	0.8%	0	0.0%	1	0.3%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	2	0.2%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***105***	***7.1%***	***58***	***5.4%***	***21***	***5.5%***

OCULAR DISORDERS REPORT
CHIHUAHUA

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,478 #	 %	Year Examined: 2016-2020 Total # Dogs: 1,072 #	 %	Year Examined: 2021 Total # Dogs: 379 #	 %
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	2	0.1%	0	0.0%	0	0.0%
110.135 PHPV/ PTVL	2	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	14	0.9%	15	1.4%	4	1.1%
110.320 VITREOUS DEGENERATION SYNERESIS	49	3.3%	15	1.4%	5	1.3%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	7	0.5%	2	0.2%	1	0.3%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	3	0.2%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	11	0.7%	1	0.1%	0	0.0%
120.960 RETINOPATHY	1	0.1%	1	0.1%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.1%	1	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	0	0.0%	1	0.1%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	21	1.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	23	1.6%	1	0.1%	1	0.3%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	25	1.7%	41	3.8%	17	4.5%
NORMAL						
.000 NORMAL GLOBE	1,179	79.8%	875	81.6%	311	82.1%

CHINESE CRESTED

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	4	NO	
D.	Lens luxation	Autosomal recessive	2, 3	NO	Mutation in the *ADAMTS17 gene*
E.	Vitreous degeneration - anterior chamber - syneresis	 Not defined Not defined	 1 1	 Breeder option Breeder option	
F.	Retinal atrophy (*prcd*)	Autosomal recessive	4	NO	Mutation in the *prcd* gene
G.	Retinal atrophy - rod-cone dysplasia type 3 (rcd3)	Autosomal recessive	5, 6	NO	Mutation in the *PDE6A* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from its normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

E. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

F. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Chinese Crested is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

In the Chinese Crested, a second, but very infrequency type of PRA has been identified that is caused by the mutation in the *PDE6A* gene that causes PRA in Cardigan Welsh Corgis. However, most cases of PRA that test normal for the *prcd* gene defect likely results from a gene defect that is still to be identified.

G. Retinal atrophy - rod-cone dysplasia type 3 (*rcd3*)

PRA in the Chinese Crested is an autosomal recessive trait caused by a one base pair deletion in the gene encoding the alpha subunit of cyclic GMP phosphodiesterase (rcd3). PRA begins early in life with clinical signs of night blindness and a lack of rod ERG responses is seen at 6-8 weeks of age. Dogs are completely blind by 2-3 years of age when ophthalmoscopic signs are first visible. The mutation is found in the *PDE6A* gene. A DNA test is available.

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OCULAR DISORDERS REPORT
CHINESE CRESTED

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	6,499		535		116	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	4	0.1%	0	0.0%	0	0.0%
10.000	GLAUCOMA	2	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	2	0.0%	1	0.2%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	4	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	39	0.6%	5	0.9%	1	0.9%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	3	0.0%	2	0.4%	1	0.9%
40.910	KERATOCONJUNCTIVITIS SICCA	18	0.3%	1	0.2%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	3	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	5	0.1%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	7	0.1%	1	0.2%	0	0.0%
70.700	CORNEAL DYSTROPHY	34	0.5%	4	0.7%	1	0.9%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.0%	1	0.2%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	5	0.1%	0	0.0%	0	0.0%
93.120	IRIS CYST	3	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	2	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	166	2.6%	17	3.2%	4	3.4%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	11	0.2%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	10	0.2%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	5	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	3	0.0%	0	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.0%	1	0.2%	0	0.0%
95.120	CILIARY BODY CYST	1	0.0%	0	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	3	0.0%	0	0.0%	0	0.0%
97.120	COLOBOMA	2	0.0%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	152	2.3%	19	3.6%	5	4.3%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	34	0.5%	18	3.4%	3	2.6%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	20	0.3%	2	0.4%	1	0.9%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	13	0.2%	3	0.6%	1	0.9%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	4	0.1%	1	0.2%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	8	0.1%	2	0.4%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	10	0.2%	5	0.9%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	6	0.1%	4	0.7%	2	1.7%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	42	0.6%	4	0.7%	1	0.9%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	30	0.5%	2	0.4%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	30	0.5%	1	0.2%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.0%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	5	0.1%	1	0.2%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	5	0.1%	1	0.2%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.0%	2	0.4%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	2	0.4%	1	0.9%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.0%	3	0.6%	1	0.9%

OCULAR DISORDERS REPORT
CHINESE CRESTED

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 6,499 #	 %	2016-2020 535 #	 %	2021 116 #	 %
LENS Continued						
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	1	0.9%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.2%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.2%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	4	0.1%	1	0.2%	1	0.9%
100.330 GENERALIZED/ COMPLETE CATARACT	26	0.4%	2	0.4%	1	0.9%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	2	0.4%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	25	0.4%	5	0.9%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***245***	***3.8%***	***58***	***10.8%***	***13***	***11.2%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	6	0.1%	2	0.4%	0	0.0%
110.135 PHPV/ PTVL	2	0.0%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	234	3.6%	25	4.7%	1	0.9%
110.320 VITREOUS DEGENERATION SYNERESIS	522	8.0%	31	5.8%	4	3.4%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	31	0.5%	1	0.2%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	6	0.1%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	2	0.0%	0	0.0%	1	0.9%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	96	1.5%	3	0.6%	0	0.0%
120.400 RETINAL HEMORRHAGE	4	0.1%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	8	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.0%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	4	0.1%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	13	0.2%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	8	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	68	1.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	152	2.3%	2	0.4%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	44	0.7%	21	3.9%	2	1.7%
NORMAL						
.000 NORMAL GLOBE	5,517	84.9%	422	78.9%	96	82.8%

CHINESE FOO DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Chinese Foo Dog. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Genetic Test Available; No Reference

OCULAR DISORDERS REPORT
CHINESE FOO DOG

There are no statistics available for this breed

CHINESE SHAR-PEI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma – POAG	Autosomal recessive	2-4	NO	Mutation in the *ADAMTS17* gene
B.	Entropion	Not defined	1, 5-8	NO	
C.	Secondary keratitis - chronic	Not defined	1	Breeder option	
D.	Lens luxation	Autosomal recessive	1, 2, 9	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

A 6 base pair deletion in exon 22 of *ADAMTS17* has been found in some affected Chinese Shar-Pei. Results supported phenotype is an autosomal recessive trait. A genetic test is available.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

The condition is a particularly severe problem in the Chinese Shar-Pei and is compounded by breeder selection for facial conformation with heavy skin folds which encourages formation of entropion.

C. Secondary keratitis - chronic

A specific designation does not exist on the CAER form for this condition. We ask examiners to mark other – unlisted conditions suspected as inherited. Then in the comments box please write secondary keratitis – chronic.

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. Often associated with entropion or a combination of entropion and ectropion.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness.

A 6 base pair deletion in exon 22 of *ADAMTS17* has been found in some affected Chinese Shar-Pei. Results supported phenotype is an autosomal recessive trait. A genetic test is available.

References

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OCULAR DISORDERS REPORT
CHINESE SHAR-PEI

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	603		94		27	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.2%	1	1.1%	0	0.0%
10.000	GLAUCOMA	0	0.0%	1	1.1%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	306	50.7%	27	28.7%	13	48.1%
22.000	ECTROPION, UNSPECIFIED	12	2.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	3	0.5%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.2%	1	1.1%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.3%	1	1.1%	0	0.0%
CORNEA							
70.210	PANNUS	29	4.8%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	11	1.8%	10	10.6%	1	3.7%
70.700	CORNEAL DYSTROPHY	4	0.7%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	6	1.0%	1	1.1%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	15	2.5%	1	1.1%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	5	0.8%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.8%	3	3.2%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.3%	2	2.1%	2	7.4%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.2%	0	0.0%	0	0.0%
93.810	UVEAL MELANOMA	1	0.2%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	4	0.7%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	13	2.2%	3	3.2%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	2	0.3%	1	1.1%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.2%	1	1.1%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.3%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.2%	2	2.1%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.2%	0	0.0%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	2	0.3%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	5	0.8%	1	1.1%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	1	1.1%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.3%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	1	0.2%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	2	0.3%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	9	1.5%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***24***	***4.0%***	***6***	***6.4%***	***0***	***0.0%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.2%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	1	0.2%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	4	0.7%	0	0.0%	1	3.7%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.2%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	0.3%	0	0.0%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.2%	0	0.0%	0	0.0%
OPTIC NERVE							
130.120	OPTIC NERVE HYPOPLASIA	1	0.2%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
CHINESE SHAR-PEI

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	603		94		27	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
OTHER						
900.000 OTHER, UNSPECIFIED	9	1.5%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	17	2.8%	1	1.1%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	21	3.5%	7	7.4%	3	11.1%
NORMAL						
.000 NORMAL GLOBE	286	47.4%	50	53.2%	10	37.0%

CHINOOK

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Persistent pupillary membranes	Not defined	1	Breeder option	
	- iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Retinal dysplasia - folds	Not defined	1	Breeder option	
D.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	2	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal

dysplasia is undetermined.

D. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
CHINOOK

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,398 #	 %	Year Examined: 2016-2020 Total # Dogs: 269 #	 %	Year Examined: 2021 Total # Dogs: 69 #	 %
EYELIDS						
20.140 ECTOPIC CILIA	1	0.1%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	5	0.4%	0	0.0%	0	0.0%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	1	0.1%	0	0.0%	0	0.0%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	3	0.2%	3	1.1%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	2	0.1%	1	0.4%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	1	0.1%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	86	6.2%	9	3.3%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.1%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.1%	1	0.4%	1	1.4%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
93.810 UVEAL MELANOMA	1	0.1%	0	0.0%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	0	0.0%	1	0.4%	1	1.4%
LENS						
100.200 CATARACT, UNSPECIFIED	2	0.1%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	75	5.4%	17	6.3%	1	1.4%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	7	0.5%	4	1.5%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.1%	2	0.7%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.1%	2	0.7%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.4%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	3	0.2%	4	1.5%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	8	0.6%	4	1.5%	1	1.4%
100.307 PUNCTATE CATARACT, CAPSULAR	3	0.2%	6	2.2%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	8	0.6%	2	0.7%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	16	1.1%	2	0.7%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	7	0.5%	1	0.4%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	9	0.6%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	7	0.5%	1	0.4%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	5	0.4%	0	0.0%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.1%	0	0.0%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.1%	2	0.7%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	1.4%
100.328 Y-SUTURE TIP OPACITIES	1	0.1%	4	1.5%	1	1.4%
100.330 GENERALIZED/ COMPLETE CATARACT	9	0.6%	1	0.4%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***92***	***6.6%***	***36***	***13.4%***	***3***	***4.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	2	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	15	1.1%	3	1.1%	1	1.4%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	63	4.5%	2	0.7%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
CHINOOK

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,398 #	 %	2016-2020 269 #	 %	2021 69 #	 %
RETINA Continued						
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.4%	0	0.0%
OPTIC NERVE						
130.150 OPTIC DISC COLOBOMA	0	0.0%	0	0.0%	1	1.4%
OTHER						
900.000 OTHER, UNSPECIFIED	19	1.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	41	2.9%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	11	0.8%	9	3.3%	6	8.7%
NORMAL						
.000 NORMAL GLOBE	1,179	84.3%	216	80.3%	58	84.1%

CHOW CHOW

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Autosomal recessive	1-3	NO
B.	Entropion	Not defined	1	NO
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- iris to cornea	Not defined	1	NO
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
	- endothelial opacity/no strands	Not defined		NO
D.	Cataract	Not defined	1, 4	NO

DESCRIPTION AND COMMENTS

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine screening exam for certification.

Age of onset in the Chow Chow appears to be anywhere between 3-6 years of age and has been observed as a bilateral condition. Gonioscopy has shown extremely narrow iridocorneal angles and in many regions no evidence of trabecular meshwork.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

Entropion in the Chow Chow has been observed for decades and is definitely related to the amount of skin covering the head and face. Because of the conformation admired by both fanciers and the judges, it is doubtful that we will see a significant change in the incidence of entropion as folds are, in many cases, desired by these individuals. Entropion requires

surgical correction in the Chow Chow to return comfort and decrease chances for vision loss.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Major PPM's have been observed in the Chow Chow. Many ophthalmologists have observed puppies so severely affected that they are temporarily or permanently blind. The blindness is due to adherence of the membranes to the cornea and/or lens.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Chow Chow, the only reported cataract is congenital. The clinical appearance is variable, ranging from small nuclear or capsular opacities to generalized opacity. The central lens (nucleus) is most consistently affected with variable involvement of the peripheral lens (cortex). Concurrent ocular anomalies may include entropion, microphthalmia, persistent pupillary membranes, and retinal folds, although any direct relationship of these latter conditions to the cataract is unclear.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, MacKay EO. Prevalence of the breed-related glaucomas in pure-bred dogs in North America. *Vet Ophthalmol*. 2004;7:97-111.

3. Corcaran KA, Koch SA. Primary glaucoma in the Chow chows. *Prog Vet Comp Ophthal*. 1994;4:193-197.

4. Collins BK, Collier LL, Johnson GS, et al. Familial cataracts and concurrent ocular anomalies in chow chows. *J Am Vet Med Assoc*. 1992;200:1485-1491.

OCULAR DISORDERS REPORT
CHOW CHOW

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,336		212		73	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	4	0.3%	0	0.0%	0	0.0%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	3	0.2%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	365	27.3%	40	18.9%	16	21.9%
22.000	ECTROPION, UNSPECIFIED	22	1.6%	5	2.4%	1	1.4%
25.110	DISTICHIASIS	8	0.6%	2	0.9%	0	0.0%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	2	0.1%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	9	0.7%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	25	1.9%	3	1.4%	0	0.0%
70.700	CORNEAL DYSTROPHY	8	0.6%	1	0.5%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	17	1.3%	0	0.0%	0	0.0%
UVEA							
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	5	0.4%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	463	34.7%	64	30.2%	24	32.9%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	17	1.3%	1	0.5%	1	1.4%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	55	4.1%	8	3.8%	1	1.4%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	8	0.6%	1	0.5%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	12	0.9%	7	3.3%	3	4.1%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.1%	8	3.8%	1	1.4%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	29	2.2%	3	1.4%	1	1.4%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	2	0.1%	0	0.0%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	5	0.4%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.1%	1	0.5%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	2	0.1%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.1%	1	0.5%	1	1.4%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	5	0.4%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	9	0.7%	1	0.5%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	3	0.2%	2	0.9%	0	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.5%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	1	0.5%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***35***	***2.6%***	***7***	***3.3%***	***1***	***1.4%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	5	0.4%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	2	0.1%	1	0.5%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2	0.1%	0	0.0%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.1%	0	0.0%	0	0.0%
120.190	RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	8	0.6%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
CHOW CHOW

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,336 #	 %	2016-2020 212 #	 %	2021 73 #	 %
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	17	1.3%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	22	1.6%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	21	1.6%	7	3.3%	2	2.7%
NORMAL						
.000 NORMAL GLOBE	602	45.1%	95	44.8%	31	42.5%

CIRNECO DELL'ETNA

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CIRNECO DELL'ETNA breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CIRNECO DELL ETNA

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 19 #	%	2016-2020 46 #	%	2021 23 #	%
EYELIDS						
25.110 DISTICHIASIS	1	5.3%	1	2.2%	2	8.7%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	2	4.3%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	2.2%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	4.3%	2	8.7%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	1	2.2%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	2.2%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	2.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***3***	***6.5%***	***0***	***0.0%***
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	0	0.0%	1	2.2%	0	0.0%
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	4.3%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	18	94.7%	38	82.6%	19	82.6%

CLUMBER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1, 2	Breeder option
B.	Ectropion	Not defined	1	Breeder option
C.	Distichiasis	Not defined	1	Breeder option
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
E.	Cataract	Not defined	1	NO
F.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Entropion

A conformational defect resulting in "in-rolling" of one or both of the eyelids, which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Hodgman SFJ. Abnormalities and defects in pedigree dogs: I. An investigation into the existence of abnormalities in pedigree dogs in British Isles. *J Small Anim Pract*. 1963;4:447-456.

OCULAR DISORDERS REPORT
CLUMBER SPANIEL

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	2,686		273		88	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	6	0.2%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	167	6.2%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	583	21.7%	56	20.5%	23	26.1%
22.000	ECTROPION, UNSPECIFIED	435	16.2%	30	11.0%	17	19.3%
25.110	DISTICHIASIS	192	7.1%	30	11.0%	14	15.9%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	5	0.2%	0	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	18	0.7%	3	1.1%	2	2.3%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	13	0.5%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	11	0.4%	1	0.4%	0	0.0%
70.700	CORNEAL DYSTROPHY	5	0.2%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	0	0.0%	1	0.4%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	62	2.3%	7	2.6%	1	1.1%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.1%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	0.2%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.1%	0	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	2	0.1%	0	0.0%	0	0.0%
97.120	COLOBOMA	3	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	15	0.6%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	86	3.2%	14	5.1%	4	4.5%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	20	0.7%	8	2.9%	3	3.4%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	28	1.0%	1	0.4%	2	2.3%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	6	0.2%	2	0.7%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	15	0.6%	4	1.5%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.2%	4	1.5%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.0%	1	0.4%	1	1.1%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	15	0.6%	1	0.4%	2	2.3%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	41	1.5%	5	1.8%	3	3.4%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	7	0.3%	0	0.0%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	15	0.6%	1	0.4%	1	1.1%
100.316	INCIPIENT CATARACT, NUCLEUS	8	0.3%	1	0.4%	1	1.1%
100.317	INCIPIENT CATARACT, CAPSULAR	5	0.2%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	1	0.4%	1	1.1%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.4%	0	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	2	0.7%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.4%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	2	0.1%	4	1.5%	0	0.0%

OCULAR DISORDERS REPORT
CLUMBER SPANIEL

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2,686		273		88	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.330 GENERALIZED/ COMPLETE CATARACT	5	0.2%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***192***	***7.1%***	***37***	***13.6%***	***14***	***15.9%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	6	0.2%	0	0.0%	1	1.1%
110.135 PHPV/ PTVL	3	0.1%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	181	6.7%	3	1.1%	4	4.5%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	8	0.3%	2	0.7%	1	1.1%
120.190 RETINAL DYSPLASIA, DETACHED	0	0.0%	1	0.4%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	15	0.6%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.0%	0	0.0%	0	0.0%
OPTIC NERVE						
130.150 OPTIC DISC COLOBOMA	2	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	25	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	64	2.4%	2	0.7%	1	1.1%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	29	1.1%	5	1.8%	3	3.4%
NORMAL						
.000 NORMAL GLOBE	1,426	53.1%	135	49.5%	33	37.5%

COCKER SPANIEL

(*American)

*The official breed name is Cocker Spaniel. The designation "American" has been used to avoid confusion and emphasize the distinction from the English Cocker Spaniel breed.

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Keratoconjunctivitis sicca	Not defined	1, 2	NO	
B.	Glaucoma	Not defined	1, 3, 4	NO	
C.	Ectropion	Not defined	1	Breeder option	
D.	Distichiasis	Not defined	1, 2, 5, 6	Breeder option	
E.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
F.	Prolapsed gland of the third eyelid	Not defined	1, 7	Breeder option	
G.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
H.	Secondary keratitis – chronic	Not defined	1	Passes with no notation	
I.	Cataract	Presumed autosomal recessive	1, 2, 8-11	NO	
J.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 12-14	NO	Mutation in the *prcd* gene
K.	Retinal dysplasia - folds	Not defined	1, 15	Breeder option	

Description and Comments

A. Keratoconjunctivitis sicca

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

C. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

D. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

E. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct adjacent to the eye. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

F. Prolapsed gland of the third eyelid

Protrusion of the tear gland associated with the third eyelid. The mode of inheritance of this disorder is unknown. The exposed gland may become irritated. Commonly referred to as "cherry eye."

G. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

H. Secondary keratitis - chronic

A specific designation does not exist on the CAER form for this condition. We ask examiners to mark other – unlisted conditions suspected as inherited. Then in the comments box please write secondary keratitis – chronic.

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. Often associated with entropion or a combination of entropion and ectropion.

I. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In this breed, the onset of cataract may occur at an early age (less than 2 years) with rapid progression to maturity and associated with significant lens-induced inflammation.

J. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Cocker Spaniel is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

K. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Williams LW, Peiffer RL, Gelatt KN, et al. A survey of ocular findings in the American cocker spaniel. *J Am Anim Hosp Assoc*. 1979;15:603-607.

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OCULAR DISORDERS REPORT
COCKER SPANIEL

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	56,980		6,604		1,271	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	35	0.1%	1	0.0%	3	0.2%
10.000	GLAUCOMA	34	0.1%	6	0.1%	3	0.2%
EYELIDS							
20.110	EYELID DERMOID	2	0.0%	0	0.0%	0	0.0%
20.140	ECTOPIC CILIA	55	0.1%	2	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	179	0.3%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	158	0.3%	8	0.1%	3	0.2%
22.000	ECTROPION, UNSPECIFIED	981	1.7%	37	0.6%	3	0.2%
25.110	DISTICHIASIS	28,710	50.4%	3,204	48.5%	632	49.7%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	473	0.8%	241	3.6%	60	4.7%
40.910	KERATOCONJUNCTIVITIS SICCA	341	0.6%	96	1.5%	18	1.4%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	0	0.0%	1	0.0%	2	0.2%
51.100	THIRD EYELID CARTILAGE ANOMALY	8	0.0%	1	0.0%	1	0.1%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	218	0.4%	22	0.3%	8	0.6%
CORNEA							
70.210	PANNUS	497	0.9%	1	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	488	0.9%	128	1.9%	23	1.8%
70.700	CORNEAL DYSTROPHY	1,582	2.8%	148	2.2%	29	2.3%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	37	0.1%	6	0.1%	0	0.0%
UVEA							
90.250	PIGMENTARY UVEITIS	1	0.0%	0	0.0%	0	0.0%
93.110	IRIS HYPOPLASIA	2	0.0%	2	0.0%	0	0.0%
93.120	IRIS CYST	20	0.0%	2	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	8	0.0%	2	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	0.0%	0	0.0%
93.180	IIRIS SPHINCTER DYSPLASIA	1	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	161	0.3%	30	0.5%	6	0.5%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	30	0.1%	2	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	35	0.1%	1	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	28	0.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	36	0.1%	35	0.5%	8	0.6%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	5	0.0%	3	0.0%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	0	0.0%	1	0.0%	1	0.1%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	5	0.0%	1	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	33	0.1%	0	0.0%	0	0.0%
97.120	COLOBOMA	14	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	1,023	1.8%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3,355	5.9%	442	6.7%	81	6.4%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1,078	1.9%	339	5.1%	50	3.9%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	564	1.0%	92	1.4%	16	1.3%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	160	0.3%	47	0.7%	7	0.6%

OCULAR DISORDERS REPORT
COCKER SPANIEL

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 56,980 #	 %	2016-2020 6,604 #	 %	2021 1,271 #	 %
LENS Continued						
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	166	0.3%	33	0.5%	14	1.1%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	212	0.4%	123	1.9%	5	0.4%
100.306 PUNCTATE CATARACT, NUCLEUS	87	0.2%	28	0.4%	4	0.3%
100.307 PUNCTATE CATARACT, CAPSULAR	105	0.2%	63	1.0%	8	0.6%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	1,048	1.8%	158	2.4%	17	1.3%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1,212	2.1%	147	2.2%	15	1.2%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	311	0.5%	64	1.0%	8	0.6%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	109	0.2%	11	0.2%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	184	0.3%	24	0.4%	3	0.2%
100.316 INCIPIENT CATARACT, NUCLEUS	193	0.3%	32	0.5%	7	0.6%
100.317 INCIPIENT CATARACT, CAPSULAR	83	0.1%	28	0.4%	7	0.6%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	46	0.1%	63	1.0%	11	0.9%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	43	0.1%	74	1.1%	9	0.7%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	6	0.0%	17	0.3%	1	0.1%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	2	0.0%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	4	0.0%	2	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	9	0.0%	25	0.4%	1	0.1%
100.327 INCOMPLETE CATARACT, CAPSULAR	1	0.0%	2	0.0%	2	0.2%
100.328 Y-SUTURE TIP OPACITIES	25	0.0%	47	0.7%	16	1.3%
100.330 GENERALIZED/ COMPLETE CATARACT	1,015	1.8%	53	0.8%	10	0.8%
100.340 RESORBING/ HYPERMATURE CATARACT	16	0.0%	22	0.3%	4	0.3%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	70	0.1%	20	0.3%	2	0.2%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***7,701***	***13.5%***	***1,496***	***22.7%***	***215***	***16.9%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	42	0.1%	10	0.2%	3	0.2%
110.135 PHPV/ PTVL	9	0.0%	1	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	20	0.0%	5	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	135	0.2%	16	0.2%	2	0.2%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	6,765	11.9%	358	5.4%	38	3.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	166	0.3%	9	0.1%	3	0.2%
120.190 RETINAL DYSPLASIA, DETACHED	9	0.0%	0	0.0%	1	0.1%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	460	0.8%	14	0.2%	1	0.1%
120.400 RETINAL HEMORRHAGE	7	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	14	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	19	0.0%	26	0.4%	3	0.2%
OPTIC NERVE						
130.110 MICROPAPILLA	4	0.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	10	0.0%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	111	0.2%	3	0.0%	2	0.2%
OTHER						
900.000 OTHER, UNSPECIFIED	451	0.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	1,059	1.9%	18	0.3%	9	0.7%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	874	1.5%	320	4.8%	68	5.4%
NORMAL						
.000 NORMAL GLOBE	23,464	41.2%	2,310	35.0%	472	37.1%

COLLIE

(Rough and Smooth varieties)

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmia	Not defined	1, 2	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes - iris to iris - iris to lens	 Not defined Not defined	 1 1	 Breeder option NO	
E.	Cataract	Not defined	1	NO	
F.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
G.	Retinal atrophy - generalized	Not defined	1	NO	
H.	Retinal atrophy-Rod/cone dysplasia type 2- (*rcd2*)	Autosomal recessive	3-66	NO	Mutation in the *RD3* gene
I.	Retinal dysplasia - folds	Not defined	1	Breeder option	
J.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	1, 7-31	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Microphthalmia

Microphthalmia is a congenital defect characterized by a small eye often associated with defects of the cornea, iris (coloboma), anterior chamber, lens (cataract) and/or retina. An association has been made between partial albinism, multiple ocular defects (especially microphthalmia) and deafness in a number of canine breeds including the Collie. From these reports it appears that a predominantly white hair coat is associated with a higher incidence of ocular defects.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. In the Collie, because there is significant clinical disease associated with the abnormal hairs, breeding of affected animals should be discouraged.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Collie, this is a particularly serious problem noted frequently on routine screening examination. The majority of persistent pupillary membranes identified on routine screening examinations include iris sheets, and bridging from the iris to cornea and the iris to lens. These may result in vision impairment.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

G. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA is inherited as an autosomal recessive trait in most breeds. In the Collie, the rod/cone degeneration occurs very rarely and in those cases has not been caused by any of the known genetic mutations.

H. Retinal atrophy - Rod-cone dysplasia type 2- (*rcd2*)

An inherited retinal disease characterized by abortive or abnormal development of rods and cones. The disease can be detected histologically by 6 weeks. Clinical night blindness is observed as early as 6 weeks with total blindness by 1 year of age. It may be diagnosed as early as 24 days with an ERG. Histologically the disease can be detected by 6 weeks. This form of retinal dysplasia is clinically similar to, but genetically distinct from that seen in the Irish Setter. This condition is caused by an insertion in *RD3.* A DNA test is available.

I. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

J. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

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OCULAR DISORDERS REPORT
COLLIE

Diagnostic Name	1991-2016 #	1991-2016 %	2016-2020 #	2016-2020 %	2021 #	2021 %
Year Examined:	**1991-2016**		**2016-2020**		**2021**	
Total # Dogs:	**55,278**		**8,911**		**1,819**	
GLOBE						
.110 MICROPHTHALMIA	835	1.5%	325	3.6%	48	2.6%
10.000 GLAUCOMA	7	0.0%	0	0.0%	0	0.0%
EYELIDS						
20.110 EYELID DERMOID	1	0.0%	0	0.0%	0	0.0%
20.140 ECTOPIC CILIA	5	0.0%	0	0.0%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	55	0.1%	3	0.0%	1	0.1%
22.000 ECTROPION, UNSPECIFIED	8	0.0%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	1,043	1.9%	136	1.5%	39	2.1%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	8	0.0%	1	0.0%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA	5	0.0%	0	0.0%	0	0.0%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	8	0.0%	5	0.1%	1	0.1%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	2	0.0%	0	0.0%	0	0.0%
CORNEA						
70.210 PANNUS	2	0.0%	1	0.0%	0	0.0%
70.220 PIGMENTARY KERATITIS	7	0.0%	1	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	386	0.7%	38	0.4%	1	0.1%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	12	0.0%	0	0.0%	0	0.0%
UVEA						
90.250 PIGMENTARY UVEITIS	1	0.0%	0	0.0%	0	0.0%
93.110 IRIS HYPOPLASIA	3	0.0%	5	0.1%	0	0.0%
93.120 IRIS CYST	19	0.0%	4	0.0%	7	0.4%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.150 IRIS COLOBOMA	23	0.0%	1	0.0%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	1	0.0%	6	0.1%	4	0.2%
93.180 IIRIS SPHINCTER DYSPLASIA	1	0.0%	3	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	8,814	15.9%	2,315	26.0%	470	25.8%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	433	0.8%	133	1.5%	22	1.2%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	123	0.2%	15	0.2%	3	0.2%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	65	0.1%	4	0.0%	4	0.2%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	29	0.1%	21	0.2%	8	0.4%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	12	0.0%	2	0.0%	0	0.0%
93.810 UVEAL MELANOMA	2	0.0%	3	0.0%	0	0.0%
95.120 CILIARY BODY CYST	1	0.0%	0	0.0%	2	0.1%
97.150 CHORIORETINAL COLOBOMA, CONGENITAL	160	0.3%	294	3.3%	37	2.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	37,715	68.2%	6,699	75.2%	1,477	81.2%
97.120 COLOBOMA	2,298	4.2%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	114	0.2%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	528	1.0%	111	1.2%	20	1.1%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	96	0.2%	21	0.2%	1	0.1%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	24	0.0%	4	0.0%	1	0.1%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	6	0.0%	0	0.0%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	30	0.1%	4	0.0%	0	0.0%

OCULAR DISORDERS REPORT
COLLIE

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 55,278 #	 %	2016-2020 8,911 #	 %	2021 1,819 #	 %
LENS Continued						
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	24	0.0%	7	0.1%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	185	0.3%	64	0.7%	14	0.8%
100.307 PUNCTATE CATARACT, CAPSULAR	38	0.1%	16	0.2%	5	0.3%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	93	0.2%	21	0.2%	4	0.2%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	109	0.2%	11	0.1%	3	0.2%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	35	0.1%	9	0.1%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	34	0.1%	7	0.1%	2	0.1%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	23	0.0%	6	0.1%	2	0.1%
100.316 INCIPIENT CATARACT, NUCLEUS	140	0.3%	53	0.6%	9	0.5%
100.317 INCIPIENT CATARACT, CAPSULAR	27	0.0%	9	0.1%	3	0.2%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	3	0.0%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	3	0.0%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	3	0.0%	6	0.1%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	4	0.0%	2	0.0%	1	0.1%
100.330 GENERALIZED/ COMPLETE CATARACT	49	0.1%	0	0.0%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	0	0.0%	1	0.1%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	8	0.0%	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,036***	***1.9%***	***248***	***2.8%***	***46***	***2.5%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	372	0.7%	37	0.4%	15	0.8%
110.135 PHPV/ PTVL	48	0.1%	5	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.0%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	44	0.1%	2	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	3,710	6.7%	728	8.2%	111	6.1%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	55	0.1%	7	0.1%	1	0.1%
120.190 RETINAL DYSPLASIA, DETACHED	86	0.2%	30	0.3%	3	0.2%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	813	1.5%	2	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	105	0.2%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	823	1.5%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	59	0.1%	117	1.3%	14	0.8%
120.960 RETINOPATHY	1	0.0%	2	0.0%	0	0.0%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	0	0.0%	1	0.1%
OPTIC NERVE						
130.110 MICROPAPILLA	132	0.2%	50	0.6%	15	0.8%
130.120 OPTIC NERVE HYPOPLASIA	231	0.4%	37	0.4%	8	0.4%
130.150 OPTIC DISC COLOBOMA	4,320	7.8%	816	9.2%	166	9.1%
OTHER						
900.000 OTHER, UNSPECIFIED	132	0.2%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	286	0.5%	18	0.2%	3	0.2%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	609	1.1%	37	0.4%	11	0.6%
NORMAL						
.000 NORMAL GLOBE	14,192	25.7%	1,442	16.2%	216	11.9%

COTON DE TULEAR

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
B.	Prolapsed gland of third eyelid	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Y-suture tip opacity	Not defined	1	Breeder option	
G.	Vitreous degeneration	Not defined	1	Breeder option	
H.	Retinal atrophy (*prcd*)	Not defined	2, 3	NO	Mutation in the *prcd* gene
I.	Multifocal retinopathy - *cmr2*	Autosomal recessive	4, 5	Breeder Option	Mutation in the *BEST1* gene

Description and Comments

A. Imperforate Lacrimal Punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

B. Prolapse of the gland of the third eyelid

Protrusion of the tear gland associated with the third eyelid. The mode of inheritance of this disorder is unknown. The exposed gland may become irritated and severe chronic inflammation or keratoconjunctivitis sicca/dry eye syndrome may ensue. Commonly referred to as "cherry eye."

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

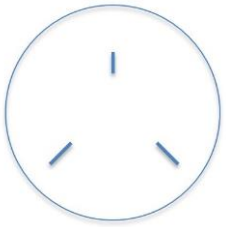
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

G. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

H. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Coton de Tulear is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

I. Multifocal retinopathy – *cmr2*

Canine Multifocal Retinopathy type 2 (*cmr2*) is characterized by numerous distinct (i.e. multi-focal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There is typically a serous sub-retinal fluid in the Coton de Tulear, although there may be accumulation of sub-retinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 15 weeks to 1 year of age. The lesions typically remain static in size and color beyond 1 year of age. The bullae appear to gradually lose the serous sub-retinal fluid after 4-5 years of age. Discrete areas of tapetal hyper-reflectivity might also be seen. Most dogs exhibit no noticeable problem with vision despite their abnormal appearing retinas. Electroretinograms reveal significant differences in photopic flickers in affected dogs.

Canine Multifocal Retinopathy type 2 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Coton du Tulear. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

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10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

4. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci*. 2007;48:1959-1967.

5. Grahn BH, Sandmeyer LL, Breaux C. Retinopathy of Coton de Tulear dogs: clinical manifestations, electroretinographic, ultrasonographic, fluorescein and indocyanine green angiographic, and optical coherence tomographic findings. *Vet Ophthalmol*. 2008;11:242-249.

OCULAR DISORDERS REPORT
COTON DE TULEAR

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	5,077		738		118	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	4	0.1%	2	0.3%	0	0.0%
25.110	DISTICHIASIS	43	0.8%	4	0.5%	3	2.5%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	10	1.4%	1	0.8%
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	1	0.1%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	13	0.3%	10	1.4%	0	0.0%
CORNEA							
70.220	PIGMENTARY KERATITIS	1	0.0%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	47	0.9%	13	1.8%	1	0.8%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.0%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	2	0.0%	0	0.0%	0	0.0%
93.120	IRIS CYST	4	0.1%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	2	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	438	8.6%	63	8.5%	11	9.3%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	8	0.2%	1	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	0.1%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.0%	2	0.3%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	8	0.2%	0	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	1	0.0%	0	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	1	0.1%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	173	3.4%	35	4.7%	8	6.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	13	0.3%	5	0.7%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	7	0.1%	3	0.4%	1	0.8%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.1%	5	0.7%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	18	0.4%	9	1.2%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	4	0.1%	2	0.3%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	13	0.3%	13	1.8%	3	2.5%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	13	0.3%	2	0.3%	2	1.7%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	16	0.3%	2	0.3%	1	0.8%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	10	0.2%	1	0.1%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.0%	1	0.1%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	3	0.1%	4	0.5%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	4	0.1%	2	0.3%	1	0.8%
100.317	INCIPIENT CATARACT, CAPSULAR	7	0.1%	1	0.1%	2	1.7%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	9	0.2%	18	2.4%	1	0.8%
100.330	GENERALIZED/ COMPLETE CATARACT	7	0.1%	1	0.1%	0	0.0%
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.1%	0	0.0%

OCULAR DISORDERS REPORT
COTON DE TULEAR

Diagnostic Name	1991-2016 #	1991-2016 %	2016-2020 #	2016-2020 %	2021 #	2021 %
Year Examined:	**1991-2016**		**2016-2020**		**2021**	
Total # Dogs:	**5,077**		**738**		**118**	
LENS Continued						
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***135***	***2.7%***	***71***	***9.6%***	***11***	***9.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	6	0.1%	3	0.4%	0	0.0%
110.135 PHPV/ PTVL	1	0.0%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	6	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	42	0.8%	9	1.2%	2	1.7%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	21	0.4%	0	0.0%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	11	0.2%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	3	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	31	0.6%	5	0.7%	0	0.0%
120.370 MULTIFOCAL RETINOPATHY	2	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.0%	3	0.4%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	3	0.1%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	2	0.0%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	44	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	151	3.0%	2	0.3%	1	0.8%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	51	1.0%	36	4.9%	3	2.5%
NORMAL						
.000 NORMAL GLOBE	4,347	85.6%	559	75.7%	91	77.1%

CURLY-COATED RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
C.	Cataract	Not defined	1, 2	NO
D.	Y-suture tip opacity	Not defined	1	Breeder option
E.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membrane (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

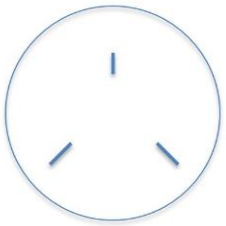
In the Curly-Coated Retriever the following cataracts have been reported:

1. **Anterior cortical subcapsular cataract:** Anterior subcapsular striate cortical cataracts usually occur bilaterally, slowly progress and usually occur between 5-8 years of age.

2. **Posterior subcapsular cataract:** Posterior polar subcapsular opacities occur at 2-4 years of age and progress slowly.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Retinal dysplasia – folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Barnett KC. Comparative aspects of canine hereditary eye disease. *Adv Vet Sci Comp Med.* 1976;20:39-67.

OCULAR DISORDERS REPORT
CURLY-COATED RETRIEVER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,900		184		66	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.1%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	4	0.2%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	11	0.6%	0	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	3	0.2%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	149	7.8%	13	7.1%	4	6.1%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	2	0.1%	1	0.5%	1	1.5%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	14	0.7%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.1%	0	0.0%	0	0.0%
UVEA							
90.250	PIGMENTARY UVEITIS	1	0.1%	0	0.0%	0	0.0%
93.120	IRIS CYST	1	0.1%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	70	3.7%	11	6.0%	4	6.1%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	4	0.2%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.3%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	12	0.6%	11	6.0%	3	4.5%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	13	0.7%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	19	1.0%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	108	5.7%	29	15.8%	5	7.6%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	15	0.8%	4	2.2%	1	1.5%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	16	0.8%	2	1.1%	1	1.5%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.1%	4	2.2%	1	1.5%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	16	0.8%	23	12.5%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.1%	5	2.7%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	11	0.6%	4	2.2%	2	3.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	12	0.6%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	13	0.7%	1	0.5%	1	1.5%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	11	0.6%	0	0.0%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	6	0.3%	2	1.1%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	3	0.2%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	3	0.2%	0	0.0%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	0	0.0%	1	1.5%
100.328	Y-SUTURE TIP OPACITIES	6	0.3%	19	10.3%	6	9.1%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.2%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***137***	***7.2%***	***64***	***34.8%***	***13***	***19.7%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.1%	2	1.1%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.2%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	17	0.9%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
CURLY-COATED RETRIEVER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,900 #	 %	2016-2020 184 #	 %	2021 66 #	 %
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	17	0.9%	5	2.7%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	3	0.2%	0	0.0%	1	1.5%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	11	0.6%	1	0.5%	0	0.0%
120.960 RETINOPATHY	1	0.1%	0	0.0%	1	1.5%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	0	0.0%	1	1.5%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	1	0.5%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	3	0.2%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	13	0.7%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	16	0.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	34	1.8%	1	0.5%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	27	1.4%	9	4.9%	7	10.6%
NORMAL						
.000 NORMAL GLOBE	1,523	80.2%	108	58.7%	40	60.6%

CZECHOSLOVAKIAN VLCAK

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CZECHOSLOVAKIAN VLCAK breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CZECHOSLOVAKIAN VLCAK

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	15		48		16	
	Diagnostic Name	#	%	#	%	#	%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	2	4.2%	0	0.0%
UVEA							
93.120	IRIS CYST	0	0.0%	2	4.2%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	2	4.2%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	13.3%	2	4.2%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	1	2.1%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	2	4.2%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	1	2.1%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	2	13.3%	0	0.0%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	2.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***2***	***13.3%***	***5***	***10.4%***	***0***	***0.0%***
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1	6.7%	0	0.0%	0	0.0%
OPTIC NERVE							
130.110	MICROPAPILLA	0	0.0%	1	2.1%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	1	6.7%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	6.7%	2	4.2%	1	6.3%
NORMAL							
.000	NORMAL GLOBE	21	140.0%	38	79.2%	15	93.8%

DACHSHUND

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmia and multiple ocular defects	Not defined	1-3	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Superficial punctate keratitis	Not defined	4	NO	
D.	Corneal dystrophy - endothelial	Not defined	1, 5, 6	NO	
E.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1 1	Breeder option Passes with no notation	
F.	Cataract	Not defined	1	NO	
G.	Retinal atrophy (*crd1)*	Autosomal recessive	1, 7-18	NO	Mutation in the *RPGRIP* gene
H.	Retinopathy - associated with ceroid lipufuscinosis	Autosomal recessive	2, 19-20	NO	Mutation in the *TPP1* gene
I.	Retinal dysplasia – folds	Not defined	1	Breeder option	

Description and Comments

A. Microphthalmia and multiple ocular anomalies

Microphthalmia is a congenital defect characterized by a small eye often with associated defects of the cornea, anterior chamber, lens and/or retina. An association has been made between partial albinism, multiple ocular defects (especially microphthalmia) and deafness in a number of canine breeds including the Dachshund. From these reports it appears that a predominantly white hair coat is associated with a higher incidence of ocular defects.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Superficial punctate keratitis

Superficial punctate keratitis is characterized by multiple sites of discrete corneal inflammation and/or ulceration and which is suspected to be immune-mediated in etiology. Lesions are typically oval to circular, well-defined and may be associated with an arborizing vascular response.

D. Corneal dystrophy - endothelial

An abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

G. Retinal atrophy – *crd1*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram before it is apparent clinically.

In Miniature Dachshunds there is a recessively inherited disorder caused by a 44 base pair insertion in the *RPGRIP1* gene. The insertion presumably truncates the protein and its major C-terminal RPGR binding domain. The resulting disease is called cone-rod dystrophy 1 (crd1) as the salient clinical abnormalities are a cone ERG dysfunction which does not correlate with photopic vision defects. The onset of the disease is variable, and is influenced by a second modifier locus which also is located on canine chromosome 15. Dogs homozygous for both

defects have retinal abnormalities on ophthalmoscopy before 1-2 years of age. Dogs homozygous only for the *RPGRIP* insertion may have a late onset (>6 years) retinal degeneration diagnosed by ophthalmoscopy. Although the *RPGRIP1* molecular defect can be identified by means of a DNA test, questions have been raised about its validity given the poor genotype-phenotype correlation. A DNA test is available.

In a previous study using an inbred research colony, a 44-nucleotide insertion (ins44) in exon 2 of RPGRIP1 was associated with retinal degeneration. Despite concordance of ins44 with retinal degeneration, evidence indicate that there was phenotype-genotype discordance within the miniature long-haired dachshunds that were not directly related to the experimental colony as not all dogs that were homozygous for ins44 were developing early onset retinal degeneration, but were developing retinal degeneration at a much later stage or not at all. In this investigation MAP9 deletion associated with early retinal degeneration onset was identified. Given the new genome assembly, the nominal title is CanFam3.1MAP9 corrected. Deletion was confirmed in early onset retinal degeneration cases and not late onset retinal degeneration cases, there is a variable age of onset and demonstrate the interaction of two independent loci that contribute to the phenotype. This study has shown that RPGRIP1 ins44/ins44 dogs with early onset retinal degeneration has several polymorphisms in MAP9, some of them potentially harmful, when compared with MAP9 in late onset retinal degeneration dogs. Detection of the presence or absence of MAP early onset retinal degeneration by qPCR can be used to specify early onset or late onset status for ins44 homozygotes. The story, however, is not as straightforward as suggested by the Forman et al. 2016 paper. Unpublished work by K. Miyadera and G. Aguirre in a research colony in which one of the founders originated from a MLHD at the Animal Health Trust finds that dogs that are homozygous for the RPGRIP1 ins 44 and the newly identified MAP9 deletion still do not show early-onset retinal degeneration. This suggests that there probably is a third genetic locus that interacts with MAP9 and RPGRIP1 in determining the age of disease onset and severity of the phenotype. Regardless, the identification of the MAP9 deletion is a major finding that will help unravel the complex genetics of this retinal disorder.

H. Retinopathy associated with ceroid lipufuscinosis

Progressive, multifocal serous retinal detachments first appear in Longhaired Dachshunds with late infantile neuronal ceroid lipofuscinosis at age 5-10 months. Late infantile ceroid neuronal lipofuscinosis in Miniature Dachshunds is a fatal, autosomal recessive, inherited lysosomal storage disease characterized by progressive neurodegeneration. The disease results from a defect in the *TPP1* (Tripeptidyl peptidase) gene. Inheritance of the retinopathy is linked to the gene causing late infantile neuronal ceroid lipofuscinosis.

I. Retinal dysplasia – folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and the more severe forms of retinal dysplasia is undetermined.

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OCULAR DISORDERS REPORT
DACHSHUND

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	6,158		1,424		487	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	22	0.4%	2	0.1%	0	0.0%
10.000	GLAUCOMA	2	0.0%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	7	0.1%	2	0.1%	0	0.0%
25.110	DISTICHIASIS	375	6.1%	120	8.4%	52	10.7%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	1	0.1%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	2	0.0%	3	0.2%	0	0.0%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	1	0.0%	0	0.0%	0	0.0%
51.100	THIRD EYELID CARTILAGE ANOMALY	2	0.0%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	8	0.1%	2	0.1%	1	0.2%
CORNEA							
70.210	PANNUS	3	0.0%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	33	0.5%	2	0.1%	1	0.2%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	9	0.1%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	7	0.1%	6	0.4%	1	0.2%
93.120	IRIS CYST	4	0.1%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	25	0.4%	0	0.0%	1	0.2%
93.180	IIRIS SPHINCTER DYSPLASIA	0	0.0%	2	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	251	4.1%	76	5.3%	29	6.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	25	0.4%	6	0.4%	1	0.2%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	31	0.5%	4	0.3%	4	0.8%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	4	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	75	1.2%	81	5.7%	34	7.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	11	0.2%	5	0.4%	4	0.8%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	1	0.0%	2	0.1%	1	0.2%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	5	0.1%	2	0.1%	0	0.0%
97.120	COLOBOMA	14	0.2%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	43	0.7%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	255	4.1%	42	2.9%	8	1.6%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	36	0.6%	18	1.3%	2	0.4%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	16	0.3%	6	0.4%	1	0.2%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	10	0.2%	4	0.3%	1	0.2%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	8	0.1%	2	0.1%	1	0.2%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	10	0.2%	11	0.8%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	13	0.2%	6	0.4%	2	0.4%
100.307	PUNCTATE CATARACT, CAPSULAR	18	0.3%	12	0.8%	2	0.4%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	50	0.8%	3	0.2%	2	0.4%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	22	0.4%	2	0.1%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	16	0.3%	4	0.3%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.0%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	18	0.3%	1	0.1%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	9	0.1%	3	0.2%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	8	0.1%	5	0.4%	1	0.2%

OCULAR DISORDERS REPORT
DACHSHUND

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 6,158 #	 %	2016-2020 1,424 #	 %	2021 487 #	 %
LENS Continued						
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	3	0.2%	1	0.2%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.1%	0	0.0%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	2	0.0%	6	0.4%	5	1.0%
100.330 GENERALIZED/ COMPLETE CATARACT	39	0.6%	2	0.1%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	2	0.0%	1	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	7	0.1%	2	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***324***	***5.3%***	***90***	***6.3%***	***18***	***3.7%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	39	0.6%	4	0.3%	1	0.2%
110.135 PHPV/ PTVL	15	0.2%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.0%	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	34	0.6%	5	0.4%	2	0.4%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	56	0.9%	17	1.2%	3	0.6%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	7	0.1%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.0%	1	0.1%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	119	1.9%	8	0.6%	2	0.4%
120.400 RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	5	0.1%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	2	0.1%	0	0.0%
120.960 RETINOPATHY	2	0.0%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	19	0.3%	5	0.4%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	40	0.6%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	26	0.4%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	89	1.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	198	3.2%	5	0.4%	2	0.4%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	97	1.6%	77	5.4%	13	2.7%
NORMAL						
.000 NORMAL GLOBE	4,809	78.1%	1,013	71.1%	353	72.5%

DALMATIAN

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/sphincter dysplasia.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	1-3	NO
B.	Distichiasis	Not defined	1	Breeder option
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
D.	Iris hypoplasia	Not defined	1	Breeder option
E.	Iris sphincter dysplasia	Not defined	1	Breeder option
F.	Cataract	Not defined	1, 2	NO
G.	Vitreous degeneration	Not defined	1	Breeder option

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Iris Hypoplasia

A congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the OFA form.

E. Iris sphincter dysplasia

A congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue at the level of the iris sphincter, causing pupillary dilation. This abnormality has been noted in the Dalmatian breed.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

G. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

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OCULAR DISORDERS REPORT
DALMATIAN

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2,765		1,083		269	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
.110 MICROPHTHALMIA	1	0.0%	0	0.0%	0	0.0%
EYELIDS						
20.140 ECTOPIC CILIA	1	0.0%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	5	0.2%	0	0.0%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	125	4.5%	62	5.7%	4	1.5%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	1	0.1%	3	1.1%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	0.0%
CORNEA						
70.210 PANNUS	1	0.0%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	77	2.8%	23	2.1%	6	2.2%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	2	0.1%	0	0.0%	0	0.0%
UVEA						
93.110 IRIS HYPOPLASIA	50	1.8%	11	1.0%	5	1.9%
93.120 IRIS CYST	3	0.1%	0	0.0%	0	0.0%
93.150 IRIS COLOBOMA	15	0.5%	1	0.1%	0	0.0%
93.180 IIRIS SPHINCTER DYSPLASIA	14	0.5%	10	0.9%	2	0.7%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	24	0.9%	9	0.8%	3	1.1%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	3	0.1%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	0.2%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.1%	1	0.1%	1	0.4%
95.120 CILIARY BODY CYST	0	0.0%	1	0.1%	0	0.0%
97.150 CHORIORETINAL COLOBOMA, CONGENITAL	1	0.0%	0	0.0%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	55	2.0%	22	2.0%	5	1.9%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	15	0.5%	9	0.8%	4	1.5%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	7	0.3%	4	0.4%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	8	0.3%	5	0.5%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.0%	3	0.3%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	6	0.2%	1	0.1%	1	0.4%
100.307 PUNCTATE CATARACT, CAPSULAR	3	0.1%	2	0.2%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	21	0.8%	11	1.0%	1	0.4%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	13	0.5%	1	0.1%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	13	0.5%	1	0.1%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	3	0.1%	1	0.1%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	5	0.2%	1	0.1%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	2	0.1%	3	0.3%	1	0.4%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	3	0.1%	2	0.2%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.1%	2	0.2%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	1	0.0%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
DALMATIAN

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,765 #	 %	2016-2020 1,083 #	 %	2021 269 #	 %
LENS Continued						
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	2	0.2%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	6	0.2%	0	0.0%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	4	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***113***	***4.1%***	***48***	***4.4%***	***7***	***2.6%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	4	0.4%	0	0.0%
110.135 PHPV/ PTVL	2	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	8	0.3%	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	22	0.8%	2	0.2%	2	0.7%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	12	0.4%	7	0.6%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	4	0.4%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	5	0.2%	3	0.3%	1	0.4%
120.400 RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.0%	4	0.4%	1	0.4%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.0%	1	0.1%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	43	1.6%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	88	3.2%	3	0.3%	1	0.4%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	112	4.1%	33	3.0%	12	4.5%
NORMAL						
.000 NORMAL GLOBE	2,282	82.5%	899	83.0%	227	84.4%

DANDIE DINMONT TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	2, 3	NO
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option

Description and Comments

A. Glaucoma

Glaucoma is an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

In the Dandie Dinmont terrier a 9.5 Mb susceptibility locus has been identified on canine chromosome 8. The definitive mutation has not been determined. A genetic test is not yet available.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

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OCULAR DISORDERS REPORT
DANDIE DINMONT TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	259		31		44	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.4%	0	0.0%	0	0.0%
10.000	GLAUCOMA	1	0.4%	0	0.0%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	20	7.7%	1	3.2%	2	4.5%
CORNEA							
70.700	CORNEAL DYSTROPHY	6	2.3%	1	3.2%	0	0.0%
UVEA							
93.120	IRIS CYST	1	0.4%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.4%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	26	10.0%	4	12.9%	2	4.5%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.4%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.8%	4	12.9%	1	2.3%
LENS							
100.200	CATARACT, UNSPECIFIED	4	1.5%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	28	10.8%	2	6.5%	2	4.5%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	3	1.2%	2	6.5%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	3	1.2%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.4%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.8%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	5	1.9%	0	0.0%	3	6.8%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	2	0.8%	3	9.7%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.4%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	1	3.2%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	5	1.9%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.4%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***26***	***10.0%***	***6***	***19.4%***	***3***	***6.8%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	3	1.2%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	6	2.3%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	7	2.7%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	5	1.9%	2	6.5%	1	2.3%
NORMAL							
.000	NORMAL GLOBE	180	69.5%	18	58.1%	35	79.5%

DANISH BROHOLMER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DANISH BROHOLMER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
DANISH BROHOLMER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	2	100.0%	0		0	

DANISH SWEDISH FARMDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DANISH SWEDISH FARMDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
DANISH SWEDISH FARMDOG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 10 #	 %	2016-2020 50 #	 %	2021 14 #	 %
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	6	12.0%	0	0.0%
LENS						
100.316 INCIPIENT CATARACT, NUCLEUS	0	0.0%	1	2.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***1***	***2.0%***	***0***	***0.0%***
OTHER						
900.100 OTHER, NOT INHERITED	0	0.0%	1	2.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	4.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	10	100.0%	41	82.0%	14	100.0%

DOBERMAN PINSCHER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Microphthalmia with multiple ocular defects	Not defined	1-5	NO
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1-5	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Persistent hyperplastic primary vitreous/ Persistent hyperplastic tunica vasculosa lentis (PHPV/PHTVL)	Presumed dominant/ incomplete penetrance	1, 6-14	NO
F.	Retinal dysplasia - folds	Not defined	1	Breeder option
G.	Ligneous conjunctivitis	Not defined	15	NO

Description and Comments

A. Microphthalmia with multiple ocular defects

Microphthalmia is a congenital defect characterized by a small eye often associated with defects of the cornea, iris (coloboma), anterior chamber, lens (cataract) and/or retina (retinal dysplasia). Note that this syndrome is distinct from "E," PHPV/PHTVL, which may also be associated with microphthalmia.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

Lens opacity which may affect one or both eyes and may involve the lens partially or completely. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies.

Cataracts have been infrequently observed in the Doberman Pinscher and there is no specific location attributed to cataracts within the Doberman lens. Most cataracts are bilateral, usually observed within the first two years of life, and may cause significant vision loss.

E. Persistent hyperplastic primary vitreous (PHPV)/Persistent hyperplastic tunica vasculosa lentis (PHTVL)

Persistent hyperplastic primary vitreous is a congenital defect resulting from abnormalities in the development and regression of the hyaloid artery (the primary vitreous) and the interaction of this blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with persistent hyperplastic tunica vasculosa lentis which results from failure of regression of the embryologic vascular network which surrounds the developing lens.

The condition in the Doberman includes a spectrum of malformations ranging from spots of pigment on the posterior surface of the lens to posterior lenticonus, cataract and a dense fibrous plaque on the posterior surface of the lens. In the more severe forms, partial or complete vision impairment occurs. PHPV has been extensively studied in the Doberman in Europe. This disorder has been observed occasionally in the Doberman in the United States.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

G. Ligneous conjunctivitis

A rare type of conjunctivitis characterized by the formation of thick membranes covering conjunctiva of the nictitans and eyelids of affected dogs. This condition has been diagnosed in four unrelated Doberman Pinschers, three of which had life-threatening systemic disease. Ligneous conjunctivitis has also been reported in one Yorkshire Terrier.

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OCULAR DISORDERS REPORT
DOBERMAN PINSCHER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	5,272		1,248		245	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	7	0.1%	0	0.0%	0	0.0%
10.000	GLAUCOMA	0	0.0%	1	0.1%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	6	0.1%	1	0.1%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	87	1.7%	19	1.5%	7	2.9%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	1	0.1%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	7	0.1%	2	0.2%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	7	0.1%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	10	0.2%	1	0.1%	2	0.8%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.1%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
93.120	IRIS CYST	7	0.1%	6	0.5%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	116	2.2%	19	1.5%	6	2.4%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	33	0.6%	2	0.2%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	8	0.2%	2	0.2%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	4	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	80	1.5%	141	11.3%	39	15.9%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	3	0.1%	4	0.3%	0	0.0%
93.810	UVEAL MELANOMA	3	0.1%	1	0.1%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	1	0.1%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	2	0.0%	0	0.0%	0	0.0%
97.120	COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	32	0.6%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	289	5.5%	57	4.6%	12	4.9%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	20	0.4%	9	0.7%	1	0.4%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	5	0.1%	4	0.3%	1	0.4%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	5	0.1%	0	0.0%	1	0.4%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	4	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	15	0.3%	9	0.7%	1	0.4%
100.306	PUNCTATE CATARACT, NUCLEUS	13	0.2%	12	1.0%	2	0.8%
100.307	PUNCTATE CATARACT, CAPSULAR	38	0.7%	17	1.4%	6	2.4%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	9	0.2%	7	0.6%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	18	0.3%	4	0.3%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	7	0.1%	3	0.2%	1	0.4%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	8	0.2%	3	0.2%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	17	0.3%	8	0.6%	2	0.8%
100.317	INCIPIENT CATARACT, CAPSULAR	10	0.2%	8	0.6%	0	0.0%

OCULAR DISORDERS REPORT
DOBERMAN PINSCHER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	5,272		1,248		245	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	2	0.2%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	3	0.2%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.1%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	2	0.2%	1	0.4%
100.328 Y-SUTURE TIP OPACITIES	1	0.0%	6	0.5%	2	0.8%
100.330 GENERALIZED/ COMPLETE CATARACT	14	0.3%	2	0.2%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.0%	3	0.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***216***	***4.1%***	***100***	***8.0%***	***18***	***7.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	19	0.4%	8	0.6%	3	1.2%
110.135 PHPV/ PTVL	43	0.8%	9	0.7%	3	1.2%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	10	0.2%	1	0.1%	1	0.4%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	97	1.8%	5	0.4%	1	0.4%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	12	0.2%	0	0.0%	1	0.4%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	12	0.2%	3	0.2%	1	0.4%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	2	0.2%	0	0.0%
120.960 RETINOPATHY	1	0.0%	0	0.0%	0	0.0%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.1%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	0	0.0%	1	0.4%
130.120 OPTIC NERVE HYPOPLASIA	3	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	57	1.1%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	167	3.2%	6	0.5%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	86	1.6%	90	7.2%	12	4.9%
NORMAL						
.000 NORMAL GLOBE	4,431	84.0%	900	72.1%	162	66.1%

DOGO ARGENTINO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DOGO ARGENTINO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
DOGO ARGENTINO

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 129 #	 %	2016-2020 22 #	 %	2021 29 #	 %
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	0	0.0%	0	0.0%	1	3.4%
25.110 DISTICHIASIS	1	0.8%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	1	0.8%	2	9.1%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	1	0.8%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	14	10.9%	0	0.0%	1	3.4%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.8%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	1	0.8%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.8%	0	0.0%	1	3.4%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.8%	0	0.0%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	4.5%	1	3.4%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	2	1.6%	1	4.5%	1	3.4%
100.316 INCIPIENT CATARACT, NUCLEUS	2	1.6%	0	0.0%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	1	0.8%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***7***	***5.4%***	***2***	***9.1%***	***2***	***6.9%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.8%	0	0.0%	0	0.0%
OTHER						
900.100 OTHER, NOT INHERITED	1	0.8%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.8%	1	4.5%	4	13.8%
NORMAL						
.000 NORMAL GLOBE	109	84.5%	18	81.8%	23	79.3%

DOGUE DE BORDEAUX

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Ectropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Corneal dystrophy – epithelial/stromal	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Multifocal retinopathy - *cmr1*	Autosomal recessive	2	Breeder option	Mutation in the *CNGB3* gene

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Entropion in the Mastiff is severe and may require multiple surgical corrections.

B. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (cmr1) is characterized by numerous distinct (i.e. multi-focal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

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OCULAR DISORDERS REPORT
DOGUE DE BORDEAUX

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	302		101		19	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
20.160 MACROPALPEBRAL FISSURE	9	3.0%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	16	5.3%	21	20.8%	3	15.8%
22.000 ECTROPION, UNSPECIFIED	33	10.9%	13	12.9%	0	0.0%
25.110 DISTICHIASIS	30	9.9%	7	6.9%	3	15.8%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.3%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	6	2.0%	6	5.9%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	1	0.3%	0	0.0%	0	0.0%
UVEA						
93.120 IRIS CYST	2	0.7%	1	1.0%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	0	0.0%	1	1.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	13	4.3%	4	4.0%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.3%	1	1.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	4	1.3%	1	1.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	5	1.7%	0	0.0%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.3%	1	1.0%	0	0.0%
95.120 CILIARY BODY CYST	1	0.3%	1	1.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	9	3.0%	0	0.0%	1	5.3%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.3%	1	1.0%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.0%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	4	1.3%	0	0.0%	1	5.3%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.3%	0	0.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	2	2.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	1	0.3%	1	1.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	1	0.3%	0	0.0%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	1.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***8***	***2.6%***	***6***	***5.9%***	***1***	***5.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.3%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	6	2.0%	1	1.0%	0	0.0%
120.960 RETINOPATHY	1	0.3%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	6	2.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	10	3.3%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	1.3%	6	5.9%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	206	68.2%	55	54.5%	14	73.7%

DRENTSCH PARTRIJSHOND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DRENTSCH PARTRIJSHOND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
DRENTSCHE PATRIJSHOND

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		11		22		11	
Diagnostic Name		**#**	**%**	**#**	**%**	**#**	**%**
UVEA							
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	4.5%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	9.1%	1	4.5%	1	9.1%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	9.1%	1	4.5%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	9.1%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	4.5%	1	9.1%
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	4.5%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***2***	***18.2%***	***3***	***13.6%***	***1***	***9.1%***
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	0	0.0%	1	4.5%	0	0.0%
OTHER							
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	18.2%	0	0.0%	1	9.1%
NORMAL							
.000	NORMAL GLOBE	9	81.8%	19	86.4%	9	81.8%

DREVER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DREVER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
DREVER

There are no statistics available for this breed

DUTCH SHEPHERD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Cataract	Not defined	1	NO

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
DUTCH SHEPHERD

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	48		77		31	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	3	6.3%	0	0.0%	0	0.0%
CORNEA						
70.210 PANNUS	0	0.0%	1	1.3%	0	0.0%
70.700 CORNEAL DYSTROPHY	1	2.1%	2	2.6%	1	3.2%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	3	3.9%	2	6.5%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	4.2%	0	0.0%	1	3.2%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	14.6%	9	11.7%	3	9.7%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	2.1%	1	1.3%	1	3.2%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	2	2.6%	1	3.2%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	2.6%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	1	2.1%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	2	2.6%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	2	4.2%	4	5.2%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	2.1%	3	3.9%	2	6.5%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	2	4.2%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1	2.1%	0	0.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	1	2.1%	1	1.3%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	2	2.6%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***9***	***18.8%***	***17***	***22.1%***	***4***	***12.9%***
RETINA						
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	2.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	0	0.0%	1	3.2%
OTHER						
900.000 OTHER, UNSPECIFIED	3	6.3%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	0	0.0%	1	1.3%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	6.3%	3	3.9%	3	9.7%
NORMAL						
.000 NORMAL GLOBE	37	77.1%	59	76.6%	20	64.5%

ECT LANDSEER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ECT LANDSEER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ECT LANDSEER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		2		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	0		2	100.0%	0	

ENGLISH COCKER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Keratoconjunctivitis sicca	Not defined	1, 2	NO	
B.	Glaucoma	Not defined	1, 3-4	NO	
C.	Distichiasis	Not defined	1, 4, 5	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1, 6	Breeder option	
	- iris to cornea	Not defined	1, 6	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
E.	Cataract	Not defined	1, 6-9	NO	
F.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 10-14	NO	Mutation in the *prcd* gene
G.	Central progressive retinal atrophy	Not defined	15-17	NO	
H.	Retinal dysplasia - folds	Presumed autosomal recessive	1	Breeder option	

Description and Comments

A. Keratoconjunctivitis sicca (KCS)

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine screening exam for certification.

Glaucoma in the English Cocker Spaniel is recognized in England. The frequency and significance of this disease in the breed in the United States is not known, but is probably low.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the English Cocker Spaniel, this is a particularly serious problem as the majority of PPMs identified on routine screening examination bridge from the iris to the cornea and are associated with corneal opacities which may result in vision impairment.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Congenital cataracts have been reported in Red Cocker Spaniels, presumably English Cocker Spaniels, in Denmark. The cataracts affected the anterior capsule; in some cases the cortex and/or nucleus were opaque. Associated findings in some dogs were persistent pupillary membrane (PPM) and/or microphthalmia. It is likely that these cataracts are part of a syndrome characterized by multiple congenital ocular anomalies. The condition is familial, but a specific mode of inheritance has not been defined.

F. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the English Cocker Spaniel is *prcd*

which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. However, in the English Cocker Spaniel, the phenotype can be very variable in the age of onset. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

Other forms of retinal degeneration that are not *prcd* are recognized in the breed. The currently available genetic test will not detect these other forms of PRA.

G. Central progressive retinal atrophy (CPRA)

A progressive retinal degeneration in which photoreceptor degeneration occurs secondary to disease of the underlying pigment epithelium. Progression is slow and some animals may never lose vision. CPRA is a frequent occurrence in England, but is uncommon elsewhere.

CPRA is characterized by the appearance of brown spots and patches primarily in the tapetal fundus and retinal degeneration. These areas are created by an accumulation of autofluorescent lipopigment within the retinal pigment epithelium cells. These changes are consistent with retinal changes observed in Vitamin E deficiency. Neurologic signs including ataxia and proprioceptive deficits have also been identified in affected dogs.

In the English Cocker Spaniel, retinal lesions of CPRA have been related to an underlying abnormal metabolism of Vitamin E resulting in a systemic deficiency.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

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OCULAR DISORDERS REPORT
ENGLISH COCKER SPANIEL

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	10,945		1,114		283	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	14	0.1%	1	0.1%	0	0.0%
10.000	GLAUCOMA	1	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.110	EYELID DERMOID	1	0.0%	0	0.0%	0	0.0%
20.140	ECTOPIC CILIA	6	0.1%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	3	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	46	0.4%	6	0.5%	1	0.4%
22.000	ECTROPION, UNSPECIFIED	97	0.9%	1	0.1%	0	0.0%
25.110	DISTICHIASIS	1,966	18.0%	159	14.3%	47	16.6%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	18	0.2%	8	0.7%	2	0.7%
40.910	KERATOCONJUNCTIVITIS SICCA	12	0.1%	0	0.0%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	6	0.1%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	10	0.1%	1	0.1%	0	0.0%
70.220	PIGMENTARY KERATITIS	11	0.1%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	95	0.9%	10	0.9%	3	1.1%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	37	0.3%	0	0.0%	0	0.0%
UVEA							
90.250	PIGMENTARY UVEITIS	1	0.0%	0	0.0%	0	0.0%
93.120	IRIS CYST	5	0.0%	0	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	6	0.1%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	2	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	135	1.2%	25	2.2%	7	2.5%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	41	0.4%	3	0.3%	1	0.4%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	184	1.7%	7	0.6%	1	0.4%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	10	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	36	0.3%	39	3.5%	10	3.5%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	17	0.2%	10	0.9%	2	0.7%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	0	0.0%	1	0.1%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	172	1.6%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	674	6.2%	58	5.2%	16	5.7%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	110	1.0%	37	3.3%	4	1.4%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	54	0.5%	6	0.5%	1	0.4%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	22	0.2%	6	0.5%	1	0.4%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	13	0.1%	3	0.3%	2	0.7%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	35	0.3%	9	0.8%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	27	0.2%	5	0.4%	2	0.7%
100.307	PUNCTATE CATARACT, CAPSULAR	14	0.1%	12	1.1%	5	1.8%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	131	1.2%	7	0.6%	1	0.4%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	133	1.2%	3	0.3%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	86	0.8%	7	0.6%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	8	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	27	0.2%	1	0.1%	0	0.0%

OCULAR DISORDERS REPORT
ENGLISH COCKER SPANIEL

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	10,945		1,114		283	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.316 INCIPIENT CATARACT, NUCLEUS	62	0.6%	3	0.3%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	17	0.2%	4	0.4%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	6	0.5%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	6	0.5%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	5	0.4%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	2	0.2%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	1	0.0%	0	0.0%	1	0.4%
100.328 Y-SUTURE TIP OPACITIES	1	0.0%	5	0.4%	2	0.7%
100.330 GENERALIZED/ COMPLETE CATARACT	100	0.9%	2	0.2%	1	0.4%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	9	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,017***	***9.3%***	***130***	***11.7%***	***20***	***7.1%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	9	0.1%	3	0.3%	1	0.4%
110.135 PHPV/ PTVL	4	0.0%	1	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.0%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	23	0.2%	4	0.4%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	161	1.5%	21	1.9%	1	0.4%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	14	0.1%	2	0.2%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	2	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	423	3.9%	1	0.1%	0	0.0%
120.400 RETINAL HEMORRHAGE	3	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.0%	1	0.1%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	2	0.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	2	0.0%	1	0.1%	0	0.0%
130.150 OPTIC DISC COLOBOMA	15	0.1%	0	0.0%	3	1.1%
OTHER						
900.000 OTHER, UNSPECIFIED	47	0.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	242	2.2%	4	0.4%	2	0.7%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	160	1.5%	58	5.2%	17	6.0%
NORMAL						
.000 NORMAL GLOBE	7,413	67.7%	742	66.6%	196	69.3%

ENGLISH COONHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ENGLISH COONHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ENGLISH COONHOUND

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1 #	 %	Year Examined: 2016-2020 Total # Dogs: 0 #	 %	Year Examined: 2021 Total # Dogs: 1 #	 %
NORMAL						
.000 NORMAL GLOBE	1	100.0%	0		1	100.0%

ENGLISH FOXHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ENGLISH FOXHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ENGLISH FOXHOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		3		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0		1	33.3%	0	
NORMAL						
.000 NORMAL GLOBE	0		2	66.7%	0	

ENGLISH JACK RUSSELL TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ENGLISH JACK RUSSELL TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ENGLISH JACK RUSSELL TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2		0		1	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	2	100.0%	0		1	100.0%

ENGLISH SETTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Retinal atrophy - rod-cone dysplasia recessive type 1 (*rcd4*)	Autosomal recessive	2, 3	NO	Mutation in the *C2orf71* gene
E.	Retinal dysplasia-folds	Not defined	1	Breeder option	
F.	Ceroid lipofuscinosis	Autosomal recessive	4-9	NO	Mutation in the *CLN8* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of the dog. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal atrophy - Rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

F. Ceroid lipofuscinosis

An inherited disease of humans and animals characterized by the accumulation of lipopigment in various tissues of the body including the eye. It results in progressive neurologic disease including blindness. (Also called Batten's Disease.) A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Bjerkas E. Generalised progressive retinal atrophy in the English Setter in Norway. *Vet Rec*. 1990;126:217. PMID: 2316162

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9. Nilsson SE, Wrigstad A. Electrophysiology in some animal and human hereditary diseases involving the retinal pigment epithelium. Eye (Lond). 1997;11 (Pt 5):698-706. doi: 10.1038/eye.1997.180. PMID: 9474321.

OCULAR DISORDERS REPORT
ENGLISH SETTER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,720 #	 %	2016-2020 105 #	 %	2021 11 #	 %
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	8	0.5%	3	2.9%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	3	0.2%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	70	4.1%	1	1.0%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	2	0.1%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	13	0.8%	1	1.0%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	3	0.2%	0	0.0%	0	0.0%
UVEA						
93.120 IRIS CYST	1	0.1%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	63	3.7%	5	4.8%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	5	0.3%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	7	0.4%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	2	1.9%	1	9.1%
93.810 UVEAL MELANOMA	0	0.0%	1	1.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	5	0.3%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	63	3.7%	5	4.8%	3	27.3%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	5	0.3%	2	1.9%	1	9.1%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	11	0.6%	2	1.9%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	1.9%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	5	0.3%	0	0.0%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	2	0.1%	0	0.0%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	2	0.1%	1	1.0%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	5	0.3%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	8	0.5%	1	1.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.1%	1	1.0%	1	9.1%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	2	0.1%	0	0.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	2	0.1%	0	0.0%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	1.0%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	2	1.9%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	1.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	4	0.2%	0	0.0%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	3	0.2%	1	1.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***58***	***3.4%***	***14***	***13.3%***	***2***	***18.2%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	7	0.4%	0	0.0%	0	0.0%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	4	0.2%	1	1.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	35	2.0%	3	2.9%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	15	0.9%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	22	1.3%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.1%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
ENGLISH SETTER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,720 #	 %	2016-2020 105 #	 %	2021 11 #	 %
OTHER						
900.000 OTHER, UNSPECIFIED	6	0.3%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	53	3.1%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	5	0.3%	2	1.9%	1	9.1%
NORMAL						
.000 NORMAL GLOBE	1,450	84.3%	77	73.3%	8	72.7%

ENGLISH SHEPHERD

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (*prcd*)	Autosomal recessive	2	NO	Mutation in the *prcd* gene
B.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/coloboma	Autosomal recessive	1, 3-4	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the English Shepherd is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

B. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

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OCULAR DISORDERS REPORT
ENGLISH SHEPHERD

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	120		34		2	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	1.7%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	5	4.2%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	0	0.0%	3	8.8%	0	0.0%
CORNEA							
70.210	PANNUS	1	0.8%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	1	0.8%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	5	4.2%	2	5.9%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.8%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	2.5%	1	2.9%	1	50.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	2	1.7%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.8%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	2.9%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.8%	1	2.9%	1	50.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.8%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.8%	0	0.0%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	2	1.7%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	3	2.5%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	4	3.3%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***15***	***12.5%***	***2***	***5.9%***	***1***	***50.0%***
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2	1.7%	0	0.0%	0	0.0%
OTHER							
900.100	OTHER, NOT INHERITED	4	3.3%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	3.3%	6	17.6%	1	50.0%
NORMAL							
.000	NORMAL GLOBE	97	80.8%	22	64.7%	1	50.0%

ENGLISH SPRINGER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	 Not defined Not defined	 1 1	 Breeder option Passes with no notation	
E.	Cataract	Not defined	1	NO	
F.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
G.	Retinal atrophy - *cord-1*	Autosomal recessive	1, 3	NO	Mutation in the *RPGRIP1* gene
H.	Retinal dysplasia - folds	Presumed autosomal recessive	1, 4-6, 9	NO	
I.	Retinal dysplasia - geographic	Not defined	10	NO	
J.	Refractive error	Not defined	7, 8	Breeder option	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. In the English Springer Spaniel this usually involves the lower lateral lid margin.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted

E. Cataract

Lens opacity which may affect one or both eyes and may involve the lens partially or completely. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies.

Cataract in the English Springer Spaniel is reported to be a familial trait usually involving the posterior subcapsular region of the lens that progresses slowly.

F. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

G. Retinal atrophy - *cord-1*

Cord-1 PRA in the English Springer Spaniel has an onset of clinical signs at 2 to 9 years of age leading to blindness in most affected dogs. *Cord1* PRA in the English Springer Spaniel has been described as beginning with increased granularity of the fundus or tiny hyporeflective brown or grey patches in the far peripheral tapetum. Over time, these abnormalities become more diffuse with mottling over much of the tapetum. Vessel attenuation accompanies the more diffuse changes. In advanced cases, there is generalized tapetal hyperreflectivity and vessel attenuation. Pedigree analysis has shown cord-1 in the English Springer Spaniel to be an autosomal recessive trait. A mutation in the *RPGRIP1*

gene in cone-rod dystrophy (*cord1*) was found through genetic testing to be associated with one form of PRA in English Springer Spaniels, but not all clinically affected dogs have the *RPGRIP1* mutation, implying that other mutations have yet to be identified. A DNA test is available. The test is accurate only for this mutation and will not identify other forms of PRA. Not all dogs homozygous for the *RPGRIP1* genotype demonstrate the phenotype clinically.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

The relationship between folds and geographic/detached lesions has been a topic of dispute for many years. It is the consensus of the English Springer Spaniel Field Trial Association Heritable Defects Committee (the parent breed club in the United States) that none of the forms of retinal dysplasia are desirable in a breeding animal.

I. Retinal dysplasia - geographic

Abnormal development of the retina present at birth. Any irregularly shaped area of abnormal retinal development containing both areas of thinning and areas of elevation representing folds and retinal disorganization.

J. Refractive Myopia

A condition of the eye where the light that comes in does not directly focus on the retina but in front of it. In common terminology, "near-sighted." This condition has been shown to have a genetic component in English Springer Spaniels, although the exact mode of inheritance has not been determined.

References

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OCULAR DISORDERS REPORT
ENGLISH SPRINGER SPANIEL

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	46,327		7,713		1,276	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	26	0.1%	3	0.0%	0	0.0%
10.000	GLAUCOMA	5	0.0%	2	0.0%	0	0.0%
EYELIDS							
20.110	EYELID DERMOID	2	0.0%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	3	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	278	0.6%	48	0.6%	15	1.2%
22.000	ECTROPION, UNSPECIFIED	56	0.1%	7	0.1%	0	0.0%
25.110	DISTICHIASIS	371	0.8%	50	0.6%	9	0.7%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	3	0.0%	8	0.1%	1	0.1%
40.910	KERATOCONJUNCTIVITIS SICCA	11	0.0%	1	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	0	0.0%	1	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	8	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	6	0.0%	1	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	4	0.0%	0	0.0%	1	0.1%
70.700	CORNEAL DYSTROPHY	564	1.2%	112	1.5%	19	1.5%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	12	0.0%	1	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	11	0.0%	3	0.0%	1	0.1%
93.120	IRIS CYST	15	0.0%	3	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	4	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	28	0.1%	3	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.0%	4	0.1%	0	0.0%
93.180	IIRIS SPHINCTER DYSPLASIA	0	0.0%	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3,467	7.5%	639	8.3%	127	10.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	113	0.2%	12	0.2%	1	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	90	0.2%	2	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	48	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	68	0.1%	59	0.8%	17	1.3%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	16	0.0%	1	0.0%	1	0.1%
93.810	UVEAL MELANOMA	2	0.0%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	1	0.0%	1	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	1	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	4	0.0%	0	0.0%	0	0.0%
97.120	COLOBOMA	5	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	97	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1,166	2.5%	190	2.5%	37	2.9%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	215	0.5%	94	1.2%	13	1.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	111	0.2%	21	0.3%	2	0.2%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	51	0.1%	20	0.3%	2	0.2%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	25	0.1%	5	0.1%	1	0.1%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	92	0.2%	22	0.3%	3	0.2%
100.306	PUNCTATE CATARACT, NUCLEUS	54	0.1%	29	0.4%	4	0.3%

OCULAR DISORDERS REPORT
ENGLISH SPRINGER SPANIEL

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	Total # Dogs:	46,327		7,713		1,276	
	Diagnostic Name	#	%	#	%	#	%
LENS Continued							
100.307	PUNCTATE CATARACT, CAPSULAR	58	0.1%	42	0.5%	9	0.7%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	197	0.4%	44	0.6%	6	0.5%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	190	0.4%	44	0.6%	4	0.3%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	101	0.2%	17	0.2%	1	0.1%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	23	0.0%	3	0.0%	2	0.2%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	41	0.1%	5	0.1%	5	0.4%
100.316	INCIPIENT CATARACT, NUCLEUS	62	0.1%	18	0.2%	3	0.2%
100.317	INCIPIENT CATARACT, CAPSULAR	29	0.1%	15	0.2%	6	0.5%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	6	0.0%	8	0.1%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	13	0.2%	1	0.1%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	2	0.0%	3	0.0%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	7	0.1%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	3	0.0%	4	0.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	12	0.0%	19	0.2%	4	0.3%
100.330	GENERALIZED/ COMPLETE CATARACT	86	0.2%	7	0.1%	0	0.0%
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.0%	1	0.1%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	27	0.1%	3	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***1,456***	***3.1%***	***441***	***5.7%***	***67***	***5.3%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	230	0.5%	54	0.7%	20	1.6%
110.135	PHPV/ PTVL	38	0.1%	4	0.1%	1	0.1%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	8	0.0%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	188	0.4%	44	0.6%	2	0.2%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1,872	4.0%	171	2.2%	18	1.4%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	714	1.5%	49	0.6%	15	1.2%
120.190	RETINAL DYSPLASIA, DETACHED	125	0.3%	4	0.1%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	479	1.0%	29	0.4%	5	0.4%
120.400	RETINAL HEMORRHAGE	8	0.0%	0	0.0%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	57	0.1%	0	0.0%	0	0.0%
120.920	RETINAL DETACHMENT WITH DIALYSIS	2	0.0%	1	0.0%	1	0.1%
120.960	RETINOPATHY	17	0.0%	8	0.1%	2	0.2%
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	0	0.0%	2	0.2%
OPTIC NERVE							
130.110	MICROPAPILLA	9	0.0%	5	0.1%	1	0.1%
130.120	OPTIC NERVE HYPOPLASIA	7	0.0%	2	0.0%	0	0.0%
130.150	OPTIC DISC COLOBOMA	13	0.0%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	336	0.7%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	723	1.6%	12	0.2%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	394	0.9%	212	2.7%	28	2.2%
NORMAL							
.000	NORMAL GLOBE	38,148	82.3%	6,071	78.7%	986	77.3%

ENGLISH TOY SPANIEL

(King Charles, Prince Charles, Ruby, Blenheim)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Distichiasis	Not defined	1	Breeder option
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
D.	Cataract	Not defined	1	NO
E.	Persistent hyperplastic primary vitreous /Persistent hyperplastic tunica vasculosa lentis (PHPV/PHTVL)	Presumed dominant/ incomplete penetrance	1	NO
F.	Persistent hyaloid artery remnant	Not defined	1	Breeder option
G.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Entropion

A conformational defect resulting in "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures, which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Onset of cataract in the English Toy Spaniel is at an early age (less than 6 months), affecting the cortex and nucleus with rapid progression to complete cataract, resulting in blindness.

E. Persistent hyperplastic primary vitreous (PHPV)/Persistent hyperplastic tunica vasculosa lentis (PHTVL)

Persistent hyperplastic primary vitreous is a congenital defect resulting from abnormalities in the development and regression of the hyaloid artery (the primary vitreous) and the interaction of this blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with persistent hyperplastic tunica vasculosa lentis which results from failure of regression of the embryologic vascular network which surrounds the developing lens.

F. Persistent hyaloid artery remnant (PHA)

A congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small vascular strand (PHA**)** or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
ENGLISH TOY SPANIEL

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,061		390		104	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	4	0.4%	3	0.8%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	10	0.9%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	56	5.3%	6	1.5%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	3	0.3%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	124	11.7%	29	7.4%	4	3.8%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	2	0.2%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	0	0.0%	1	0.3%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.2%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	1	0.1%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	20	1.9%	4	1.0%	1	1.0%
70.700	CORNEAL DYSTROPHY	134	12.6%	68	17.4%	22	21.2%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.4%	1	0.3%	1	1.0%
UVEA							
93.120	IRIS CYST	1	0.1%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	0.3%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	12	1.1%	5	1.3%	6	5.8%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.2%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	4	0.4%	3	0.8%	1	1.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	1	0.3%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	10	0.9%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	62	5.8%	14	3.6%	2	1.9%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	20	1.9%	9	2.3%	1	1.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	20	1.9%	2	0.5%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	7	0.7%	0	0.0%	1	1.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	6	0.6%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	6	0.6%	3	0.8%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	21	2.0%	11	2.8%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	23	2.2%	11	2.8%	2	1.9%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	23	2.2%	6	1.5%	1	1.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	3	0.3%	3	0.8%	2	1.9%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	14	1.3%	0	0.0%	1	1.0%
100.317	INCIPIENT CATARACT, CAPSULAR	15	1.4%	2	0.5%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	3	0.3%	5	1.3%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.3%	6	1.5%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.1%	2	0.5%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	6	1.5%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.1%	1	0.3%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	3	0.3%	0	0.0%	1	1.0%
100.330	GENERALIZED/ COMPLETE CATARACT	20	1.9%	2	0.5%	0	0.0%
100.340	RESORBING/ HYPERMATURE CATARACT	3	0.3%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
ENGLISH TOY SPANIEL

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1,061		390		104	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***203***	***19.1%***	***69***	***17.7%***	***9***	***8.7%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	74	7.0%	52	13.3%	13	12.5%
110.135 PHPV/ PTVL	14	1.3%	5	1.3%	1	1.0%
110.320 VITREOUS DEGENERATION SYNERESIS	21	2.0%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	57	5.4%	18	4.6%	6	5.8%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	7	0.7%	4	1.0%	1	1.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.1%	1	0.3%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	6	0.6%	1	0.3%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.1%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.1%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	55	5.2%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	38	3.6%	1	0.3%	1	1.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	48	4.5%	23	5.9%	6	5.8%
NORMAL						
.000 NORMAL GLOBE	543	51.2%	176	45.1%	51	49.0%

ENTLEBUCHER MOUNTAIN DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma	Not defined	2	NO	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Presumed autosomal recessive	2, 3	NO	
D.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 2, 4	NO	Mutation in the *prcd* gene
E.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

Glaucoma is an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume

cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Cataracts in the Entlebucher Mountain Dog generally become evident in young to middle-aged dogs (5.5 +/- 2.6 years). The opacities typically begin in the posterior subcapsular/capsular polar region along the suture lines as early as 1-2 years of age. Most dogs are affected with bilaterally symmetrical cataracts, which may or may not progress. Pedigree analysis suggests an autosomal recessive mode of inheritance.

D. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

E. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Entlebucher Mountain Dog is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Spiess BM. [Inherited eye diseases in the Entlebucher Mountain Dog]. *Schweizer Archiv fur Tierheilkunde*. 1994;136:105-110. Vererbte Augenkrankheiten beim Entlebucher Sennenhund. PMID: 8171308

3. Heitmann M, Hamann H, Brahm R, et al. Analysis of prevalence of presumed inherited eye diseases in Entlebucher Mountain Dogs. *Vet Ophthalmol*. 2005;8:145-151. PMID: 15910366

4. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT
ENTLEBUCHER MOUNTAIN DOG

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		980		311		58	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	11	1.1%	1	0.3%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	3	0.3%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	5	0.5%	0	0.0%	1	1.7%
UVEA							
93.120	IRIS CYST	2	0.2%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	48	4.9%	11	3.5%	1	1.7%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	4	0.4%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.2%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	7	0.7%	10	3.2%	2	3.4%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	61	6.2%	24	7.7%	3	5.2%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	5	0.5%	9	2.9%	2	3.4%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	36	3.7%	10	3.2%	4	6.9%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	5	0.5%	3	1.0%	1	1.7%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.2%	1	0.3%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	4	0.4%	1	0.3%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.3%	5	1.6%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	11	1.1%	13	4.2%	1	1.7%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	13	1.3%	1	0.3%	1	1.7%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	69	7.0%	20	6.4%	4	6.9%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	9	0.9%	2	0.6%	1	1.7%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	4	0.4%	1	0.3%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	4	0.4%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	10	1.0%	1	0.3%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.2%	2	0.6%	1	1.7%
100.330	GENERALIZED/ COMPLETE CATARACT	9	0.9%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***186***	***19.0%***	***69***	***22.2%***	***15***	***25.9%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.1%	0	0.0%	1	1.7%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	2	0.6%	1	1.7%
110.320	VITREOUS DEGENERATION SYNERESIS	5	0.5%	9	2.9%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	26	2.7%	5	1.6%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	7	0.7%	1	0.3%	0	0.0%
120.190	RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	30	3.1%	0	0.0%	1	1.7%
120.960	RETINOPATHY	2	0.2%	0	0.0%	0	0.0%
OPTIC NERVE							
130.110	MICROPAPILLA	2	0.2%	1	0.3%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
ENTLEBUCHER MOUNTAIN DOG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 980 #	 %	2016-2020 311 #	 %	2021 58 #	 %
OTHER						
900.000 OTHER, UNSPECIFIED	20	2.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	39	4.0%	3	1.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	23	2.3%	25	8.0%	3	5.2%
NORMAL						
.000 NORMAL GLOBE	725	74.0%	215	69.1%	38	65.5%

EPAGNEUL BRETON

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the EPAGNEUL BRETON breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
EPAGNEUL BRETON

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	3		28		6	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	33.3%	1	3.6%	1	16.7%
LENS						
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	1	3.6%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	1	3.6%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	3.6%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***3***	***10.7%***	***0***	***0.0%***
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	7.1%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	2	66.7%	24	85.7%	5	83.3%

ESTRELA MOUNTAIN DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ESTRELA MOUNTAIN DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ESTRELA MOUNTAIN DOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	3		1		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	3	100.0%	1	100.0%	0	

EURASIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	2-4	NO
B.	Distichiasis	Not defined	1	Breeder option
C.	Cataracts	Not defined	1	NO

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening examination.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Cataracts

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Boillot T, Rosolen SG, Dulaurent T, Goulle F, Thomas P, Isard PF, Azoulay T, Lafarge-Beurlet S, Woods M, Lavillegrand S, Ivkovic I, Neveux N, Sahel JA, Picaud S, Froger N. Determination of morphological, biometric and biochemical susceptibilities in healthy Eurasier dogs with suspected inherited glaucoma. PLoS One. 2014 Nov 7;9(11):e111873. doi: 10.1371/journal.pone.0111873. PMID: 25380252

3. Strom AR, Hassig M, Iburg TM, et al. Epidemiology of canine glaucoma presented to University of Zurich from 1995 to 2009. Part 1: Congenital and primary glaucoma (4 and 123 cases). *Vet Ophthalmol*. 2011;14:121-126. Epub 2011/03/04. PMID: 21366828

4. Rosolen SG, Boillot T, Dulaurent T, et al. Morphological, biometrical and biochemical susceptibilities for glaucoma in a healthy Eurasier dog - ECVO 2014 abstract #44. *Vet Ophthalmol*. 2014;17:E23.

OCULAR DISORDERS REPORT
EURASIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 100 #	 %	Year Examined: 2016-2020 Total # Dogs: 97 #	 %	Year Examined: 2021 Total # Dogs: 21 #	 %
EYELIDS						
25.110 DISTICHIASIS	34	34.0%	19	19.6%	9	42.9%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	0	0.0%	1	4.8%
CORNEA						
70.700 CORNEAL DYSTROPHY	3	3.0%	3	3.1%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	1.0%	3	3.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	2	2.1%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	0	0.0%	1	1.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	5	5.0%	6	6.2%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	2	2.1%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	2	2.0%	1	1.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	3	3.0%	3	3.1%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	1.0%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	1.0%	1	1.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	4	4.1%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	1.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	1.0%	1	1.0%	1	4.8%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***7***	***7.0%***	***14***	***14.4%***	***1***	***4.8%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	1.0%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	0	0.0%	1	1.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	1	1.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	5	5.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	5	5.0%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	4.0%	0	0.0%	1	4.8%
NORMAL						
.000 NORMAL GLOBE	63	63.0%	60	61.9%	11	52.4%

FIELD SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1 1	Breeder option Passes with no notation	
E.	Cataract	Not defined	1	NO	
F.	Retinal atrophy (*prcd)*	Autosomal recessive	1, 2	NO	Mutation in the *prcd* gene
G.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Field Spaniel is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
FIELD SPANIEL

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,411 #	 %	2016-2020 742 #	 %	2021 162 #	 %
GLOBE						
.110 MICROPHTHALMIA	0	0.0%	2	0.3%	0	0.0%
EYELIDS						
20.160 MACROPALPEBRAL FISSURE	6	0.2%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	10	0.4%	0	0.0%	1	0.6%
22.000 ECTROPION, UNSPECIFIED	11	0.5%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	156	6.5%	32	4.3%	5	3.1%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	4	0.2%	13	1.8%	1	0.6%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	1	0.0%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	28	1.2%	6	0.8%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	1	0.0%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	137	5.7%	68	9.2%	6	3.7%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	6	0.2%	0	0.0%	2	1.2%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	7	0.3%	1	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	16	0.7%	27	3.6%	5	3.1%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.2%	3	0.4%	0	0.0%
FUNDUS						
97.120 COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	3	0.1%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	117	4.9%	34	4.6%	7	4.3%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	17	0.7%	14	1.9%	2	1.2%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	3	0.1%	2	0.3%	1	0.6%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.1%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	5	0.2%	2	0.3%	1	0.6%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	3	0.1%	6	0.8%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	4	0.2%	1	0.1%	2	1.2%
100.307 PUNCTATE CATARACT, CAPSULAR	9	0.4%	10	1.3%	2	1.2%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	16	0.7%	5	0.7%	5	3.1%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	5	0.2%	3	0.4%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.1%	1	0.1%	2	1.2%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	1	0.1%	2	1.2%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	5	0.2%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	7	0.3%	1	0.1%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	5	0.2%	2	0.3%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	0	0.0%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	4	0.2%	6	0.8%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	2	0.1%	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***94***	***3.9%***	***56***	***7.5%***	***17***	***10.5%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	3	0.1%	1	0.1%	1	0.6%
110.135 PHPV/ PTVL	4	0.2%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	4	0.5%	0	0.0%

OCULAR DISORDERS REPORT
FIELD SPANIEL

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,411 #	 %	2016-2020 742 #	 %	2021 162 #	 %
VITREOUS Continued						
110.320 VITREOUS DEGENERATION SYNERESIS	2	0.1%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	250	10.4%	43	5.8%	3	1.9%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	9	0.4%	4	0.5%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.1%	2	0.3%	0	0.0%
120.400 RETINAL HEMORRHAGE	4	0.2%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	1	0.1%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.0%	2	0.3%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%	1	0.6%
130.150 OPTIC DISC COLOBOMA	0	0.0%	2	0.3%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	47	1.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	61	2.5%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	48	2.0%	38	5.1%	2	1.2%
NORMAL						
.000 NORMAL GLOBE	1,770	73.4%	518	69.8%	127	78.4%

FILA BRASILEIRO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the FILA BRASILEIRO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
FILA BRASILEIRO

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	4		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
OTHER						
900.000 OTHER, UNSPECIFIED	1	25.0%	0		0	
NORMAL						
.000 NORMAL GLOBE	4	100.0%	0		0	

FINNISH LAPPHUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Retinal atrophy (*prcd)*	Autosomal recessive	2	NO	Mutation in the *prcd* gene
D.	Multifocal retinopathy - *cmr3*	Autosomal recessive	3, 4	NO	Mutation in the *BEST1* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the form of PRA in the Finnish Lapphund is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in

dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

D. Multifocal retinopathy (*cmr3*)

Canine Multifocal Retinopathy type 3 (*cmr3*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

Clinically the disease is similar to that seen in the Bullmastiff and Coton deTulear, but the mutation in the Bestrophin 1 gene (*BEST1* alias *VMD2*) is different. The multifocal retinopathy seen in the Lapponian Herder is caused by a deletion at position 1,388 and a substitution at position 1,466 and is therefore called *cmr3*. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006 Nov;88:551-563. PMID: 16938425

3. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci.* 2007 May;48:1959-1967. PMID: 17460247

4. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650; PMCID: PMC4985128.

OCULAR DISORDERS REPORT
FINNISH LAPPHUND

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		520		174		80	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	1	0.2%	1	0.6%	0	0.0%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	0	0.0%	1	1.3%
CORNEA							
70.220	PIGMENTARY KERATITIS	1	0.2%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	51	9.8%	19	10.9%	6	7.5%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.2%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	1.2%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.2%	5	2.9%	2	2.5%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	37	7.1%	8	4.6%	7	8.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	5	1.0%	2	1.1%	1	1.3%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	10	1.9%	2	1.1%	1	1.3%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	3	1.7%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	0	0.0%	1	1.3%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	4	0.8%	1	0.6%	2	2.5%
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.6%	1	0.6%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	2	0.4%	5	2.9%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.2%	1	0.6%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.2%	2	1.1%	1	1.3%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.4%	1	0.6%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.6%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	1	0.6%	2	2.5%
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	2	1.1%	2	2.5%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	0	0.0%	1	1.3%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	1.1%	1	1.3%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.2%	1	0.6%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***29***	***5.6%***	***25***	***14.4%***	***12***	***15.0%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	1	0.6%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	10	1.9%	1	0.6%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.2%	0	0.0%	0	0.0%
120.960	RETINOPATHY	1	0.2%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	10	1.9%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	14	2.7%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	9	1.7%	2	1.1%	3	3.8%
NORMAL							
.000	NORMAL GLOBE	427	82.1%	126	72.4%	58	72.5%

FINNISH SPITZ

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
FINNISH SPITZ

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 247 #	 %	2016-2020 17 #	 %	2021 6 #	 %
EYELIDS						
20.140 ECTOPIC CILIA	1	0.4%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	2	0.8%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	2	0.8%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.8%	8	47.1%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	1	0.4%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	33	13.4%	1	5.9%	1	16.7%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	2	0.8%	0	0.0%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.4%	0	0.0%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.4%	0	0.0%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	2	0.8%	0	0.0%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.4%	1	5.9%	1	16.7%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.4%	0	0.0%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	0	0.0%	1	16.7%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***9***	***3.6%***	***1***	***5.9%***	***2***	***33.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	4	1.6%	0	0.0%	1	16.7%
110.320 VITREOUS DEGENERATION SYNERESIS	3	1.2%	1	5.9%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	2	0.8%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	6	2.4%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	3	1.2%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	8	3.2%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	0.8%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	195	78.9%	9	52.9%	4	66.7%

FLAT-COATED RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	2-4	NO
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Y-suture tip opacity	Not defined	1	Breeder option
F.	Retinopathy	Not defined	1	Breeder Option

Description and Comments

A. Glaucoma (with pectinate ligament abnormality)

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

Flat-Coated Retrievers have been shown to have a higher prevalence of pectinate ligament abnormalities compared with other breeds. There is a significant association between pectinate ligament abnormalities and glaucoma in this breed. The heritability of pectinate ligament abnormalities in Flat-Coated Retrievers is estimated at 0.7. Since glaucoma and pectinate ligament abnormalities are closely associated, glaucoma may also be heritable.

In a recent report, pectinate ligament abnormalities were prevalent and significantly associated with age in a population of Flat-Coated Retrievers in the UK.

Due to the incidence of PLD in the breed and the increased progression observed with age, it may be prudent to perform repeated gonioscopy examinations over time.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong

recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

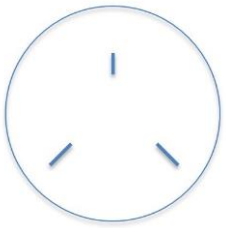
Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. The exact frequency and significance of cataracts in the breed is not known.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinopathy

Patchy to focal unilateral or bilateral hyper reflective tapetal lesions or regions of retinal thinning, most frequently peripheral but occasionally central. Details regarding age of onset and progression of lesions or their significance have not been characterized.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Read RA, Wood JL, Lakhani KH, Read RA. Pectinate ligament dysplasia (PLD) and glaucoma in Flat-Coated Retrievers. I. Objectives, technique and results of a PLD survey. *Vet Ophthalmol*. 1998;1:85-90. PMID: 11397215

3. Read RA, Wood JL, Lakhani KH, Read RA. Pectinate ligament dysplasia (PLD) and glaucoma in Flat-Coated Retrievers. II. Assessment of prevalence and heritability. *Vet Ophthalmol.* 1998;1:91-99. PMID: 11397216

4. Oliver JA, Ekiri A, Mellersh CS. Prevalence of pectinate ligament dysplasia and associations with age, sex and intraocular pressure in the Basset Hound, Flat-Coated Retriever and Dandie Dinmont Terrier. Can Genet Epidemiol 2016 March 12;3:1doi: 10.1186/s40575-016-0033-1. PMID: 26973793

OCULAR DISORDERS REPORT
FLAT-COATED RETRIEVER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	8,696		1,977		310	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	0.0%	1	0.1%	0	0.0%
10.000	GLAUCOMA	2	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	9	0.1%	1	0.1%	1	0.3%
20.160	MACROPALPEBRAL FISSURE	2	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	16	0.2%	5	0.3%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	33	0.4%	2	0.1%	0	0.0%
25.110	DISTICHIASIS	1,097	12.6%	252	12.7%	52	16.8%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	1	0.0%	0	0.0%	0	0.0%
51.100	THIRD EYELID CARTILAGE ANOMALY	0	0.0%	0	0.0%	1	0.3%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	4	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	0	0.0%	0	0.0%	1	0.3%
70.220	PIGMENTARY KERATITIS	2	0.0%	1	0.1%	0	0.0%
70.700	CORNEAL DYSTROPHY	52	0.6%	14	0.7%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	3	0.0%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	2	0.0%	0	0.0%	0	0.0%
93.120	IRIS CYST	27	0.3%	3	0.2%	1	0.3%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.0%	2	0.1%	1	0.3%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	208	2.4%	85	4.3%	14	4.5%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	14	0.2%	1	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	3	0.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	60	0.7%	62	3.1%	16	5.2%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	5	0.1%	0	0.0%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	3	0.2%	0	0.0%
95.120	CILIARY BODY CYST	0	0.0%	1	0.1%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
97.120	COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	16	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	987	11.4%	299	15.1%	42	13.5%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	214	2.5%	207	10.5%	31	10.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	25	0.3%	13	0.7%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	11	0.1%	9	0.5%	1	0.3%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	35	0.4%	26	1.3%	1	0.3%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	51	0.6%	60	3.0%	4	1.3%
100.306	PUNCTATE CATARACT, NUCLEUS	19	0.2%	29	1.5%	3	1.0%
100.307	PUNCTATE CATARACT, CAPSULAR	42	0.5%	34	1.7%	4	1.3%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	42	0.5%	18	0.9%	3	1.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	22	0.3%	5	0.3%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	17	0.2%	11	0.6%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	6	0.1%	4	0.2%	1	0.3%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	12	0.1%	4	0.2%	1	0.3%
100.316	INCIPIENT CATARACT, NUCLEUS	7	0.1%	7	0.4%	1	0.3%
100.317	INCIPIENT CATARACT, CAPSULAR	8	0.1%	2	0.1%	1	0.3%

OCULAR DISORDERS REPORT
FLAT-COATED RETRIEVER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 8,696 #	 %	2016-2020 1,977 #	 %	2021 310 #	 %
LENS Continued						
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	1	0.1%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	32	0.4%	65	3.3%	15	4.8%
100.330 GENERALIZED/ COMPLETE CATARACT	6	0.1%	2	0.1%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***569***	***6.5%***	***498***	***25.2%***	***66***	***21.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	13	0.1%	7	0.4%	2	0.6%
110.135 PHPV/ PTVL	5	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	2	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	1	0.0%	3	0.2%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	18	0.2%	8	0.4%	1	0.3%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	12	0.1%	3	0.2%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	0	0.0%	1	0.1%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	51	0.6%	5	0.3%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	3	0.2%	0	0.0%
120.960 RETINOPATHY	14	0.2%	18	0.9%	1	0.3%
OPTIC NERVE						
130.110 MICROPAPILLA	5	0.1%	4	0.2%	2	0.6%
130.120 OPTIC NERVE HYPOPLASIA	3	0.0%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	21	0.2%	9	0.5%	1	0.3%
OTHER						
900.000 OTHER, UNSPECIFIED	160	1.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	267	3.1%	6	0.3%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	151	1.7%	157	7.9%	23	7.4%
NORMAL						
.000 NORMAL GLOBE	6,581	75.7%	1,165	58.9%	183	59.0%

FRENCH BULLDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
	- endothelial opacity/no strands	Not defined	1	NO	
E.	Cataract	Autosomal recessive	1, 2	NO	Mutation in the *HSF4* gene
F.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of the dog. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

C. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the French Bulldog, the condition is inherited as an autosomal recessive mutation in the *HSF4* gene (*HSF4-1*). A DNA test is available.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Mellersh CS, Pettitt L, Forman OP, et al. Identification of mutations in HSF4 in dogs of three different breeds with hereditary cataracts. *Vet Ophthalmol*. 2006;9:369-378. PMID: 16939467

OCULAR DISORDERS REPORT
FRENCH BULLDOG

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	3,854		2,371		736	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.0%	1	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.0%	2	0.1%	2	0.3%
20.160	MACROPALPEBRAL FISSURE	3	0.1%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	40	1.0%	25	1.1%	17	2.3%
22.000	ECTROPION, UNSPECIFIED	6	0.2%	2	0.1%	0	0.0%
25.110	DISTICHIASIS	261	6.8%	134	5.7%	31	4.2%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	26	0.7%	49	2.1%	9	1.2%
40.910	KERATOCONJUNCTIVITIS SICCA	3	0.1%	1	0.0%	1	0.1%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	1	0.0%	1	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	6	0.2%	4	0.2%	0	0.0%
CORNEA							
70.210	PANNUS	4	0.1%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	20	0.5%	12	0.5%	6	0.8%
70.700	CORNEAL DYSTROPHY	32	0.8%	16	0.7%	14	1.9%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	6	0.2%	1	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	0	0.0%	2	0.3%
93.120	IRIS CYST	9	0.2%	1	0.0%	1	0.1%
93.150	IRIS COLOBOMA	1	0.0%	2	0.1%	1	0.1%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	98	2.5%	66	2.8%	12	1.6%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	6	0.2%	1	0.0%	1	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	55	1.4%	20	0.8%	2	0.3%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	3	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	8	0.2%	4	0.2%	2	0.3%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	37	1.0%	41	1.7%	5	0.7%
93.810	UVEAL MELANOMA	1	0.0%	1	0.0%	0	0.0%
95.120	CILIARY BODY CYST	0	0.0%	1	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	1	0.0%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	91	2.4%	44	1.9%	8	1.1%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	18	0.5%	17	0.7%	4	0.5%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	8	0.2%	7	0.3%	1	0.1%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	11	0.3%	9	0.4%	1	0.1%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.1%	1	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	5	0.1%	3	0.1%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.1%	15	0.6%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	5	0.1%	11	0.5%	7	1.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	43	1.1%	13	0.5%	5	0.7%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	15	0.4%	2	0.1%	2	0.3%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	19	0.5%	5	0.2%	1	0.1%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	3	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	4	0.1%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	11	0.3%	6	0.3%	2	0.3%
100.317	INCIPIENT CATARACT, CAPSULAR	6	0.2%	10	0.4%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	3	0.1%	3	0.4%

OCULAR DISORDERS REPORT
FRENCH BULLDOG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 3,854 #	 %	2016-2020 2,371 #	 %	2021 736 #	 %
LENS Continued						
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	2	0.1%	1	0.1%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.0%	1	0.1%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	6	0.3%	1	0.1%
100.328 Y-SUTURE TIP OPACITIES	2	0.1%	0	0.0%	1	0.1%
100.330 GENERALIZED/ COMPLETE CATARACT	18	0.5%	1	0.0%	1	0.1%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***178***	***4.6%***	***113***	***4.8%***	***31***	***4.2%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	15	0.4%	19	0.8%	3	0.4%
110.135 PHPV/ PTVL	1	0.0%	2	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	7	0.2%	7	0.3%	2	0.3%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	86	2.2%	47	2.0%	10	1.4%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	10	0.3%	10	0.4%	2	0.3%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.0%	0	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.1%	1	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	1	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	65	1.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	88	2.3%	9	0.4%	2	0.3%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	48	1.2%	108	4.6%	27	3.7%
NORMAL						
.000 NORMAL GLOBE	3,176	82.4%	1,790	75.5%	589	80.0%

FRENCH POINTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the FRENCH POINTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
FRENCH POINTER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		1		1	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS						
100.328 Y-SUTURE TIP OPACITIES	1	100.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***100.0%***	***0***	***0.0%***	***0***	***0.0%***
NORMAL						
.000 NORMAL GLOBE	0	0.0%	1	100.0%	1	100.0%

FRENCH SPANIEL

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the FRENCH SPANIEL breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
FRENCH SPANIEL

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	2		3		14	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	50.0%	0	0.0%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	0	0.0%	0	0.0%	2	14.3%
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	0	0.0%	1	7.1%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	0	0.0%	1	7.1%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	50.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	0	0.0%	1	7.1%
LENS							
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	50.0%	0	0.0%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	50.0%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	50.0%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	50.0%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	1	50.0%	1	33.3%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	33.3%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	0	0.0%	1	7.1%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***5***	***250.0%***	***2***	***66.7%***	***1***	***7.1%***
VITREOUS							
110.320	VITREOUS DEGENERATION SYNERESIS	1	50.0%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	3	150.0%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	0	0.0%	1	7.1%
NORMAL							
.000	NORMAL GLOBE	0	0.0%	1	33.3%	10	71.4%

GERMAN LONGHAIRED POINTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the GERMAN LONGHAIRED POINTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
GERMAN LONGHAIRED POINTER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	10		23		2	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	0	0.0%	1	4.3%	0	0.0%
UVEA						
93.120 IRIS CYST	1	10.0%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	2	20.0%	1	4.3%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	10.0%	1	4.3%	0	0.0%
LENS						
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	2	8.7%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	2	8.7%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	2	8.7%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	4.3%	1	50.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***7***	***30.4%***	***1***	***50.0%***
VITREOUS						
110.320 VITREOUS DEGENERATION SYNERESIS	0	0.0%	1	4.3%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1	10.0%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	7	70.0%	16	69.6%	1	50.0%

GERMAN PINSCHER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder Option
B.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation
C.	Cataract	Not defined	1	NO
D.	Persistent hyperplastic tunica vasculosa lentis (PHTVL)	Not defined	2, 3	NO
E.	Micropapilla	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of the dog. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely

(diffuse) or in a localized region.

There may be more than one type of inherited cataract in German Pinschers. One form is reported in Finland with a later age of onset in which a pedigree analysis suggested autosomal recessive or incomplete dominant inheritance (4). Another form is reported in Germany with an earlier age of onset in which a pedigree analysis suggested autosomal recessive inheritance (5). Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Persistent hyperplastic tunica vasculosa lentis (PHTVL)

Persistent tunica vasculosa lentis results from the failure of regression of the embryologic vascular network which surrounds the developing lens. This disorder has been observed in German Pinschers in Finland and Germany. A pedigree analysis suggested recessive or incomplete dominant inheritance (4).

E. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. It may be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Leppanen M, Martenson J, Maki K. Results of ophthalmologic screening examinations of German Pinschers in Finland--a retrospective study. *Vet Ophthalmol*. 2001;4:165-169. PMID: 11722779

3. Pfahler S, Menzel J, Brahm R, et al. Prevalence and formation of primary cataracts and persistent hyperplastic tunica vasculosa lentis in the German Pinscher population in Germany. *Vet Ophthalmol*. 2015;18:135-140. PMID: 24674602

OCULAR DISORDERS REPORT
GERMAN PINSCHER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,124		425		60	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	5	0.4%	9	2.1%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	0	0.0%	0	0.0%
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	2	0.5%	0	0.0%
70.700	CORNEAL DYSTROPHY	19	1.7%	1	0.2%	1	1.7%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	8	0.7%	2	0.5%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	5	0.4%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	10	0.9%	14	3.3%	1	1.7%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	74	6.6%	36	8.5%	2	3.3%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	23	2.0%	18	4.2%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	28	2.5%	8	1.9%	2	3.3%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	0.5%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	9	0.8%	2	0.5%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	9	0.8%	3	0.7%	1	1.7%
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.4%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	8	0.7%	8	1.9%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	22	2.0%	10	2.4%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	38	3.4%	9	2.1%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	7	0.6%	5	1.2%	1	1.7%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	6	0.5%	1	0.2%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	8	0.7%	1	0.2%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	5	0.4%	4	0.9%	1	1.7%
100.317	INCIPIENT CATARACT, CAPSULAR	8	0.7%	4	0.9%	1	1.7%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	3	0.7%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	5	1.2%	0	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	2	0.5%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.2%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.2%	1	1.7%
100.328	Y-SUTURE TIP OPACITIES	2	0.2%	4	0.9%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	8	0.7%	2	0.5%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***187***	***16.6%***	***93***	***21.9%***	***7***	***11.7%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.2%	0	0.0%	0	0.0%
110.135	PHPV/ PTVL	4	0.4%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	14	1.2%	2	0.5%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2	0.2%	0	0.0%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.1%	0	0.0%	0	0.0%
120.400	RETINAL HEMORRHAGE	1	0.1%	0	0.0%	0	0.0%
120.960	RETINOPATHY	2	0.2%	0	0.0%	0	0.0%
OPTIC NERVE							
130.110	MICROPAPILLA	10	0.9%	5	1.2%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	6	0.5%	1	0.2%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	26	2.3%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	31	2.8%	1	0.2%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	17	1.5%	34	8.0%	2	3.3%

OCULAR DISORDERS REPORT
GERMAN PINSCHER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1,124		425		60	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	915	81.4%	295	69.4%	49	81.7%

GERMAN SHEPHERD DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Plasmoma/atypical pannus	Not defined	1	NO	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1, 2	Breeder option	
D.	Chronic superficial keratitis/pannus	Not defined	1, 3-9	NO	
E.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	 Not defined Not defined	 1 1	 Breeder option Passes with no notation	
F.	Cataract - Cortical	Presumed autosomal recessive	1, 10	NO	
G.	Cone degeneration - hemeralopia/ achromatopsia	Autosomal recessive	11	NO	Mutation in the *CNGA3* gene
H.	Retinal dysplasia - folds	Not defined	1, 12	Breeder option	
I.	Micropapilla	Not defined	1	Breeder option	
J.	Limbal melanoma	Not defined	13	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Plasmoma/atypical pannus

Bilateral lymphocytic/plasmocytic infiltration of the nictitating membranes which may occur independent of corneal Pannus.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Chronic superficial keratitis/pannus

A bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation follows the vascularization. If severe, vision impairment occurs. Pannus may be associated with plasma cell infiltration of the nictitans which may also occur independent of corneal disease.

The German Shepherd Dog has a higher incidence of pannus than any other breed. The MHC class II risk haplotype has been shown. Although there are likely several other genes and environmental factors that contribute to CSK, a recent paper suggested that MHC class II is a major genetic risk factor. Dogs with the risk haplotype were 2.7 times more likely to develop CSK. Homozygosity of the risk haplotype increased the risk of CSK to over eightfold.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume

cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Cortical: Reported by Barnett in Great Britain, opacities are first apparent at 8-12 weeks of age, in the posterior cortex and progress to involve the Y-sutures and nucleus. The equatorial subcapsular cortex is unaffected. No progression is noted after 1-2 years of age. Test breeding suggests an autosomal recessive mode of inheritance.

G. Cone degeneration - hemeralopia/achromatopsia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Afflicted puppies develop day-blindness and colorblindness. Afflicted dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. A 5-month-old German Shepherd puppy with vision loss during daylight hours was recently identified with a mutation in the *CNGA3* gene.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

I. Optic nerve hypoplasia

A congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be unable to differentiate from micropapilla on a routine (dilated) screening ophthalmoscopic exam.

J. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. It may be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

K. Limbal melanoma

Most limbal melanomas are really epibulbar melanocytomas, but there is a possibility of an extension of an intraocular melanoma extending outward and presenting as a limbal melanoma. An epibulbar melanocytoma originates from the superficial pigment lining the limbus and the lesion may eventually extend into the eye. Metastasis has not been documented and the mass is characterized by large epithelioid cells The lesion presents as a subconjunctival smooth mass most commonly in the dorsolateral limbal region and extends later into the cornea and posterior on the sclera. Breed predisposition have been

noted in the German Shepherd, Labrador and Golden Retriever.

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1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

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10. Barnett KC. Hereditary cataract in the German Shepherd Dog. *J Small Anim Pract*. 1986;27:387-395.

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OCULAR DISORDERS REPORT
GERMAN SHEPHERD DOG

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	4,695		988		253	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	7	0.1%	2	0.2%	0	0.0%
10.000	GLAUCOMA	3	0.1%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	3	0.1%	2	0.2%	1	0.4%
22.000	ECTROPION, UNSPECIFIED	4	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	53	1.1%	4	0.4%	1	0.4%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	0	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	3	0.1%	0	0.0%	0	0.0%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	10	0.2%	15	1.5%	2	0.8%
51.100	THIRD EYELID CARTILAGE ANOMALY	3	0.1%	1	0.1%	1	0.4%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	109	2.3%	19	1.9%	4	1.6%
70.220	PIGMENTARY KERATITIS	1	0.0%	1	0.1%	0	0.0%
70.700	CORNEAL DYSTROPHY	217	4.6%	46	4.7%	14	5.5%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.0%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	20	0.4%	5	0.5%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	2	0.0%	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	64	1.4%	16	1.6%	8	3.2%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	16	0.3%	0	0.0%	2	0.8%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	8	0.2%	3	0.3%	2	0.8%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.0%	1	0.1%	1	0.4%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	12	0.3%	11	1.1%	1	0.4%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.0%	2	0.2%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	2	0.2%	0	0.0%
95.120	CILIARY BODY CYST	0	0.0%	1	0.1%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	28	0.6%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	242	5.2%	87	8.8%	17	6.7%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	35	0.7%	19	1.9%	4	1.6%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	14	0.3%	5	0.5%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	18	0.4%	1	0.1%	2	0.8%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.0%	3	0.3%	1	0.4%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	19	0.4%	26	2.6%	1	0.4%
100.306	PUNCTATE CATARACT, NUCLEUS	47	1.0%	34	3.4%	6	2.4%
100.307	PUNCTATE CATARACT, CAPSULAR	15	0.3%	11	1.1%	3	1.2%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	35	0.7%	8	0.8%	1	0.4%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	31	0.7%	8	0.8%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	20	0.4%	5	0.5%	1	0.4%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	3	0.1%	2	0.2%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	7	0.1%	2	0.2%	1	0.4%

OCULAR DISORDERS REPORT
GERMAN SHEPHERD DOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	4,695		988		253	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.316 INCIPIENT CATARACT, NUCLEUS	64	1.4%	21	2.1%	7	2.8%
100.317 INCIPIENT CATARACT, CAPSULAR	3	0.1%	10	1.0%	3	1.2%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	2	0.2%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	1	0.1%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	0.2%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.1%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	2	0.2%	1	0.4%
100.327 INCOMPLETE CATARACT, CAPSULAR	1	0.0%	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	7	0.1%	21	2.1%	2	0.8%
100.330 GENERALIZED/ COMPLETE CATARACT	21	0.4%	5	0.5%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	8	0.2%	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***371***	***7.9%***	***191***	***19.3%***	***33***	***13.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	6	0.1%	3	0.3%	0	0.0%
110.135 PHPV/ PTVL	3	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.1%	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	10	0.2%	1	0.1%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	89	1.9%	13	1.3%	5	2.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	17	0.4%	2	0.2%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	20	0.4%	2	0.2%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	4	0.1%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	1	0.1%	0	0.0%
120.960 RETINOPATHY	2	0.0%	0	0.0%	0	0.0%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	0	0.0%	2	0.8%
OPTIC NERVE						
130.110 MICROPAPILLA	25	0.5%	12	1.2%	3	1.2%
130.120 OPTIC NERVE HYPOPLASIA	35	0.7%	2	0.2%	0	0.0%
130.150 OPTIC DISC COLOBOMA	3	0.1%	1	0.1%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	58	1.2%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	144	3.1%	6	0.6%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	75	1.6%	62	6.3%	14	5.5%
NORMAL						
.000 NORMAL GLOBE	3,605	76.8%	679	68.7%	177	70.0%

GERMAN SHORTHAIRED POINTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
E.	Retinal dysplasia - folds	Not defined	1	Breeder option	
F.	Cone degeneration - (achromatopsia)	Autosomal recessive	2, 3	NO	Mutation in the *CNGB3* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation,

specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Persistent hyaloid artery remnant (PHA)

A congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small vascular strand (PHA**)** or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

F. Cone degeneration - hemeralopia/achromatopsia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Afflicted puppies develop day-blindness, colorblindness, and photophobia between 8 and 12 weeks of age. Afflicted dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. A missense mutation in the same gene (*CNGB3*) that has been identified in CD-affected Alaskan Malamute-derived dogs has been detected in German Shorthaired Pointers affected with a clinically identical allelic disorder. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

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OCULAR DISORDERS REPORT
GERMAN SHORTHAIRED POINTER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	6,097		2,055		538	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
10.000	GLAUCOMA	1	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	10	0.2%	6	0.3%	2	0.4%
22.000	ECTROPION, UNSPECIFIED	4	0.1%	1	0.0%	0	0.0%
25.110	DISTICHIASIS	221	3.6%	108	5.3%	28	5.2%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	3	0.0%	0	0.0%	1	0.2%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	1	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	1	0.0%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	20	0.3%	1	0.0%	1	0.2%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.0%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	1	0.0%	1	0.0%	1	0.2%
93.120	IRIS CYST	6	0.1%	2	0.1%	1	0.2%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	2	0.0%	0	0.0%	1	0.2%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	412	6.8%	134	6.5%	40	7.4%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	17	0.3%	2	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.1%	4	0.2%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	1	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	16	0.3%	29	1.4%	2	0.4%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	3	0.0%	1	0.0%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	0	0.0%	1	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	1	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	9	0.1%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	313	5.1%	78	3.8%	13	2.4%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	40	0.7%	27	1.3%	3	0.6%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	50	0.8%	17	0.8%	1	0.2%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	15	0.2%	5	0.2%	1	0.2%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	4	0.1%	6	0.3%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	19	0.3%	16	0.8%	2	0.4%
100.306	PUNCTATE CATARACT, NUCLEUS	31	0.5%	22	1.1%	5	0.9%
100.307	PUNCTATE CATARACT, CAPSULAR	17	0.3%	20	1.0%	2	0.4%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	19	0.3%	3	0.1%	1	0.2%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	91	1.5%	17	0.8%	6	1.1%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	20	0.3%	2	0.1%	2	0.4%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.0%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	18	0.3%	3	0.1%	1	0.2%
100.316	INCIPIENT CATARACT, NUCLEUS	22	0.4%	6	0.3%	2	0.4%

OCULAR DISORDERS REPORT
GERMAN SHORTHAIRED POINTER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	6,097		2,055		538	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.317 INCIPIENT CATARACT, CAPSULAR	12	0.2%	8	0.4%	2	0.4%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	2	0.1%	1	0.2%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	7	0.1%	1	0.0%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	7	0.1%	10	0.5%	3	0.6%
100.330 GENERALIZED/ COMPLETE CATARACT	14	0.2%	2	0.1%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***403***	***6.6%***	***168***	***8.2%***	***32***	***5.9%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	8	0.1%	21	1.0%	6	1.1%
110.135 PHPV/ PTVL	13	0.2%	3	0.1%	1	0.2%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.0%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	20	0.3%	9	0.4%	2	0.4%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	129	2.1%	19	0.9%	8	1.5%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	24	0.4%	3	0.1%	1	0.2%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	9	0.1%	0	0.0%	1	0.2%
120.920 RETINAL DETACHMENT WITH DIALYSIS	2	0.0%	1	0.0%	0	0.0%
120.960 RETINOPATHY	4	0.1%	4	0.2%	1	0.2%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	3	0.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	4	0.1%	1	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	99	1.6%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	134	2.2%	4	0.2%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	67	1.1%	87	4.2%	21	3.9%
NORMAL						
.000 NORMAL GLOBE	4,951	81.2%	1,560	75.9%	408	75.8%

GERMAN SPANIEL

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the GERMAN SPANIEL breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
GERMAN SPANIEL

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		1		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	0		1	100.0%	0	

GERMAN SPITZ

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	

Description and Comments

A. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
GERMAN SPITZ

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	5		37		8	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	20.0%	1	2.7%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	2.7%	0	0.0%
LENS						
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	1	2.7%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	0	0.0%	1	12.5%
100.330 GENERALIZED/ COMPLETE CATARACT	0	0.0%	0	0.0%	1	12.5%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***1***	***2.7%***	***2***	***25.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	7	18.9%	0	0.0%
110.135 PHPV/ PTVL	0	0.0%	0	0.0%	1	12.5%
RETINA						
120.960 RETINOPATHY	1	20.0%	0	0.0%	0	0.0%
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	2.7%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	4	80.0%	27	73.0%	6	75.0%

GERMAN WIREHAIRED POINTER

(Drathaar, Deutsch Drathaar)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
C.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
GERMAN WIREHAIRED POINTER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	668		394		91	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	1	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	9	1.3%	6	1.5%	1	1.1%
CORNEA							
70.730	CORNEAL ENDOTHELIAL DEGENERATION	0	0.0%	1	0.3%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	1	0.3%	1	1.1%
93.120	IRIS CYST	0	0.0%	1	0.3%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	9	1.3%	17	4.3%	4	4.4%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	0.3%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	5	0.7%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	18	2.7%	16	4.1%	3	3.3%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	2	0.3%	0	0.0%	1	1.1%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	6	0.9%	2	0.5%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.3%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.1%	4	1.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	4	0.6%	4	1.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.4%	5	1.3%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	4	1.0%	1	1.1%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	10	1.5%	3	0.8%	1	1.1%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	2	0.5%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	3	0.4%	0	0.0%	1	1.1%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.3%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	0.5%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	2	0.3%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***37***	***5.5%***	***28***	***7.1%***	***4***	***4.4%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.3%	2	0.5%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.3%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	2	0.3%	1	0.3%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	3	0.4%	0	0.0%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.1%	1	0.3%	0	0.0%
120.190	RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	9	1.3%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	8	1.2%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	14	2.1%	11	2.8%	1	1.1%
NORMAL							
.000	NORMAL GLOBE	590	88.3%	332	84.3%	83	91.2%

GIANT SCHNAUZER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Cataract	Not defined	1	NO	
C.	Y-suture tip opacity	Not defined	1	Breeder option	
D.	Retinal atrophy (*prcd*)	Autosomal recessive	1	NO	Mutation in the *prcd* gene
	Retinal Atrophy	Autosomal recessive	2	NO	Mutation in the *NECAP1* gene
E.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

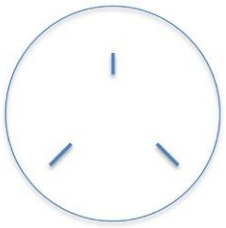
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

D. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A genetic test is available.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Hitti, R. J., et al. (2019). "Whole Genome Sequencing of Giant Schnauzer Dogs with Progressive Retinal Atrophy Establishes NECAP1 as a Novel Candidate Gene for Retinal Degeneration." Genes (Basel) 10(5). PMID: 31117272

OCULAR DISORDERS REPORT
GIANT SCHNAUZER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,129		394		122	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.1%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	0	0.0%	1	0.3%	0	0.0%
25.110	DISTICHIASIS	5	0.4%	2	0.5%	0	0.0%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	2	0.5%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	10	0.9%	3	0.8%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.2%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	1	0.1%	2	0.5%	1	0.8%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.1%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	2	0.2%	1	0.3%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	55	4.9%	12	3.0%	2	1.6%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	4	0.4%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	0.5%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	7	0.6%	11	2.8%	5	4.1%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	0	0.0%	1	0.3%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	5	0.4%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	56	5.0%	20	5.1%	6	4.9%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	9	0.8%	9	2.3%	1	0.8%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	9	0.8%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.3%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	1	0.3%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	3	0.3%	5	1.3%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	2	0.2%	1	0.3%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	14	1.2%	8	2.0%	5	4.1%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	3	0.3%	2	0.5%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	24	2.1%	4	1.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	8	0.7%	1	0.3%	1	0.8%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	4	0.4%	1	0.3%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	2	0.2%	2	0.5%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.2%	5	1.3%	1	0.8%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.3%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	3	0.3%	5	1.3%	1	0.8%
100.330	GENERALIZED/ COMPLETE CATARACT	2	0.2%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.2%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***91***	***8.1%***	***46***	***11.7%***	***9***	***7.4%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	5	0.4%	4	1.0%	3	2.5%
110.135	PHPV/ PTVL	5	0.4%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	2	0.2%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	27	2.4%	2	0.5%	1	0.8%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.1%	2	0.5%	0	0.0%

OCULAR DISORDERS REPORT
GIANT SCHNAUZER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,129 #	 %	2016-2020 394 #	 %	2021 122 #	 %
RETINA Continued						
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	8	0.7%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.1%	1	0.3%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	1	0.3%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	26	2.3%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	19	1.7%	1	0.3%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	12	1.1%	15	3.8%	4	3.3%
NORMAL						
.000 NORMAL GLOBE	950	84.1%	313	79.4%	102	83.6%

GLEN OF IMAAL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Retinal atrophy - Cone rod dystrophy (*crd3*)	Autosomal recessive	2, 3	NO	Mutation in the *ADAM9* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Cone rod dystrophy

A form of late-onset PRA identified in Glen of Imaal Terriers. Ophthalmoscopic lesions are typically diagnosed by 5 years of age, however lesions may be present as early as 3 years of age in affected dogs. Two distinct phenotypes are observed in affected Glen of Imaal Terriers. The most common phenotype is subtle but generalized tapetal hyperreflectivity and retinal vascular attenuation that progresses over 1 - 2 years after initial examination. The less common phenotype is a focal mid-temporal (area centralis) area of distinct tapetal hyperreflectivity without generalized retinal disease. This lesion may remain unchanged for over a year but will progress to generalized retinal atrophy by 2 - 4 years after initial examination. ERG dysfunction can be observed as early as 15 weeks of age. The disorder is caused by a mutation present in the *ADAM9* gene. A DNA test is available that will unequivocally identify normal, affected, and carrier dogs. The

test is accurate only for this mutation and will not identify other forms of PRA.

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OCULAR DISORDERS REPORT
GLEN OF IMAAL TERRIER

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		606		191		29	
Diagnostic Name		#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.2%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	2	0.3%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	21	3.5%	9	4.7%	0	0.0%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	1	0.5%	0	0.0%
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	1	0.5%	0	0.0%
UVEA							
93.120	IRIS CYST	1	0.2%	1	0.5%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.2%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	2	1.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	1	0.5%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	55	9.1%	7	3.7%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	6	1.0%	5	2.6%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.2%	2	1.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.7%	2	1.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.5%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.3%	1	0.5%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.5%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.5%	2	1.0%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	5	0.8%	3	1.6%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.5%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	5	0.8%	1	0.5%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.3%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	1	0.2%	0	0.0%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.2%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.2%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	0.2%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.2%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.5%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***37***	***6.1%***	***18***	***9.4%***	***0***	***0.0%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.2%	1	0.5%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	2	0.3%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	7	1.2%	0	0.0%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	4	0.7%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	23	3.8%	1	0.5%	0	0.0%
120.960	RETINOPATHY	1	0.2%	0	0.0%	0	0.0%
OPTIC NERVE							
130.120	OPTIC NERVE HYPOPLASIA	1	0.2%	0	0.0%	0	0.0%
130.150	OPTIC DISC COLOBOMA	4	0.7%	1	0.5%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	12	2.0%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	12	2.0%	2	1.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	26	4.3%	7	3.7%	0	0.0%

OCULAR DISORDERS REPORT
GLEN OF IMAAL TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	606		191		29	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	488	80.5%	158	82.7%	29	100.0%

GOLDEN RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmos	Autosomal recessive	2	NO	Mutation in the *SIX6* gene
B.	Entropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
E.	Uveal cysts	Not defined	1, 3-5	Breeder option	
F.	Pigmentary uveitis	Not defined	1, 3-6	NO	
G.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	 Not defined Not defined	 1 7	 Breeder option Passes with no notation	
H.	Cataract	Not defined	1, 7-12	NO	
I.	Y-suture tip opacity	Not defined	1	Breeder option	
J.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
K.	Vitreous degeneration	Not defined	1	Breeder option	
L.	Retinal atrophy *prcd* *PRA1* *PRA2*	 Autosomal recessive Autosomal recessive Autosomal recessive	 1, 12, 13 14 15, 16	 NO NO NO	 Mutation in the *prcd* gene Mutation in the *SLC4A3* gene Mutation in the *TTC8* gene

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
M.	Retinal dysplasia - folds	Not defined	1, 17	Breeder option	
N.	Retinal dysplasia - geographic	Not defined	1, 17	NO	
O.	Limbal melanoma	Not defined	18	NO	

Description and Comments

A. Micropthalmos

A congenital anomaly in which the globe is abnormally small. Commonly associated with multiple ocular malformations and when severe, may affect vision.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Selection should be directed against entropion and toward a head conformation that reduces or eliminates the likelihood of the defect.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

E. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

This disorder may be observed in any breed but retriever breeds tend to be predisposed. There is usually no effect on vision unless the cysts are heavily clustered and impinge

on the pupillary area. Less frequently, the cysts may rupture and adhere to the cornea or anterior lens capsule. Multiple cysts may occlude the iridocorneal angle and cause glaucoma.

F. Pigmentary uveitis

A unique uveitis observed in the Golden Retriever that is not associated with other ocular or systemic disorders. Adhesions develop between iris and lens and the peripheral iris and cornea. Pigment dispersion (exfoliation) occurs across the anterior lens capsule from the pigmented cells of the posterior iris. Other complications include secondary cataract and obstructive glaucoma. Onset is usually between 5-10 years of age.

G. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

H. Cataract

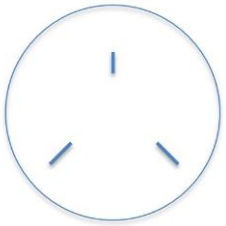
A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The most common cataract reported in the Golden Retriever is a posterior polar (posterior cortical) cataract. These are generally bilateral, although an occasional unilateral affliction may be observed. These focal opacities will occasionally remain stationary. These cataracts are usually observed between 9 months and 3 years of age. A more generalized cataract is also observed in this breed and is not always associated with the previously mentioned polar cataract. There are also cataract changes involving the Y sutures which may or may not progress.

The existence of cataracts in the Golden Retriever, often with limited clinical significance, presents problems with breeder recognition as the majority of these dogs do not evidence visual impairment. It is strongly recommended that all Golden Retrievers that are used in breeding programs be examined annually as cataract changes have been observed in multiple locations of the lens and variable age of onset.

I. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

J. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

K. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

L. Retinal atrophy

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that one form of PRA in the Golden Retriever is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*)

gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

In addition, two other known mutations that cause PRA are present in the breed. Golden Retriever PRA 1 (GR PRA1) is an autosomal recessive trait and is the predominant form in European lines of Golden Retrievers. Golden Retriever PRA 2 (GR PRA2) has also been identified within the breed. Therefore three different DNA tests are available. However these tests will only detect these three mutations. Syndromic effects in Golden Retrievers seems to be mild.

M. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

N. Retinal dysplasia – geographic

Abnormal development of the retina present at birth. Any irregularly shaped area of abnormal retinal development containing both areas of thinning and areas of elevation representing folds and retinal disorganization.

O. Limbal melanoma

Most limbal melanomas are really epibulbar melanocytomas, but there is a possibility of an extension of an intraocular melanoma extending outward and presenting as a limbal melanoma. An epibulbar melanocytoma originates from the superficial pigment lining the limbus and the lesion may eventually extend into the eye. Metastasis has not been documented and the mass is characterized by large epithelioid cells. The lesion presents as a subconjunctival smooth mass most commonly in the dorsolateral limbal region and extends later into the cornea and posterior on the sclera. Breed predispositions have been noted in the German Shepherd Dog, and Labrador and Golden Retrievers.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

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OCULAR DISORDERS REPORT
GOLDEN RETRIEVER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	157,021		44,409		10,449	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	52	0.0%	7	0.0%	2	0.0%
10.000	GLAUCOMA	32	0.0%	1	0.0%	0	0.0%
EYELIDS							
20.110	EYELID DERMOID	3	0.0%	0	0.0%	0	0.0%
20.140	ECTOPIC CILIA	53	0.0%	5	0.0%	3	0.0%
20.160	MACROPALPEBRAL FISSURE	22	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	367	0.2%	80	0.2%	15	0.1%
22.000	ECTROPION, UNSPECIFIED	103	0.1%	9	0.0%	2	0.0%
25.110	DISTICHIASIS	16,919	10.8%	3,881	8.7%	892	8.5%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	31	0.0%	42	0.1%	9	0.1%
40.910	KERATOCONJUNCTIVITIS SICCA	5	0.0%	2	0.0%	0	0.0%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	2	0.0%	0	0.0%	0	0.0%
51.100	THIRD EYELID CARTILAGE ANOMALY	16	0.0%	6	0.0%	3	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	41	0.0%	1	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	11	0.0%	0	0.0%	1	0.0%
70.220	PIGMENTARY KERATITIS	15	0.0%	13	0.0%	5	0.0%
70.700	CORNEAL DYSTROPHY	633	0.4%	220	0.5%	68	0.7%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	37	0.0%	5	0.0%	3	0.0%
UVEA							
90.250	PIGMENTARY UVEITIS	971	0.6%	534	1.2%	112	1.1%
93.110	IRIS HYPOPLASIA	3	0.0%	3	0.0%	1	0.0%
93.120	IRIS CYST	6,518	4.2%	1,911	4.3%	438	4.2%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	17	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	20	0.0%	2	0.0%	1	0.0%
93.170	ANTERIOR CHAMBER CYST	598	0.4%	1,335	3.0%	308	2.9%
93.180	IIRIS SPHINCTER DYSPLASIA	1	0.0%	1	0.0%	1	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3,382	2.2%	1,315	3.0%	273	2.6%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	115	0.1%	24	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	83	0.1%	11	0.0%	3	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	111	0.1%	1	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	421	0.3%	622	1.4%	177	1.7%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	44	0.0%	20	0.0%	4	0.0%
93.810	UVEAL MELANOMA	22	0.0%	17	0.0%	4	0.0%
95.120	CILIARY BODY CYST	676	0.4%	368	0.8%	92	0.9%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	1	0.0%	2	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	9	0.0%	0	0.0%	0	0.0%
97.120	COLOBOMA	8	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	952	0.6%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	9,441	6.0%	3,193	7.2%	825	7.9%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1,293	0.8%	1,155	2.6%	248	2.4%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2,503	1.6%	782	1.8%	160	1.5%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	778	0.5%	701	1.6%	158	1.5%

OCULAR DISORDERS REPORT
GOLDEN RETRIEVER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	157,021		44,409		10,449	
	Diagnostic Name	#	%	#	%	#	%
LENS Continued							
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	167	0.1%	100	0.2%	23	0.2%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	927	0.6%	336	0.8%	44	0.4%
100.306	PUNCTATE CATARACT, NUCLEUS	408	0.3%	411	0.9%	115	1.1%
100.307	PUNCTATE CATARACT, CAPSULAR	594	0.4%	542	1.2%	98	0.9%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	998	0.6%	510	1.1%	112	1.1%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	3,199	2.0%	879	2.0%	197	1.9%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1,084	0.7%	639	1.4%	181	1.7%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	72	0.0%	28	0.1%	2	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	743	0.5%	153	0.3%	32	0.3%
100.316	INCIPIENT CATARACT, NUCLEUS	385	0.2%	302	0.7%	76	0.7%
100.317	INCIPIENT CATARACT, CAPSULAR	318	0.2%	216	0.5%	62	0.6%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	39	0.0%	77	0.2%	16	0.2%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	74	0.0%	133	0.3%	26	0.2%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	19	0.0%	63	0.1%	6	0.1%
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	2	0.0%	2	0.0%	1	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	8	0.0%	25	0.1%	2	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	17	0.0%	52	0.1%	4	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	12	0.0%	31	0.1%	4	0.0%
100.328	Y-SUTURE TIP OPACITIES	131	0.1%	240	0.5%	52	0.5%
100.330	GENERALIZED/ COMPLETE CATARACT	350	0.2%	36	0.1%	6	0.1%
100.340	RESORBING/ HYPERMATURE CATARACT	4	0.0%	13	0.0%	2	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	31	0.0%	3	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***15,077***	***9.6%***	***7,426***	***16.7%***	***1,627***	***15.6%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	150	0.1%	89	0.2%	19	0.2%
110.135	PHPV/ PTVL	37	0.0%	10	0.0%	2	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	18	0.0%	6	0.0%	3	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	258	0.2%	89	0.2%	8	0.1%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1,967	1.3%	481	1.1%	80	0.8%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	786	0.5%	224	0.5%	44	0.4%
120.190	RETINAL DYSPLASIA, DETACHED	38	0.0%	5	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	173	0.1%	12	0.0%	1	0.0%
120.400	RETINAL HEMORRHAGE	18	0.0%	0	0.0%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	28	0.0%	0	0.0%	0	0.0%
120.920	RETINAL DETACHMENT WITH DIALYSIS	3	0.0%	3	0.0%	1	0.0%
120.960	RETINOPATHY	33	0.0%	46	0.1%	9	0.1%
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.0%	2	0.0%
OPTIC NERVE							
130.110	MICROPAPILLA	10	0.0%	12	0.0%	1	0.0%
130.120	OPTIC NERVE HYPOPLASIA	37	0.0%	7	0.0%	0	0.0%
130.150	OPTIC DISC COLOBOMA	56	0.0%	12	0.0%	1	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	1,783	1.1%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	3,017	1.9%	90	0.2%	30	0.3%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2,069	1.3%	1,967	4.4%	436	4.2%
NORMAL							
.000	NORMAL GLOBE	118,631	75.6%	28,876	65.0%	6,992	66.9%

GORDON SETTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Ectropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	 Not defined Not defined	 1 1	 Breeder option Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy - rod-cone dysplasia type 4 (*rcd4*)	Autosomal recessive	2	NO	Mutation in the *C2orf71* gene
F.	Cone degeneration - achromatopsia	Not defined	3	NO	
G.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelids which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

F. Cone degeneration - achromatopsia

Suspected inherited retinopathy characterized by degeneration of the cone receptors and loss of vision in bright light. Age of onset is variable. Ophthalmoscopic examination is normal. The ERG abnormalities are more suggestive of a cone-rod dystrophy. The mode of inheritance and genetic mutation are not yet known.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Downs LM, Bell JS, Freeman J, et al. Late-onset progressive retinal atrophy in the Gordon and Irish Setter breeds is associated with a frameshift mutation in C2orf71. *Anim Genet*. 2012;44:169-177. PMID: 22686255

3. Good KL, Komaromy AM, Kass PH, et al. Novel retinopathy in related Gordon Setters: a clinical, behavioral, electrophysiological, and genetic investigation. *Vet Ophthalmol*. 2015:1-11. PMID: 26417729

OCULAR DISORDERS REPORT
GORDON SETTER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	2,217		325		48	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	0.1%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	9	0.4%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	15	0.7%	2	0.6%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	52	2.3%	4	1.2%	0	0.0%
25.110	DISTICHIASIS	42	1.9%	4	1.2%	0	0.0%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	1	0.3%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	3	0.1%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.0%	0	0.0%	1	2.1%
CORNEA							
70.210	PANNUS	3	0.1%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	8	0.4%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	19	0.9%	1	0.3%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	0.3%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	112	5.1%	40	12.3%	5	10.4%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	7	0.3%	1	0.3%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	4	0.2%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	15	0.7%	17	5.2%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.2%	1	0.3%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	9	0.4%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	79	3.6%	16	4.9%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	10	0.5%	4	1.2%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	10	0.5%	2	0.6%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	3	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	4	0.2%	1	0.3%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	7	0.3%	5	1.5%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	5	0.2%	8	2.5%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	7	0.3%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	14	0.6%	3	0.9%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	8	0.4%	1	0.3%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.0%	1	0.3%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	6	0.3%	1	0.3%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	6	0.3%	1	0.3%	1	2.1%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	0	0.0%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.0%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	2	0.1%	1	0.3%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	10	0.5%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***105***	***4.7%***	***28***	***8.6%***	***1***	***2.1%***

OCULAR DISORDERS REPORT
GORDON SETTER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,217 #	 %	Year Examined: 2016-2020 Total # Dogs: 325 #	 %	Year Examined: 2021 Total # Dogs: 48 #	 %
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	12	0.5%	3	0.9%	1	2.1%
110.135 PHPV/ PTVL	5	0.2%	2	0.6%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	5	0.2%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	32	1.4%	7	2.2%	1	2.1%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	4	0.2%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	17	0.8%	2	0.6%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	8	0.4%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	8	0.4%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	40	1.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	59	2.7%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	31	1.4%	12	3.7%	1	2.1%
NORMAL						
.000 NORMAL GLOBE	1,807	81.5%	231	71.1%	39	81.3%

GRAND BASSET GRIFFON VENDEEN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the GRAND BASSET GRIFFON VENDEEN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
GRAND BASSET GRIFFON VENDEEN

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	65		106		7	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	1	1.5%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	4	6.2%	3	2.8%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	7.7%	2	1.9%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	0.9%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	5	7.7%	4	3.8%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	3.1%	6	5.7%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	1.5%	0	0.0%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	1.5%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.9%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	0	0.0%	1	14.3%
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	0.9%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	2	1.9%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.9%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	2	1.9%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	2	1.9%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.9%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	1	1.5%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	0.9%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***3***	***4.6%***	***11***	***10.4%***	***1***	***14.3%***
VITREOUS							
110.135	PHPV/ PTVL	1	1.5%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1	1.5%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	1.5%	0	0.0%	0	0.0%
OPTIC NERVE							
130.110	MICROPAPILLA	0	0.0%	0	0.0%	1	14.3%
OTHER							
900.000	OTHER, UNSPECIFIED	2	3.1%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	1	1.5%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	1.9%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	47	72.3%	87	82.1%	5	71.4%

GREAT DANE

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Microphthalmia with multiple ocular defects associated with partial albinism	Presumed autosomal dominant	1, 2	NO
B.	Glaucoma	Not defined	1, 3	NO
C.	Entropion	Not defined	1	Breeder option
D.	Ectropion	Not defined	1	Breeder option
E.	Distichiasis	Not defined	1	Breeder option
F.	Nictitans cartilage anomaly/eversion	Not defined	1	Breeder option
G.	Prolapsed gland of the third eyelid	Not defined	4	Breeder option
H.	Uveal cysts	Not defined	1, 5	Breeder option
I.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
J.	Cataract	Not defined	1	NO

Description and Comments

A. Microphthalmia with multiple ocular defects associated with partial albinism

Multiple ocular defects are seen associated with partial albinism (white or light coat color) and deafness in Great Danes. The abnormalities are thought to stem from a common developmental defect. Ocular defects are anterior segment dysgenesis, equatorial staphylomas, microphthalmia, cortical cataracts, lens luxation, spherophakia, iris coloboma, and blue irides. An autosomal dominant mode of inheritance is suspected. The hearing loss is attributable to cochlea-saccular degeneration.

B. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when

sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine screening exam for certification.

C. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Entropion and ectropion often occur together in this breed, associated with an abnormally large palpebral fissure.

D. Ectropion

A conformational defect resulting in eversion of the eyelids which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

E. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

F. Nictitans cartilage anomaly/eversion

A scroll-like curling of the cartilage of the third eyelid, usually everting the margin. This condition may occur in one or both eyes and may cause mild ocular irritation.

G. Prolapsed gland of the third eyelid

Protrusion of the tear gland associated with the third eyelid. The mode of inheritance of this disorder is unknown. The exposed gland may become irritated. Commonly referred to as "cherry eye."

Great Danes were overrepresented in a study of prolapsed gland of the third eyelid. In the study, 83% of the prolapsed glands in Great Danes occurred before 1 year of age. Great Danes were also more likely to develop bilateral prolapsed glands that occurred either simultaneously with the first prolapse or with a short time interval between prolapses.

H. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs. In

the Great Dane, pigmented cysts may also arise from pigmented epithelial cells of the ciliary body. Ciliary body cysts may predispose to glaucoma in the Great Dane.

I. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

J. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gwin RM, Wyman M, Lim DJ, et al. Multiple ocular defects associated with partial albinism and deafness in the dog. *J Am Anim Hosp Assoc*. 1981;17:401-408.

3. Wood JL, Lakhani KH, Mason IK, et al. Relationship of the degree of goniodysgenesis and other ocular measurements to glaucoma in Great Danes. *Am J Vet Res*. 2001;62:1493-1499. PMID: 11560283

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OCULAR DISORDERS REPORT
GREAT DANE

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	6,715		2,682		611	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	24	0.4%	3	0.1%	0	0.0%
10.000	GLAUCOMA	2	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	124	1.8%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	168	2.5%	109	4.1%	31	5.1%
22.000	ECTROPION, UNSPECIFIED	263	3.9%	113	4.2%	26	4.3%
25.110	DISTICHIASIS	366	5.5%	139	5.2%	24	3.9%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	6	0.1%	1	0.0%	2	0.3%
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	1	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	135	2.0%	85	3.2%	24	3.9%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	13	0.2%	12	0.4%	2	0.3%
CORNEA							
70.210	PANNUS	2	0.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	4	0.1%	2	0.1%	1	0.2%
70.700	CORNEAL DYSTROPHY	28	0.4%	8	0.3%	0	0.0%
UVEA							
90.250	PIGMENTARY UVEITIS	1	0.0%	1	0.0%	0	0.0%
93.110	IRIS HYPOPLASIA	6	0.1%	6	0.2%	0	0.0%
93.120	IRIS CYST	72	1.1%	29	1.1%	8	1.3%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	18	0.3%	4	0.1%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	6	0.1%	28	1.0%	6	1.0%
93.180	IIRIS SPHINCTER DYSPLASIA	0	0.0%	2	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	69	1.0%	28	1.0%	3	0.5%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	15	0.2%	3	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	8	0.1%	2	0.1%	2	0.3%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	4	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	18	0.3%	23	0.9%	4	0.7%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.0%	2	0.1%	1	0.2%
93.810	UVEAL MELANOMA	3	0.0%	2	0.1%	0	0.0%
95.120	CILIARY BODY CYST	7	0.1%	3	0.1%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	3	0.1%	0	0.0%
97.120	COLOBOMA	2	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	15	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	241	3.6%	87	3.2%	18	2.9%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	32	0.5%	32	1.2%	5	0.8%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	73	1.1%	38	1.4%	6	1.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	22	0.3%	9	0.3%	2	0.3%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	5	0.1%	1	0.0%	1	0.2%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	28	0.4%	4	0.1%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	19	0.3%	8	0.3%	3	0.5%
100.307	PUNCTATE CATARACT, CAPSULAR	33	0.5%	39	1.5%	9	1.5%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	68	1.0%	27	1.0%	7	1.1%

OCULAR DISORDERS REPORT
GREAT DANE

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 6,715 #	 %	Year Examined: 2016-2020 Total # Dogs: 2,682 #	 %	Year Examined: 2021 Total # Dogs: 611 #	 %
LENS Continued						
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	154	2.3%	35	1.3%	12	2.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	43	0.6%	18	0.7%	3	0.5%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	6	0.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	19	0.3%	8	0.3%	1	0.2%
100.316 INCIPIENT CATARACT, NUCLEUS	34	0.5%	8	0.3%	3	0.5%
100.317 INCIPIENT CATARACT, CAPSULAR	24	0.4%	13	0.5%	2	0.3%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	6	0.1%	5	0.2%	1	0.2%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	7	0.1%	11	0.4%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	3	0.1%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	2	0.0%	3	0.1%	1	0.2%
100.327 INCOMPLETE CATARACT, CAPSULAR	2	0.0%	2	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	5	0.1%	3	0.1%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	52	0.8%	3	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	9	0.1%	5	0.2%	1	0.2%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***649***	***9.7%***	***271***	***10.1%***	***56***	***9.2%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	11	0.2%	13	0.5%	2	0.3%
110.135 PHPV/ PTVL	15	0.2%	2	0.1%	1	0.2%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	13	0.2%	8	0.3%	2	0.3%
110.320 VITREOUS DEGENERATION SYNERESIS	26	0.4%	8	0.3%	3	0.5%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	23	0.3%	5	0.2%	2	0.3%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	3	0.0%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	2	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	7	0.1%	1	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.0%	0	0.0%	2	0.3%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.0%	2	0.1%	1	0.2%
130.120 OPTIC NERVE HYPOPLASIA	3	0.0%	1	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	2	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	60	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	137	2.0%	21	0.8%	5	0.8%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	89	1.3%	109	4.1%	25	4.1%
NORMAL						
.000 NORMAL GLOBE	5,280	78.6%	1,915	71.4%	443	72.5%

GREAT PYRENEES

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Multifocal retinopathy - *cmr1*	Autosomal recessive	2-4	Breeder option	Mutation in the *BEST1* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (cmr1) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous sub-retinal fluid, or accumulation of sub-retinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities

despite their abnormal appearing retinas.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci*. 2007;48:1959-1967. PMID: 17460247

3. Grahn BH, Philibert H, Cullen CL, et al. Multifocal retinopathy of Great Pyrenees dogs. *Vet Ophthalmol*. 1998;1:211-221. PMID: 11397233

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OCULAR DISORDERS REPORT
GREAT PYRENEES

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1,224		144		20	
Diagnostic Name	#	%	#	%	#	%
GLOBE						
.110 MICROPHTHALMIA	2	0.2%	0	0.0%	0	0.0%
EYELIDS						
20.160 MACROPALPEBRAL FISSURE	3	0.2%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	15	1.2%	0	0.0%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	3	0.2%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	16	1.3%	0	0.0%	0	0.0%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.1%	0	0.0%	0	0.0%
CORNEA						
70.210 PANNUS	1	0.1%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	14	1.1%	3	2.1%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	3	0.2%	0	0.0%	0	0.0%
UVEA						
93.110 IRIS HYPOPLASIA	1	0.1%	0	0.0%	0	0.0%
93.120 IRIS CYST	6	0.5%	1	0.7%	0	0.0%
93.150 IRIS COLOBOMA	1	0.1%	0	0.0%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	0	0.0%	3	2.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	305	24.9%	36	25.0%	3	15.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	11	0.9%	2	1.4%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	7	0.6%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	0.7%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.2%	0	0.0%	0	0.0%
93.810 UVEAL MELANOMA	1	0.1%	0	0.0%	0	0.0%
95.120 CILIARY BODY CYST	0	0.0%	1	0.7%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	2	0.2%	0	0.0%	0	0.0%
97.120 COLOBOMA	1	0.1%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	3	0.2%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	51	4.2%	6	4.2%	1	5.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	12	1.0%	2	1.4%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	14	1.1%	1	0.7%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	7	0.6%	0	0.0%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.2%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	3	0.2%	0	0.0%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	3	0.2%	1	0.7%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	0.1%	1	0.7%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	22	1.8%	4	2.8%	1	5.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	19	1.6%	3	2.1%	1	5.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	20	1.6%	5	3.5%	1	5.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	6	0.5%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	1	0.1%	0	0.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	4	0.3%	1	0.7%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.7%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.7%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.7%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.7%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	5	0.4%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
GREAT PYRENEES

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,224 #	 %	Year Examined: 2016-2020 Total # Dogs: 144 #	 %	Year Examined: 2021 Total # Dogs: 20 #	 %
LENS Continued						
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***123***	***10.0%***	***22***	***15.3%***	***3***	***15.0%***
VITREOUS						
110.135 PHPV/ PTVL	1	0.1%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	9	0.7%	0	0.0%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	15	1.2%	1	0.7%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	2	0.2%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	5	0.4%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	4	0.3%	0	0.0%	0	0.0%
120.960 RETINOPATHY	3	0.2%	8	5.6%	1	5.0%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	0	0.0%	1	5.0%
OPTIC NERVE						
130.110 MICROPAPILLA	6	0.5%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	5	0.4%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	2	0.2%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	7	0.6%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	35	2.9%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	16	1.3%	3	2.1%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	813	66.4%	84	58.3%	12	60.0%

GREATER SWISS MOUNTAIN DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
C.	Cataract	Not defined	1	NO
D.	Persistent hyaloid artery remnant	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
GREATER SWISS MOUNTAIN DOG

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	3,023		666		167	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	20	0.7%	2	0.3%	1	0.6%
22.000	ECTROPION, UNSPECIFIED	3	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	1,009	33.4%	154	23.1%	35	21.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	5	0.2%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	2	0.1%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	1	0.0%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	13	0.4%	2	0.3%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.0%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	5	0.2%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	101	3.3%	22	3.3%	5	3.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	6	0.2%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.2%	1	0.2%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	5	0.2%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.0%	1	0.2%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.0%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	267	8.8%	41	6.2%	9	5.4%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	69	2.3%	27	4.1%	2	1.2%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	53	1.8%	15	2.3%	4	2.4%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	33	1.1%	8	1.2%	1	0.6%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	6	0.2%	2	0.3%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	11	0.4%	4	0.6%	2	1.2%
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.2%	3	0.5%	3	1.8%
100.307	PUNCTATE CATARACT, CAPSULAR	14	0.5%	12	1.8%	3	1.8%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	56	1.9%	16	2.4%	5	3.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	86	2.8%	23	3.5%	8	4.8%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	70	2.3%	17	2.6%	7	4.2%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	1	0.2%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	13	0.4%	1	0.2%	2	1.2%
100.316	INCIPIENT CATARACT, NUCLEUS	9	0.3%	1	0.2%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	11	0.4%	2	0.3%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	3	0.1%	1	0.2%	1	0.6%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	3	0.5%	3	1.8%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	5	0.8%	1	0.6%
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.0%	0	0.0%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.2%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	2	0.1%	2	0.3%	2	1.2%
100.330	GENERALIZED/ COMPLETE CATARACT	7	0.2%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***452***	***15.0%***	***144***	***21.6%***	***44***	***26.3%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	9	0.3%	7	1.1%	0	0.0%

OCULAR DISORDERS REPORT
GREATER SWISS MOUNTAIN DOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	3,023		666		167	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
VITREOUS Continued						
110.135 PHPV/ PTVL	4	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	2	0.1%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	16	0.5%	3	0.5%	2	1.2%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	7	0.2%	0	0.0%	1	0.6%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.1%	2	0.3%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	7	0.2%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	5	0.2%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	29	1.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	71	2.3%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	23	0.8%	22	3.3%	4	2.4%
NORMAL						
.000 NORMAL GLOBE	1,748	57.8%	396	59.5%	96	57.5%

GREENLAND DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the GREENLAND DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
GREENLAND DOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		2		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
90.250 PIGMENTARY UVEITIS	0		1	50.0%	0	
NORMAL						
.000 NORMAL GLOBE	0		1	50.0%	0	

GREYHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Chronic superficial keratitis/pannus	Not defined	1, 2	NO
B.	Cataract	Not defined	1	NO

Description and Comments

A. Chronic superficial keratitis/Pannus

A bilateral disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation follows the vascularization. If severe, vision impairment occurs. Pannus may be associated with plasma cell infiltration of the nictitans.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Peiffer RL, Jr., Gelatt KN, Gwin RM. Chronic superficial keratitis. *Vet Med Small Anim Clin*. 1977;72:35-37. PMID: 584092

OCULAR DISORDERS REPORT
GREYHOUND

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	652		111		51	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.2%	0	0.0%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	2	0.3%	0	0.0%	0	0.0%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.2%	0	0.0%	0	0.0%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	0	0.0%	2	1.8%	0	0.0%
51.100	THIRD EYELID CARTILAGE ANOMALY	2	0.3%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	21	3.2%	0	0.0%	1	2.0%
70.700	CORNEAL DYSTROPHY	5	0.8%	1	0.9%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.2%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	2	0.3%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.3%	0	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.2%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	2	0.3%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	21	3.2%	8	7.2%	4	7.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	6	0.9%	1	0.9%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	4	0.6%	1	0.9%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	1.8%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.3%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.2%	2	1.8%	3	5.9%
100.307	PUNCTATE CATARACT, CAPSULAR	2	0.3%	2	1.8%	1	2.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	6	0.9%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	8	1.2%	2	1.8%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	6	0.9%	1	0.9%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	2	0.3%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.3%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.9%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.2%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.3%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***43***	***6.6%***	***12***	***10.8%***	***4***	***7.8%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.2%	1	0.9%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.5%	0	0.0%	1	2.0%
110.320	VITREOUS DEGENERATION SYNERESIS	13	2.0%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	3	0.5%	2	1.8%	2	3.9%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.2%	0	0.0%	1	2.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	6	0.9%	1	0.9%	0	0.0%
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.9%	0	0.0%
OPTIC NERVE							
130.110	MICROPAPILLA	2	0.3%	0	0.0%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	2	0.3%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
GREYHOUND

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 652 #	 %	2016-2020 111 #	 %	2021 51 #	 %
OTHER						
900.000 OTHER, UNSPECIFIED	8	1.2%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	14	2.1%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	25	3.8%	9	8.1%	3	5.9%
NORMAL						
.000 NORMAL GLOBE	534	81.9%	85	76.6%	41	80.4%

HANOVERIAN HOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the HANOVERIAN HOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
HANOVERIAN HOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		15		11	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	0		15	100.0%	11	100.0%

HARRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the HARRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
HARRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 401 #	 %	2016-2020 43 #	 %	2021 0 #	 %
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	1	0.2%	0	0.0%	0	
25.110 DISTICHIASIS	2	0.5%	0	0.0%	0	
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	0	0.0%	1	2.3%	0	
CORNEA						
70.210 PANNUS	1	0.2%	0	0.0%	0	
70.700 CORNEAL DYSTROPHY	0	0.0%	1	2.3%	0	
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	12	3.0%	0	0.0%	0	
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.2%	0	0.0%	0	
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.2%	0	0.0%	0	
FUNDUS						
97.120 COLOBOMA	1	0.2%	0	0.0%	0	
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	8	2.0%	1	2.3%	0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.5%	1	2.3%	0	
100.306 PUNCTATE CATARACT, NUCLEUS	1	0.2%	0	0.0%	0	
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	4	1.0%	0	0.0%	0	
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	3	0.7%	0	0.0%	0	
100.317 INCIPIENT CATARACT, CAPSULAR	1	0.2%	0	0.0%	0	
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	2.3%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***11***	***2.7%***	***2***	***4.7%***	***0***	
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.2%	0	0.0%	0	
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	0	0.0%	1	2.3%	0	
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.7%	0	0.0%	0	
OPTIC NERVE						
130.150 OPTIC DISC COLOBOMA	1	0.2%	0	0.0%	0	
OTHER						
900.000 OTHER, UNSPECIFIED	2	0.5%	0	0.0%	0	
900.100 OTHER, NOT INHERITED	11	2.7%	0	0.0%	0	
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	1.0%	1	2.3%	0	
NORMAL						
.000 NORMAL GLOBE	370	92.3%	38	88.4%	0	

HAVANA SILK DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
HAVANA SILK DOG

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	588		91		37	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	31	5.3%	3	3.3%	1	2.7%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.3%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	8	1.4%	2	2.2%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	32	5.4%	2	2.2%	2	5.4%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.2%	0	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.2%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	10	1.7%	2	2.2%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	3	0.5%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.3%	1	1.1%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	2	0.3%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	3	0.5%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.2%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	3	0.5%	1	1.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	3	0.5%	1	1.1%	3	8.1%
100.330	GENERALIZED/ COMPLETE CATARACT	2	0.3%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.2%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***21***	***3.6%***	***3***	***3.3%***	***3***	***8.1%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.3%	0	0.0%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.5%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	3	0.5%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1	0.2%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	7	1.2%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	1	0.2%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	5	0.9%	1	1.1%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	512	87.1%	81	89.0%	34	91.9%

HAVANESE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
C.	Cataract	Not defined	1, 2	NO
D.	Y-suture tip opacity	Not defined	1	Breeder option
E.	Vitreous degeneration	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

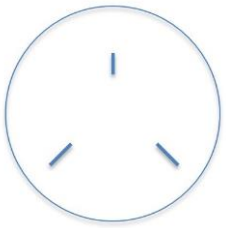
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. The exact frequency and significance of cataracts in the breed is not known.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Starr AN, Famula TR, Markward NJ, et al. Hereditary evaluation of multiple developmental abnormalities in the Havanese dog breed. *J Hered.* 2007;98:510-517. PMID: 17621585

OCULAR DISORDERS REPORT
HAVANESE

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	27,545		6,129		1,045	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	6	0.0%	1	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	10	0.0%	2	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	18	0.1%	3	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	4	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	1,374	5.0%	301	4.9%	51	4.9%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	8	0.0%	5	0.1%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	9	0.0%	1	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	2	0.0%	1	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	127	0.5%	30	0.5%	5	0.5%
CORNEA							
70.210	PANNUS	1	0.0%	1	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	3	0.0%	4	0.1%	0	0.0%
70.700	CORNEAL DYSTROPHY	109	0.4%	35	0.6%	7	0.7%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	3	0.0%	2	0.0%	0	0.0%
UVEA							
90.250	PIGMENTARY UVEITIS	1	0.0%	0	0.0%	0	0.0%
93.110	IRIS HYPOPLASIA	0	0.0%	2	0.0%	0	0.0%
93.120	IRIS CYST	3	0.0%	2	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	3	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	2	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1,700	6.2%	322	5.3%	59	5.6%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	28	0.1%	4	0.1%	1	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	13	0.0%	1	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	18	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	30	0.1%	25	0.4%	5	0.5%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.0%	2	0.0%	1	0.1%
93.810	UVEAL MELANOMA	3	0.0%	0	0.0%	1	0.1%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	2	0.0%	0	0.0%	0	0.0%
97.120	COLOBOMA	4	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	22	0.1%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1,600	5.8%	374	6.1%	49	4.7%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	192	0.7%	119	1.9%	14	1.3%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	122	0.4%	68	1.1%	7	0.7%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	47	0.2%	17	0.3%	1	0.1%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	38	0.1%	24	0.4%	3	0.3%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	338	1.2%	227	3.7%	12	1.1%
100.306	PUNCTATE CATARACT, NUCLEUS	22	0.1%	15	0.2%	1	0.1%
100.307	PUNCTATE CATARACT, CAPSULAR	78	0.3%	68	1.1%	6	0.6%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	113	0.4%	40	0.7%	2	0.2%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	216	0.8%	49	0.8%	10	1.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	48	0.2%	18	0.3%	3	0.3%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	15	0.1%	3	0.0%	1	0.1%

OCULAR DISORDERS REPORT
HAVANESE

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 27,545 #	 %	2016-2020 6,129 #	 %	2021 1,045 #	 %
LENS Continued						
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	96	0.3%	20	0.3%	3	0.3%
100.316 INCIPIENT CATARACT, NUCLEUS	20	0.1%	3	0.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	49	0.2%	17	0.3%	4	0.4%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	4	0.0%	5	0.1%	1	0.1%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	9	0.0%	12	0.2%	1	0.1%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	3	0.0%	5	0.1%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	2	0.0%	1	0.0%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	1	0.0%	2	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	148	0.5%	247	4.0%	61	5.8%
100.330 GENERALIZED/ COMPLETE CATARACT	123	0.4%	7	0.1%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	2	0.0%	3	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	11	0.0%	3	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,709***	***6.2%***	***970***	***15.8%***	***130***	***12.4%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	29	0.1%	4	0.1%	1	0.1%
110.135 PHPV/ PTVL	3	0.0%	2	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	48	0.2%	20	0.3%	6	0.6%
110.320 VITREOUS DEGENERATION SYNERESIS	459	1.7%	71	1.2%	21	2.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	138	0.5%	11	0.2%	2	0.2%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	22	0.1%	6	0.1%	1	0.1%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	104	0.4%	8	0.1%	1	0.1%
120.400 RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	12	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	4	0.1%	0	0.0%
120.960 RETINOPATHY	12	0.0%	13	0.2%	0	0.0%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	0	0.0%	1	0.1%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	3	0.0%	1	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	7	0.0%	1	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	257	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	558	2.0%	12	0.2%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	202	0.7%	204	3.3%	29	2.8%
NORMAL						
.000 NORMAL GLOBE	22,857	83.0%	4,555	74.3%	783	74.9%

HOKKAIDO DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	1	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Mizukami K, Chang H, Ota M, et al. Collie eye anomaly in Hokkaido dogs: case study. *Vet Ophthalmol.* 2012;15:128-32. PMID: 22051190

OCULAR DISORDERS REPORT
HOKKAIDO KEN

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2		21		8	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	0	0.0%	1	4.8%	1	12.5%
CORNEA						
70.220 PIGMENTARY KERATITIS	0	0.0%	0	0.0%	1	12.5%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	5	23.8%	1	12.5%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	4.8%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	4.8%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	0	0.0%	8	38.1%	2	25.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	50.0%	0	0.0%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	50.0%	0	0.0%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	6	28.6%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	4.8%	1	12.5%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	12.5%
100.330 GENERALIZED/ COMPLETE CATARACT	0	0.0%	1	4.8%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***50.0%***	***8***	***38.1%***	***2***	***25.0%***
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	0	0.0%	2	9.5%	0	0.0%
OTHER						
900.100 OTHER, NOT INHERITED	1	50.0%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	0	0.0%	7	33.3%	4	50.0%

HOVAWART

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the HOVAWART breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
HOVAWART

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 30 #	 %	Year Examined: 2016-2020 Total # Dogs: 26 #	 %	Year Examined: 2021 Total # Dogs: 9 #	 %
EYELIDS						
25.110 DISTICHIASIS	1	3.3%	1	3.8%	0	0.0%
UVEA						
93.120 IRIS CYST	0	0.0%	0	0.0%	2	22.2%
93.170 ANTERIOR CHAMBER CYST	1	3.3%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	2	6.7%	1	3.8%	1	11.1%
95.120 CILIARY BODY CYST	0	0.0%	1	3.8%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	3.3%	1	3.8%	1	11.1%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	2	7.7%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	3.3%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	1	3.8%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	3.8%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	11.1%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	3.8%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	3.8%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	3.8%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***3.3%***	***7***	***26.9%***	***1***	***11.1%***
VITREOUS						
110.320 VITREOUS DEGENERATION SYNERESIS	1	3.3%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	0	0.0%	1	11.1%
130.150 OPTIC DISC COLOBOMA	0	0.0%	0	0.0%	1	11.1%
OTHER						
900.100 OTHER, NOT INHERITED	0	0.0%	1	3.8%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	3.3%	1	3.8%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	24	80.0%	20	76.9%	5	55.6%

IBIZAN HOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
B.	Cataract	Not defined	1	NO

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
IBIZAN HOUND

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,278		532		124	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	3	0.2%	1	0.2%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	4	0.3%	0	0.0%	0	0.0%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.1%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.1%	0	0.0%	1	0.8%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	8	0.6%	3	0.6%	0	0.0%
UVEA							
93.120	IRIS CYST	3	0.2%	1	0.2%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.1%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	0	0.0%	1	0.2%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	0	0.0%	1	0.8%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	155	12.1%	58	10.9%	8	6.5%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.1%	1	0.2%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	12	0.9%	6	1.1%	5	4.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	5	0.4%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	1	0.1%	0	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	1	0.2%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	0	0.0%	1	0.2%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	4	0.3%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	81	6.3%	13	2.4%	15	12.1%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	7	0.5%	5	0.9%	5	4.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.2%	3	0.6%	1	0.8%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.2%	1	0.2%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	3	0.2%	5	0.9%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	10	0.8%	5	0.9%	5	4.0%
100.307	PUNCTATE CATARACT, CAPSULAR	4	0.3%	5	0.9%	1	0.8%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	6	0.5%	2	0.4%	1	0.8%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	9	0.7%	4	0.8%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	4	0.3%	2	0.4%	1	0.8%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	1	0.2%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	24	1.9%	12	2.3%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.2%	1	0.2%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	0	0.0%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	0	0.0%	1	0.8%
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.1%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	2	0.2%	1	0.2%	6	4.8%
100.330	GENERALIZED/ COMPLETE CATARACT	2	0.2%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.2%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***86***	***6.7%***	***47***	***8.8%***	***21***	***16.9%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	3	0.2%	3	0.6%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	5	0.4%	1	0.2%	1	0.8%

OCULAR DISORDERS REPORT
IBIZAN HOUND

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,278 #	 %	2016-2020 532 #	 %	2021 124 #	 %
VITREOUS Continued						
110.320 VITREOUS DEGENERATION SYNERESIS	11	0.9%	1	0.2%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	11	0.9%	0	0.0%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	2	0.2%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	4	0.3%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.1%	0	0.0%	0	0.0%
OPTIC NERVE						
130.150 OPTIC DISC COLOBOMA	3	0.2%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	24	1.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	20	1.6%	1	0.2%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	11	0.9%	19	3.6%	3	2.4%
NORMAL						
.000 NORMAL GLOBE	1,021	79.9%	405	76.1%	96	77.4%

ICELANDIC SHEEPDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
ICELANDIC SHEEPDOG

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,896		926		177	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	5	0.3%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	16	0.8%	8	0.9%	1	0.6%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	1	0.1%	0	0.0%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	0	0.0%	1	0.1%	0	0.0%
CORNEA							
70.210	PANNUS	0	0.0%	1	0.1%	1	0.6%
70.220	PIGMENTARY KERATITIS	0	0.0%	1	0.1%	0	0.0%
70.700	CORNEAL DYSTROPHY	9	0.5%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	2	0.1%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	103	5.4%	24	2.6%	7	4.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.1%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.2%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.1%	2	0.2%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	47	2.5%	32	3.5%	10	5.6%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	9	0.5%	11	1.2%	1	0.6%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	7	0.4%	2	0.2%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.1%	2	0.2%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	1	0.1%	1	0.6%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	10	0.5%	9	1.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	2	0.1%	3	0.3%	2	1.1%
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.2%	13	1.4%	5	2.8%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	3	0.2%	1	0.1%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	13	0.7%	2	0.2%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	4	0.2%	0	0.0%	1	0.6%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	9	0.5%	1	0.1%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	3	0.3%	2	1.1%
100.317	INCIPIENT CATARACT, CAPSULAR	3	0.2%	1	0.1%	2	1.1%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	3	0.3%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.2%	1	0.1%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	0	0.0%	1	0.6%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	0.6%
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	10	1.1%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***71***	***3.7%***	***63***	***6.8%***	***16***	***9.0%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	3	0.2%	1	0.1%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	4	0.2%	1	0.1%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	9	0.5%	0	0.0%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.1%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.1%	0	0.0%	3	1.7%
120.960	RETINOPATHY	0	0.0%	3	0.3%	0	0.0%
OPTIC NERVE							
130.150	OPTIC DISC COLOBOMA	2	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
ICELANDIC SHEEPDOG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,896 #	 %	2016-2020 926 #	 %	2021 177 #	 %
OTHER						
900.000 OTHER, UNSPECIFIED	25	1.3%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	31	1.6%	1	0.1%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	24	1.3%	49	5.3%	8	4.5%
NORMAL						
.000 NORMAL GLOBE	1,730	91.2%	800	86.4%	150	84.7%

IRISH RED AND WHITE SETTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy - rod-cone dysplasia, type 1 (*rcd1*)	Autosomal recessive	2-21	NO	Mutation of the *PDE6B* gene
B.	Retinal atrophy - rod-cone dysplasia, type 4 (*rcd4*)	Autosomal recessive	22	NO	mutation of the *C2orf71* gene
C.	Cataract	Not defined	1	NO	

Description and Comments

A. Retinal atrophy - rod-cone dysplasia, type 1 (*rcd1*)

A form of PRA identified in Irish Setters and Irish Red and White Setters. Clinical night blindness is observed as early as 6 weeks of age progressing to total blindness by one year. It may be diagnosed as early as 24 days with an ERG. Histologically the disease can be detected by 6 weeks. The disorder is caused by a mutation present in exon 21/codon 807 of the *PDE6B* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

B. Retinal atrophy - rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

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OCULAR DISORDERS REPORT
IRISH RED & WHITE SETTER

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		441		225		27	
Diagnostic Name		#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	1	0.2%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	21	4.8%	3	1.3%	0	0.0%
CORNEA							
70.210	PANNUS	2	0.5%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	1	0.2%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	0	0.0%	1	0.4%	0	0.0%
UVEA							
93.120	IRIS CYST	2	0.5%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	7	1.6%	1	0.4%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.2%	2	0.9%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.2%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	1	0.2%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	17	3.9%	9	4.0%	4	14.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	4	0.9%	4	1.8%	2	7.4%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	6	1.4%	2	0.9%	2	7.4%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.5%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	0.4%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.7%	4	1.8%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	4	0.9%	2	0.9%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	7	1.6%	1	0.4%	1	3.7%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	2	0.9%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	1	0.2%	2	0.9%	1	3.7%
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.2%	2	0.9%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.2%	1	0.4%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.2%	1	0.4%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	0	0.0%	1	3.7%
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.4%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.2%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***32***	***7.3%***	***23***	***10.2%***	***7***	***25.9%***
VITREOUS							
110.135	PHPV/ PTVL	1	0.2%	0	0.0%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.2%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	4	0.9%	2	0.9%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	4	0.9%	1	0.4%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2	0.5%	1	0.4%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.7%	0	0.0%	1	3.7%
120.960	RETINOPATHY	1	0.2%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	5	1.1%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	7	1.6%	0	0.0%	1	3.7%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	10	2.3%	20	8.9%	3	11.1%
NORMAL							
.000	NORMAL GLOBE	371	84.1%	183	81.3%	20	74.1%

IRISH SETTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
F.	Retinal atrophy - generalized	Presumed autosomal recessive	1, 2-23	NO	
G.	Retinal atrophy - rod-cone dysplasia, type 1 (*rcd1*)	Autosomal recessive	1, 2-21	NO	Mutation of the *PDE6B* gene
H.	Retinal atrophy - rod-cone dysplasia type 4 (*rcd4*)	Autosomal recessive	25	NO	Mutation of the *C2orf71* gene
I.	Amblyopia with quadriplegia	Autosomal recessive	24-25	NO	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. In the Irish Setter, the entropion usually involves the lower eyelids.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Persistent hyaloid artery remnant (PHA)

A congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

F. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

In the Irish Setter, a later form of progressive retinal atrophy has been observed by several ophthalmologists at 4-5 years of age. Cases seen in this category appear to advance more rapidly than those with rod-cone dysplasia.

G. Retinal atrophy - rod-cone dysplasia, type 1 (*rcd1*)

A form of PRA identified in Irish Setters. Clinical night blindness is observed as early as 6 weeks of age progressing to total blindness by one year. It may be diagnosed as early as 24

days with an ERG. Histologically the disease can be detected by 6 weeks. The disorder is caused by a mutation present in exon 21/codon 807 of the *PDE6B* gene. A DNA test is available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

H. Retinal atrophy - rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

I. Amblyopia with quadriplegia

A congenital quadriplegia and amblyopia. The main symptoms include inability to stand or walk, amblyopia, tremor, nystagmus and possible seizures. Pathologic lesions are confined to the cerebellum. The condition was shown to be due to a fully penetrant autosomal recessive gene that is post-natally lethal in the homozygote.

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OCULAR DISORDERS REPORT
IRISH SETTER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	2,050		261		42	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	0.1%	0	0.0%	0	0.0%
10.000	GLAUCOMA	1	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	2	0.1%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	53	2.6%	3	1.1%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	9	0.4%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	115	5.6%	15	5.7%	0	0.0%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	1	0.4%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	0	0.0%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	3	0.1%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	1	0.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	1	0.0%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	6	0.3%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.0%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	2	0.1%	2	0.8%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.1%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	82	4.0%	20	7.7%	2	4.8%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	7	0.3%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	0.3%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	21	1.0%	12	4.6%	4	9.5%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	3	0.1%	1	0.4%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	0	0.0%	1	0.4%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	31	1.5%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	105	5.1%	5	1.9%	4	9.5%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	9	0.4%	7	2.7%	3	7.1%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	16	0.8%	2	0.8%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.2%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.1%	1	0.4%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	4	0.2%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	14	0.7%	3	1.1%	1	2.4%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	21	1.0%	1	0.4%	2	4.8%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	20	1.0%	1	0.4%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	5	0.2%	0	0.0%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	4	0.2%	0	0.0%	1	2.4%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	4	0.2%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	8	0.4%	1	0.4%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	6	0.3%	1	0.4%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	0	0.0%	1	2.4%

OCULAR DISORDERS REPORT
IRISH SETTER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,050 #	 %	Year Examined: 2016-2020 Total # Dogs: 261 #	 %	Year Examined: 2021 Total # Dogs: 42 #	 %
LENS Continued						
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	1	2.4%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	0.4%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	18	0.9%	0	0.0%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***171***	***8.3%***	***18***	***6.9%***	***9***	***21.4%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	22	1.1%	5	1.9%	1	2.4%
110.135 PHPV/ PTVL	10	0.5%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	4	0.2%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	10	0.5%	2	0.8%	1	2.4%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	18	0.9%	0	0.0%	2	4.8%
120.960 RETINOPATHY	0	0.0%	1	0.4%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	4	0.2%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	19	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	38	1.9%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	41	2.0%	11	4.2%	2	4.8%
NORMAL						
.000 NORMAL GLOBE	1,567	76.4%	191	73.2%	27	64.3%

IRISH TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the IRISH TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
IRISH TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	82		38		14	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	1	1.2%	1	2.6%	0	0.0%
NICTITANS						
50.210 PLASMOMA/ ATYPICAL PANNUS	0	0.0%	0	0.0%	1	7.1%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	1.2%	0	0.0%	1	7.1%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	1.2%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	0	0.0%	1	7.1%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	6	7.3%	6	15.8%	3	21.4%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	1	2.6%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	2	2.4%	3	7.9%	2	14.3%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	2	5.3%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	2	2.4%	2	5.3%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	2.6%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	1	1.2%	1	2.6%	1	7.1%
100.317 INCIPIENT CATARACT, CAPSULAR	1	1.2%	2	5.3%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	1	1.2%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***7***	***8.5%***	***12***	***31.6%***	***3***	***21.4%***
OTHER						
900.000 OTHER, UNSPECIFIED	3	3.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	1	1.2%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	2.6%	1	7.1%
NORMAL						
.000 NORMAL GLOBE	70	85.4%	27	71.1%	8	57.1%

IRISH WATER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
C.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report

OCULAR DISORDERS REPORT
IRISH WATER SPANIEL

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,081		213		38	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	10	0.9%	0	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	3	0.3%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	277	25.6%	55	25.8%	6	15.8%
CORNEA							
70.700	CORNEAL DYSTROPHY	4	0.4%	3	1.4%	2	5.3%
UVEA							
93.120	IRIS CYST	2	0.2%	0	0.0%	1	2.6%
93.150	IRIS COLOBOMA	1	0.1%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	40	3.7%	22	10.3%	1	2.6%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.2%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.2%	1	0.5%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	3	0.3%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	97	9.0%	21	9.9%	6	15.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	22	2.0%	17	8.0%	2	5.3%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	12	1.1%	2	0.9%	4	10.5%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	6	0.6%	3	1.4%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	2	0.9%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	3	0.3%	0	0.0%	1	2.6%
100.306	PUNCTATE CATARACT, NUCLEUS	2	0.2%	2	0.9%	1	2.6%
100.307	PUNCTATE CATARACT, CAPSULAR	2	0.2%	2	0.9%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	14	1.3%	2	0.9%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	23	2.1%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	10	0.9%	1	0.5%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.2%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.2%	0	0.0%	1	2.6%
100.316	INCIPIENT CATARACT, NUCLEUS	5	0.5%	2	0.9%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	5	0.5%	0	0.0%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	0	0.0%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.1%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***116***	***10.7%***	***33***	***15.5%***	***9***	***23.7%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.2%	3	1.4%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	2	0.2%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	5	0.5%	1	0.5%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.1%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	5	0.5%	0	0.0%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	0.0%
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	2	0.9%	0	0.0%
120.960	RETINOPATHY	2	0.2%	1	0.5%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	20	1.9%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	15	1.4%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	12	1.1%	7	3.3%	1	2.6%

OCULAR DISORDERS REPORT
IRISH WATER SPANIEL

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,081 #	 %	2016-2020 213 #	 %	2021 38 #	 %
NORMAL						
.000 NORMAL GLOBE	742	68.6%	111	52.1%	25	65.8%

IRISH WOLFHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Nictitans cartilage anomaly/eversion	Not defined	1	Breeder option
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
E.	Uveal cysts	Not defined	1	Breeder option
F.	Cataract	Not defined	1	NO
G.	Retinal dysplasia - folds	Not defined	1	Breeder option
H.	Optic nerve hypoplasia	Not defined	1	NO
I.	Micropapilla	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Nictitans cartilage anomaly/eversion

A scroll-like curling of the cartilage of the third eyelid, usually everting the margin. This condition may occur in one or both eyes and may cause mild ocular irritation.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally in the neonatal period. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

H. Optic nerve hypoplasia

A congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be unable to differentiate from micropapilla on a routine (dilated) screening ophthalmoscopic exam.

I. Micropapilla

A congenital anomaly which results in a small optic disk diameter without vision loss. Contrast with optic nerve hypoplasia, which may have a similar ophthalmoscopic appearance with vision loss.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
IRISH WOLFHOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1,780		557		127	
Diagnostic Name	#	%	#	%	#	%
GLOBE						
.110 MICROPHTHALMIA	1	0.1%	0	0.0%	0	0.0%
EYELIDS						
20.140 ECTOPIC CILIA	1	0.1%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	6	0.3%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	87	4.9%	29	5.2%	9	7.1%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	1	0.2%	0	0.0%
NICTITANS						
50.210 PLASMOMA/ ATYPICAL PANNUS	1	0.1%	0	0.0%	0	0.0%
51.100 THIRD EYELID CARTILAGE ANOMALY	17	1.0%	8	1.4%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	1	0.1%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	38	2.1%	3	0.5%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	2	0.1%	0	0.0%	0	0.0%
UVEA						
93.120 IRIS CYST	81	4.6%	24	4.3%	4	3.1%
93.170 ANTERIOR CHAMBER CYST	6	0.3%	26	4.7%	5	3.9%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	19	1.1%	9	1.6%	2	1.6%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	7	0.4%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	11	0.6%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	5	0.3%	0	0.0%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.1%	0	0.0%	0	0.0%
93.810 UVEAL MELANOMA	1	0.1%	0	0.0%	0	0.0%
95.120 CILIARY BODY CYST	5	0.3%	1	0.2%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	12	0.7%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	80	4.5%	37	6.6%	8	6.3%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	14	0.8%	3	0.5%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	24	1.3%	7	1.3%	2	1.6%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.2%	4	0.7%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	9	0.5%	2	0.4%	2	1.6%
100.306 PUNCTATE CATARACT, NUCLEUS	8	0.4%	5	0.9%	5	3.9%
100.307 PUNCTATE CATARACT, CAPSULAR	10	0.6%	8	1.4%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	12	0.7%	8	1.4%	1	0.8%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	33	1.9%	11	2.0%	2	1.6%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	8	0.4%	6	1.1%	1	0.8%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	10	0.6%	5	0.9%	1	0.8%
100.316 INCIPIENT CATARACT, NUCLEUS	10	0.6%	4	0.7%	2	1.6%
100.317 INCIPIENT CATARACT, CAPSULAR	3	0.2%	8	1.4%	4	3.1%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.2%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	2	0.4%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.2%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.2%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.1%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.1%	1	0.2%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	4	0.2%	1	0.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***166***	***9.3%***	***78***	***14.0%***	***20***	***15.7%***

OCULAR DISORDERS REPORT
IRISH WOLFHOUND

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,780 #	 %	2016-2020 557 #	 %	2021 127 #	 %
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	5	0.3%	2	0.4%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	6	0.3%	2	0.4%	1	0.8%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	25	1.4%	8	1.4%	1	0.8%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	11	0.6%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	2	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	0.1%	0	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	1	0.1%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.1%	1	0.2%	0	0.0%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.2%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	12	0.7%	7	1.3%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	26	1.5%	4	0.7%	2	1.6%
130.150 OPTIC DISC COLOBOMA	2	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	22	1.2%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	59	3.3%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	34	1.9%	30	5.4%	7	5.5%
NORMAL						
.000 NORMAL GLOBE	1,358	76.3%	383	68.8%	90	70.9%

ITALIAN GREYHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Cataract	Not defined	1	NO	
B.	Vitreous degeneration				
	- syneresis	Not defined	1, 2	Breeder option	
	- anterior chamber	Not defined	1, 2	Breeder option	
C.	Retinal atrophy (*IG-PRA1*)	Autosomal recessive	1, 3	NO	A genetic test for susceptibility is available

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Italian Greyhound, posterior subcapsular and cortical cataracts at two to three years of age appear to be the more common location of occurrence, with progression noted in an undetermined percentage of dogs.

B. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

C. Retinal atrophy - *IG-PRA1*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Italian Greyhound PRA (*IG-PRA1*) is considered a "late onset" PRA with clinical signs detected between 3-5 years of age. Dogs initially lose night vision followed by decreased vision in bright light conditions. Clinically increases in tapetal reflectivity and retinal vessel attenuation are noted. The risk allele is known, but the genetic mutation has not been determined. The disease has been presumed to be inherited as an autosomal recessive trait. However some affected dogs had only one copy of the risk allele suggesting an

autosomal dominant with incomplete penetrance mode of inheritance. A DNA test is available for the risk allele. At least one other form of PRA appears to be present in the breed and will not be detected with this test.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

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3. Goldstein O, Pearce-Kelling, SE, Aguirre GD, Acland GM. Adult onset autosomal recessive hereditary retinal degeneration in Italian Greyhound dogs. *IOVS*, April 2011, Vol 52, 4351. ARVO abstract

OCULAR DISORDERS REPORT
ITALIAN GREYHOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	7,574		665		87	
Diagnostic Name	#	%	#	%	#	%
GLOBE						
.110 MICROPHTHALMIA	1	0.0%	1	0.2%	0	0.0%
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	0	0.0%	1	0.2%	0	0.0%
25.110 DISTICHIASIS	20	0.3%	3	0.5%	0	0.0%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	3	0.0%	6	0.9%	0	0.0%
CORNEA						
70.210 PANNUS	7	0.1%	0	0.0%	0	0.0%
70.220 PIGMENTARY KERATITIS	2	0.0%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	19	0.3%	2	0.3%	0	0.0%
UVEA						
93.110 IRIS HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
93.120 IRIS CYST	2	0.0%	1	0.2%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	3	0.0%	0	0.0%	0	0.0%
93.150 IRIS COLOBOMA	6	0.1%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	51	0.7%	3	0.5%	1	1.1%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	6	0.1%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.1%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	5	0.1%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	7	0.1%	1	0.2%	1	1.1%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.1%	1	0.2%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	22	0.3%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	17	0.2%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	328	4.3%	38	5.7%	4	4.6%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	107	1.4%	26	3.9%	4	4.6%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	91	1.2%	7	1.1%	1	1.1%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	31	0.4%	7	1.1%	1	1.1%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	6	0.1%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	17	0.2%	3	0.5%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	9	0.1%	2	0.3%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	17	0.2%	5	0.8%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	174	2.3%	15	2.3%	1	1.1%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	172	2.3%	18	2.7%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	101	1.3%	10	1.5%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	8	0.1%	1	0.2%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	16	0.2%	2	0.3%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	14	0.2%	2	0.3%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	17	0.2%	3	0.5%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	8	0.1%	5	0.8%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	8	0.1%	7	1.1%	1	1.1%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	3	0.0%	2	0.3%	0	0.0%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.2%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	0	0.0%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.2%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	2	0.3%	0	0.0%

OCULAR DISORDERS REPORT
ITALIAN GREYHOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	7,574		665		87	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.330 GENERALIZED/ COMPLETE CATARACT	49	0.6%	1	0.2%	1	1.1%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	36	0.5%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***866***	***11.4%***	***120***	***18.0%***	***9***	***10.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	22	0.3%	2	0.3%	0	0.0%
110.135 PHPV/ PTVL	3	0.0%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1,002	13.2%	133	20.0%	14	16.1%
110.320 VITREOUS DEGENERATION SYNERESIS	1,659	21.9%	109	16.4%	7	8.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	24	0.3%	3	0.5%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	4	0.1%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.0%	1	0.2%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	244	3.2%	8	1.2%	3	3.4%
120.400 RETINAL HEMORRHAGE	19	0.3%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	8	0.1%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	2	0.3%	0	0.0%
120.960 RETINOPATHY	6	0.1%	3	0.5%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	20	0.3%	3	0.5%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	34	0.4%	3	0.5%	0	0.0%
130.150 OPTIC DISC COLOBOMA	4	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	63	0.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	138	1.8%	5	0.8%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	89	1.2%	35	5.3%	3	3.4%
NORMAL						
.000 NORMAL GLOBE	4,967	65.6%	394	59.2%	61	70.1%

JACK RUSSELL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	1, 2-7	NO	Mutation of the *ADAMTS17* gene
E.	Vitreous degeneration	Not defined	1, 2	Breeder option	
F.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 8	NO	Mutation of the *prcd* gene
G.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	8	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea,

iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from its normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

E. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

F. Retinal Atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that one form of PRA in the Jack Russell Terrier is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

G. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve

(coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

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OCULAR DISORDERS REPORT
JACK RUSSELL TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	15,343		1,674		261	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	5	0.0%	0	0.0%	0	0.0%
10.000	GLAUCOMA	3	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	2	0.0%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	3	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	356	2.3%	27	1.6%	4	1.5%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	2	0.0%	1	0.1%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	0	0.0%	1	0.1%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	1	0.1%	0	0.0%
CORNEA							
70.210	PANNUS	1	0.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	9	0.1%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	59	0.4%	9	0.5%	1	0.4%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	9	0.1%	2	0.1%	0	0.0%
UVEA							
93.120	IRIS CYST	5	0.0%	0	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	4	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	701	4.6%	70	4.2%	14	5.4%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	40	0.3%	1	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	18	0.1%	1	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	10	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	11	0.1%	6	0.4%	4	1.5%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	6	0.0%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	1	0.0%	0	0.0%	0	0.0%
FUNDUS							
97.120	COLOBOMA	2	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	4	0.0%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	534	3.5%	51	3.0%	9	3.4%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	83	0.5%	30	1.8%	5	1.9%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	85	0.6%	13	0.8%	3	1.1%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	23	0.1%	5	0.3%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	14	0.1%	2	0.1%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	53	0.3%	20	1.2%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	26	0.2%	14	0.8%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	19	0.1%	7	0.4%	2	0.8%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	186	1.2%	15	0.9%	2	0.8%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	374	2.4%	34	2.0%	6	2.3%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	65	0.4%	8	0.5%	2	0.8%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	8	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	134	0.9%	17	1.0%	1	0.4%
100.316	INCIPIENT CATARACT, NUCLEUS	31	0.2%	2	0.1%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	26	0.2%	3	0.2%	1	0.4%

OCULAR DISORDERS REPORT
JACK RUSSELL TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 15,343 #	 %	Year Examined: 2016-2020 Total # Dogs: 1,674 #	 %	Year Examined: 2021 Total # Dogs: 261 #	 %
LENS Continued						
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	3	0.2%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	6	0.0%	9	0.5%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.1%	1	0.4%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	5	0.0%	10	0.6%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	94	0.6%	3	0.2%	1	0.4%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	81	0.5%	2	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,238***	***8.1%***	***197***	***11.8%***	***24***	***9.2%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	18	0.1%	3	0.2%	0	0.0%
110.135 PHPV/ PTVL	4	0.0%	0	0.0%	1	0.4%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	24	0.2%	5	0.3%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	209	1.4%	16	1.0%	1	0.4%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	58	0.4%	1	0.1%	2	0.8%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	20	0.1%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	4	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	84	0.5%	1	0.1%	2	0.8%
120.400 RETINAL HEMORRHAGE	4	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	8	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.0%	1	0.1%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	7	0.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	12	0.1%	1	0.1%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	113	0.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	645	4.2%	3	0.2%	1	0.4%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	113	0.7%	72	4.3%	14	5.4%
NORMAL						
.000 NORMAL GLOBE	12,694	82.7%	1,337	79.9%	208	79.7%

JAGDTERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1	NO	Mutation of the *ADAMTS17* gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Jagdterrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. Vet Ophthalmol. 2011; 14: 378-384. PMID: 22050825

OCULAR DISORDERS REPORT
JAGDTERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		2		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	0		2	100.0%	0	

JAMTHUND

(Swedish Elkhound)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (*prcd*)	Autosomal recessive	1	NO	Mutation of the *prcd* gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Jamthund is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Jamthund. The conditions listed above are currently noted solely due to the availability of a genetic test for the disease.

1. Hertil E, Bergström T, Kell U, Karlstam L, Ekman S, Ekesten B. Retinal degeneration in nine Swedish Jämthund dogs. Vet Ophthalmol. 2010 Mar;13(2):110-6. doi: 10.1111/j.1463-5224.2010.00761.x. PMID: 20447030.

OCULAR DISORDERS REPORT
JAMTHUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		1		0	
Diagnostic Name	#	%	#	%	#	%
NORMAL						
.000 NORMAL GLOBE	0		1	100.0%	0	

JAPANESE AKITA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Corneal dystrophy – epithelial/stromal	Not defined	1	Breeder option
C.	Cataract	Not defined	1	NO
D.	Persistent hyaloid artery remnant	Not defined	1	Breeder option

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
JAPANESE AKITA

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 53 #	 %	2016-2020 161 #	 %	2021 59 #	 %
EYELIDS						
25.110 DISTICHIASIS	0	0.0%	2	1.2%	4	6.8%
CORNEA						
70.700 CORNEAL DYSTROPHY	0	0.0%	5	3.1%	1	1.7%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	4	7.5%	17	10.6%	9	15.3%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	0.6%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	3.8%	11	6.8%	4	6.8%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	1.9%	1	0.6%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	1.9%	2	1.2%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.6%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.6%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	2	3.8%	6	3.7%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	2	1.2%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	3	1.9%	1	1.7%
100.317 INCIPIENT CATARACT, CAPSULAR	0	0.0%	4	2.5%	2	3.4%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	0	0.0%	1	1.7%
100.328 Y-SUTURE TIP OPACITIES	2	3.8%	7	4.3%	1	1.7%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***6***	***11.3%***	***27***	***16.8%***	***5***	***8.5%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	5	3.1%	2	3.4%
110.320 VITREOUS DEGENERATION SYNERESIS	1	1.9%	0	0.0%	1	1.7%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	0	0.0%	2	1.2%	2	3.4%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	1.9%	0	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	2	1.2%	0	0.0%
OTHER						
900.100 OTHER, NOT INHERITED	3	5.7%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	3.8%	19	11.8%	3	5.1%
NORMAL						
.000 NORMAL GLOBE	41	77.4%	106	65.8%	40	67.8%

JAPANESE CHIN
(JAPANESE SPANIEL)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Exposure keratopathy syndrome	Not defined	1	Breeder option	
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Vitreous degeneration	Not defined	1	Breeder option	
G.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 2	NO	Mutation of the *prcd* gene

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Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or more of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Exposure keratopathy syndrome

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and

macropalpebral fissure.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

G. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that one form of PRA in the Japanese Chin is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
JAPANESE CHIN

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,128		294		52	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	13	1.2%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	88	7.8%	21	7.1%	7	13.5%
22.000	ECTROPION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	55	4.9%	8	2.7%	4	7.7%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.1%	0	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.1%	2	0.7%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.2%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	9	0.8%	2	0.7%	0	0.0%
70.220	PIGMENTARY KERATITIS	44	3.9%	8	2.7%	3	5.8%
70.700	CORNEAL DYSTROPHY	2	0.2%	1	0.3%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.2%	2	0.7%	0	0.0%
UVEA							
93.150	IRIS COLOBOMA	1	0.1%	1	0.3%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	0.3%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	122	10.8%	26	8.8%	1	1.9%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	6	0.5%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	7	0.6%	0	0.0%	1	1.9%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	6	0.5%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
FUNDUS							
97.120	COLOBOMA	1	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	53	4.7%	13	4.4%	2	3.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	18	1.6%	9	3.1%	1	1.9%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	10	0.9%	1	0.3%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	7	0.6%	3	1.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	4	0.4%	4	1.4%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	4	0.4%	3	1.0%	1	1.9%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.1%	1	0.3%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	4	0.4%	0	0.0%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	39	3.5%	15	5.1%	2	3.8%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	25	2.2%	7	2.4%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	23	2.0%	5	1.7%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	1	0.3%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	8	0.7%	2	0.7%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	4	0.4%	3	1.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	11	1.0%	4	1.4%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	3	0.3%	4	1.4%	1	1.9%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	0	0.0%	2	3.8%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	0.7%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	7	0.6%	1	0.3%	0	0.0%
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.3%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	6	0.5%	1	0.3%	1	1.9%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***170***	***15.1%***	***66***	***22.4%***	***7***	***13.5%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	15	1.3%	4	1.4%	0	0.0%

OCULAR DISORDERS REPORT
JAPANESE CHIN

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,128 #	 %	2016-2020 294 #	 %	2021 52 #	 %
VITREOUS Continued						
110.135 PHPV/ PTVL	13	1.2%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	10	0.9%	1	0.3%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	44	3.9%	15	5.1%	4	7.7%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	2	0.2%	1	0.3%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	2	0.2%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	15	1.3%	1	0.3%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	0	0.0%	1	1.9%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.1%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	2	0.2%	0	0.0%	1	1.9%
OTHER						
900.000 OTHER, UNSPECIFIED	28	2.5%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	43	3.8%	4	1.4%	1	1.9%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	33	2.9%	27	9.2%	3	5.8%
NORMAL						
.000 NORMAL GLOBE	728	64.5%	154	52.4%	24	46.2%

JINDO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the JINDO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
JINDO

Diagnostic Name		Year Examined: 1991-2016 Total # Dogs: 4 #	%	2016-2020 15 #	%	2021 3 #	%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	0	0.0%	1	33.3%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	6.7%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	25.0%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	6.7%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	25.0%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	6.7%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***2***	***50.0%***	***2***	***13.3%***	***0***	***0.0%***
NORMAL							
.000	NORMAL GLOBE	3	75.0%	14	93.3%	2	66.7%

KAI KEN

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
KAI KEN

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	2		28		5	
	Diagnostic Name	#	%	#	%	#	%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	1	3.6%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	50.0%	7	25.0%	4	80.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	7.1%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	3.6%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	3.6%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	20.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***0***	***0.0%***	***2***	***7.1%***	***1***	***20.0%***
RETINA							
120.960	RETINOPATHY	0	0.0%	1	3.6%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	1	50.0%	18	64.3%	1	20.0%

KARELIAN BEAR DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST AVAILABLE
A.	Retinal atrophy (*prcd)*	Autosomal recessive	2	NO	Mutation of the *prcd* gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. A genetic test is available to detect the progressive rod cone degeneration form of PRA caused by a mutation in the *prcd*-gene. A second form of PRA is also present in the Karelian Bear Dog for which the causative mutation is not yet known.

References

1. Ahonen S, Lohi H, editors. Progressive retinal atrophy in the Karelian Bear Dog: A large animal model for retinitis pigmentosa. ARVO Abstract 2014 Annual Meeting; 2014; Orlando, FL. Program number: 3270.

OCULAR DISORDERS REPORT
KARELIAN BEAR DOG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 103 #	 %	2016-2020 13 #	 %	2021 2 #	 %
EYELIDS						
25.110 DISTICHIASIS	2	1.9%	0	0.0%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	0	0.0%	1	7.7%	0	0.0%
70.700 CORNEAL DYSTROPHY	4	3.9%	1	7.7%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	1	1.0%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	10	9.7%	2	15.4%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	2.9%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	1.0%	2	15.4%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	7.7%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	2	1.9%	0	0.0%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	3	2.9%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	4	3.9%	0	0.0%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	0	0.0%	1	7.7%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	0	0.0%	1	7.7%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	1	1.0%	1	7.7%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***10***	***9.7%***	***4***	***30.8%***	***0***	***0.0%***
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	4	3.9%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	1.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	1.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1	1.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	1	1.0%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	15.4%	1	50.0%
NORMAL						
.000 NORMAL GLOBE	79	76.7%	6	46.2%	1	50.0%

KEESHOND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO
C.	Y-suture tip opacity	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

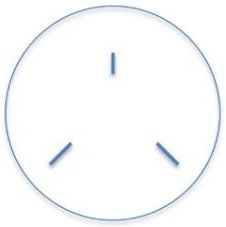
Eyelashes abnormally located in the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be

marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures" AND ALSO MARK "suspect not inherited/significance unknown" (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: "E2" or "posterior suture tip opacities." This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
KEESHOND

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 3,174 #	 %	2016-2020 637 #	 %	2021 136 #	 %
GLOBE						
.110 MICROPHTHALMIA	1	0.0%	0	0.0%	0	0.0%
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	9	0.3%	0	0.0%	2	1.5%
25.110 DISTICHIASIS	188	5.9%	23	3.6%	3	2.2%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	0	0.0%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	0	0.0%	1	0.2%	0	0.0%
70.700 CORNEAL DYSTROPHY	12	0.4%	0	0.0%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	2	0.1%	0	0.0%	0	0.0%
UVEA						
93.120 IRIS CYST	2	0.1%	0	0.0%	0	0.0%
93.150 IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	29	0.9%	3	0.5%	1	0.7%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.1%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.1%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.1%	0	0.0%	1	0.7%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.0%	0	0.0%	0	0.0%
FUNDUS						
97.120 COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	18	0.6%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	274	8.6%	79	12.4%	8	5.9%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	14	0.4%	7	1.1%	1	0.7%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	19	0.6%	3	0.5%	2	1.5%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	12	0.4%	0	0.0%	1	0.7%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.1%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	106	3.3%	65	10.2%	2	1.5%
100.306 PUNCTATE CATARACT, NUCLEUS	4	0.1%	11	1.7%	1	0.7%
100.307 PUNCTATE CATARACT, CAPSULAR	9	0.3%	18	2.8%	1	0.7%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	7	0.2%	2	0.3%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	36	1.1%	3	0.5%	1	0.7%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	9	0.3%	1	0.2%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	20	0.6%	13	2.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	14	0.4%	2	0.3%	1	0.7%
100.317 INCIPIENT CATARACT, CAPSULAR	5	0.2%	7	1.1%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.2%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	0	0.0%	1	0.7%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	1	0.7%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	0	0.0%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	1	0.0%	1	0.2%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	42	1.3%	88	13.8%	20	14.7%
100.330 GENERALIZED/ COMPLETE CATARACT	7	0.2%	1	0.2%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.2%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***331***	***10.4%***	***224***	***35.2%***	***32***	***23.5%***

OCULAR DISORDERS REPORT
KEESHOND

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 3,174 #	 %	2016-2020 637 #	 %	2021 136 #	 %
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.0%	1	0.2%	1	0.7%
110.320 VITREOUS DEGENERATION SYNERESIS	7	0.2%	4	0.6%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	6	0.2%	0	0.0%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	2	0.1%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	10	0.3%	1	0.2%	0	0.0%
120.400 RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	3	0.1%	2	0.3%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	6	0.2%	3	0.5%	1	0.7%
130.120 OPTIC NERVE HYPOPLASIA	12	0.4%	1	0.2%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	21	0.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	45	1.4%	3	0.5%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	29	0.9%	28	4.4%	7	5.1%
NORMAL						
.000 NORMAL GLOBE	2,555	80.5%	452	71.0%	98	72.1%

KERRY BLUE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Cataract	Not defined	1	NO

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

There are no references providing detailed descriptions of hereditary ocular conditions of the Kerry Blue Terrier breed. The conditions listed above are generally recognized to exist in this breed, as evidenced by identification on breed eye screening examinations and/or clinical experience of veterinary ophthalmologists.

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
KERRY BLUE TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	731		88		27	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	11	1.5%	4	4.5%	1	3.7%
CORNEA							
70.210	PANNUS	1	0.1%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	3	0.4%	1	1.1%	1	3.7%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	10	1.4%	4	4.5%	1	3.7%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.3%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	2	2.3%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	6	0.8%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	28	3.8%	3	3.4%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	16	2.2%	1	1.1%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	3	0.4%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.4%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	2	2.3%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	1	1.1%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	4	0.5%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	3	0.4%	0	0.0%	1	3.7%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	6	0.8%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***42***	***5.7%***	***4***	***4.5%***	***1***	***3.7%***
VITREOUS							
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.4%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	7	1.0%	1	1.1%	0	0.0%
RETINA							
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	0.3%	1	1.1%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	21	2.9%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	0.3%	3	3.4%	1	3.7%
NORMAL							
.000	NORMAL GLOBE	647	88.5%	73	83.0%	22	81.5%

KISHU-KEN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the KISHU-KEN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
KISHU KEN

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		4		3	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0		0	0.0%	1	33.3%
NORMAL						
.000 NORMAL GLOBE	0		4	100.0%	2	66.7%

KOMONDOR

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Cataract	Not defined	1	NO

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Appears to be relatively young age for onset in the Komondor (<4yr) and mainly anterior cortical.

References

There are no references providing detailed descriptions of hereditary ocular conditions of the Komondor breed. The conditions listed above are generally recognized to exist in this breed, as evidenced by identification on breed eye screening examinations and/or clinical experience of veterinary ophthalmologists.

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
KOMONDOR

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 342 #	 %	Year Examined: 2016-2020 Total # Dogs: 46 #	 %	Year Examined: 2021 Total # Dogs: 3 #	 %
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	1	0.3%	0	0.0%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	1	0.3%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	0	0.0%	1	2.2%	0	0.0%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	1	0.3%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	1	0.3%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	5	1.5%	0	0.0%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.6%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	14	4.1%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	26	7.6%	3	6.5%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	1	2.2%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.6%	0	0.0%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.3%	0	0.0%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	4	1.2%	1	2.2%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	3	0.9%	1	2.2%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	3	0.9%	1	2.2%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	5	1.5%	0	0.0%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.3%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	3	0.9%	1	2.2%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	5	1.5%	0	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.3%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	2.2%	1	33.3%
100.330 GENERALIZED/ COMPLETE CATARACT	1	0.3%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***43***	***12.6%***	***6***	***13.0%***	***1***	***33.3%***
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	1	0.3%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	7	2.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	6	1.8%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.3%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	280	81.9%	41	89.1%	2	66.7%

KOREAN POONGSAN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the KOREAN POONGSAN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
KOREAN POONGSAN

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	1	100.0%	0		0	

KROMFORHLANDER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the KROMFORHLANDER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
KROMFOHRLANDER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	4		6		2	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	4	100.0%	6	100.0%	2	100.0%

KUVASZ

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 2	NO	Mutation of the *prcd* gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the form of PRA in the Kuvasz is *prcd*, which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT
KUVASZ

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	542		12		1	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	0.4%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.2%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	1	0.2%	0	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	2	0.4%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	21	3.9%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.2%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	6	1.1%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.2%	0	0.0%	0	0.0%
UVEA							
93.150	IRIS COLOBOMA	2	0.4%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	23	4.2%	0	0.0%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	3	0.6%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.6%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	2	0.4%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	15	2.8%	1	8.3%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.2%	0	0.0%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.2%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.2%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	8.3%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.2%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.2%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	3	0.6%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	5	0.9%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***16***	***3.0%***	***1***	***8.3%***	***0***	***0.0%***
VITREOUS							
110.320	VITREOUS DEGENERATION SYNERESIS	1	0.2%	0	0.0%	0	0.0%
RETINA							
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	4	0.7%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	1	0.2%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	12	2.2%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	0.6%	1	8.3%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	454	83.8%	10	83.3%	1	100.0%

KYI-LEO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the KYI-LEO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
KYI-LEO

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2 #	%	2016-2020 0 #	%	2021 0 #	%
RETINA						
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	50.0%	0		0	
NORMAL						
.000 NORMAL GLOBE	1	50.0%	0		0	

LABRADOR RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1-3	Breeder option	
B.	Ectropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1, 4	Breeder option	
	- macular	Autosomal recessive	5	NO	Mutation of the *CHST6* gene
E.	Uveal cysts	Not defined	1	Breeder option	
F.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
G.	Cataract				
		Presumed dominant with incomplete penetrance	1-3, 6-8	NO	
		Autosomal recessive	9	NO	
		Not defined	1	NO	
H.	Y-suture tip opacity	Not defined	1	Breeder option	
I.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
J.	Vitreous degeneration	Not defined	1	Breeder option	
K.	Retinal atrophy				Mutation of the *prcd* gene
	- (*prcd*)	Autosomal recessive	1, 10-14	NO	
	- generalized		15	NO	Mutation of the *ABCA4* gene

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
L.	Achromatopsia Type 2 (ACHM - Type 2)	Autosomal recessive	16, 17	NO	Causative mutation not yet published
M.	Retinal dysplasia - folds	Presumed autosomal recessive	1, 18-27	NO (Breeder option with Normal DNA test for folds)	Mutation in the *COL9A3* gene
N.	Retinal dysplasia - folds/geographic/ detached (with skeletal defects)	Autosomal recessive with incomplete dominance for the eyes	1, 18-26, 28	NO	Mutation in the *COL9A3* gene
O.	Limbal melanoma	Not defined	29	NO	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Selection should be directed against entropion and toward a head conformation that reduces or eliminates the likelihood of the defect.

B. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Corneal dystrophy - epithelial/stromal/macular

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

In Labrador Retrievers in Europe, macular corneal dystrophy (MCD) has been shown to be caused by accumulations of glycosaminoglycans in the corneal stroma. This form of corneal dystrophy is caused by a mutation in the *CHST6* gene.

E. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

This disorder may be observed in any breed but retriever breeds tend to be predisposed. There is usually no effect on vision unless the cysts are heavily clustered and impinge on the pupillary area. Less frequently, the cysts may rupture and adhere to the cornea or anterior lens capsule. Multiple cysts may occlude the iridocorneal angle and cause glaucoma.

F. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Labrador Retriever, this is a potentially serious problem as many of the PPMs identified on routine screening examinations bridge from the iris to the cornea and/or from iris sheets bridging the pupils. These forms may cause vision impairment.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

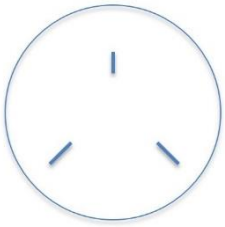
G. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The most frequently reported cataracts in the Labrador Retriever are bilateral or unilateral, focal, posterior polar (posterior cortical)/subcapsular cataracts which usually present between 1-3 years of age. These are generally stationary or very slowly progressive and generally do not interfere with vision. It has been suggested that these cataracts are inherited as dominant with incomplete penetrance, but definitive breeding studies are still required to verify this hypothesis.

A second type of cataract is a progressive cortical cataract which may involve the entire lens. It is not clear whether this is a distinct entity, or an aberrant form of the posterior polar cataract.

H. Y-suture tip opacity



These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.

These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

I. Persistent hyaloid artery remnant (PHA)

A congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small vascular strand (PHA) or as a non-vascular strand that appears gray-white (**persistent hyaloid remnant**).

J. Vitreous degeneration

Liquefaction of the vitreous gel, which may predispose to retinal detachment.

K. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Labrador Retriever is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

L. Achromatopsia Type 2 (ACHM – Type 2)

A congenital form of day blindness. Visual deficits become apparent between 8-10 weeks of age. Normal vision is present in low light conditions. Clinical examination is normal. Cone responses are absent on an electroretinogram. The causative genetic mutation has been determined, but not yet published. A DNA test is available.

M. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness.

In the Labrador Retriever, the presence of retinal folds may be seen in the heterozygous state described in "R" below, thus the recommendation against breeding.

The breeding advice for Labrador Retrievers and Samoyeds diagnosed with "retinal dysplasia - folds" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog, showing that it is not a carrier of the *COL9A3* mutation.

N. Retinal dysplasia - folds or detachment with skeletal defects

This condition is also known as oculo-skeletal dysplasia (OSD) or dwarfism with retinal dysplasia type 1 (DRD1) in the Labrador Retriever. A similar condition, DRD2, occurs in the Samoyed. The condition is autosomal recessive and homozygous affected dogs have shortened forelimbs ("downhill" conformation) with valgus deformity. They have severe ocular defects including cataract, retinal folds/multifocal retinal dysplasia, vitreal degeneration and retinal detachment. The ocular abnormalities result in blindness in most dogs. Heterozygous dogs can have either a normal ocular exam or have multiple retinal folds, vitreal membranes, or vitreal degeneration suggesting a semi-dominant mechanism with respect to the eyes. It is important to note that generally the retinal folds present in heterozygous dogs tend to cluster around the major superior blood vessels of the central tapetal region. The condition is caused by a 1 base pair insertion of *COL9A3.* A DNA test is available.

O. Limbal melanoma

Most limbal melanomas are really epibulbar melanocytomas, but there is a possibility of an extension of an intraocular melanoma extending outward and presenting as a limbal melanoma. An epibulbar melanocytoma originates from the superficial pigment lining the limbus and the lesion may eventually extend into the eye. Metastasis has not been documented and the mass is characterized by large epithelioid cells. The lesion presents as a subconjunctival smooth mass most commonly in the dorsolateral limbal region and extends later into the cornea and posterior on the sclera. Breed predisposition have been noted in the German Shepherd, Labrador and Golden Retriever.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for Labrador Retriever. However as the condition is no longer identified in the breed, the condition has been removed.

Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

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OCULAR DISORDERS REPORT
LABRADOR RETRIEVER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 230,002 #	 %	2016-2020 38,753 #	 %	2021 7,908 #	 %
GLOBE						
.110 MICROPHTHALMIA	59	0.0%	6	0.0%	2	0.0%
10.000 GLAUCOMA	28	0.0%	2	0.0%	0	0.0%
EYELIDS						
20.140 ECTOPIC CILIA	16	0.0%	2	0.0%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	86	0.0%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	996	0.4%	190	0.5%	46	0.6%
22.000 ECTROPION, UNSPECIFIED	485	0.2%	59	0.2%	7	0.1%
25.110 DISTICHIASIS	2,267	1.0%	349	0.9%	92	1.2%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	22	0.0%	22	0.1%	8	0.1%
40.910 KERATOCONJUNCTIVITIS SICCA	7	0.0%	3	0.0%	1	0.0%
NICTITANS						
50.210 PLASMOMA/ ATYPICAL PANNUS	0	0.0%	0	0.0%	2	0.0%
51.100 THIRD EYELID CARTILAGE ANOMALY	11	0.0%	1	0.0%	0	0.0%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	38	0.0%	1	0.0%	1	0.0%
CORNEA						
70.210 PANNUS	9	0.0%	0	0.0%	0	0.0%
70.220 PIGMENTARY KERATITIS	18	0.0%	7	0.0%	1	0.0%
70.700 CORNEAL DYSTROPHY	2,260	1.0%	382	1.0%	77	1.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	80	0.0%	10	0.0%	1	0.0%
UVEA						
90.250 PIGMENTARY UVEITIS	2	0.0%	0	0.0%	1	0.0%
93.110 IRIS HYPOPLASIA	6	0.0%	1	0.0%	0	0.0%
93.120 IRIS CYST	353	0.2%	80	0.2%	18	0.2%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	12	0.0%	0	0.0%	0	0.0%
93.150 IRIS COLOBOMA	11	0.0%	1	0.0%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	30	0.0%	20	0.1%	4	0.1%
93.180 IIRIS SPHINCTER DYSPLASIA	0	0.0%	2	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	6,810	3.0%	1,475	3.8%	252	3.2%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	144	0.1%	19	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	153	0.1%	13	0.0%	1	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	176	0.1%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	280	0.1%	357	0.9%	94	1.2%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	28	0.0%	13	0.0%	0	0.0%
93.810 UVEAL MELANOMA	45	0.0%	37	0.1%	4	0.1%
95.120 CILIARY BODY CYST	17	0.0%	22	0.1%	3	0.0%
97.150 CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	1	0.0%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	14	0.0%	0	0.0%	0	0.0%
97.120 COLOBOMA	11	0.0%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	728	0.3%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	9,969	4.3%	1,819	4.7%	339	4.3%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1,450	0.6%	1,003	2.6%	197	2.5%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1,377	0.6%	253	0.7%	54	0.7%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	217	0.1%	104	0.3%	16	0.2%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	169	0.1%	74	0.2%	12	0.2%

OCULAR DISORDERS REPORT
LABRADOR RETRIEVER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 230,002 #	 %	2016-2020 38,753 #	 %	2021 7,908 #	 %
LENS Continued						
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	920	0.4%	449	1.2%	30	0.4%
100.306 PUNCTATE CATARACT, NUCLEUS	269	0.1%	165	0.4%	40	0.5%
100.307 PUNCTATE CATARACT, CAPSULAR	449	0.2%	367	0.9%	57	0.7%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	727	0.3%	159	0.4%	38	0.5%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1,909	0.8%	312	0.8%	71	0.9%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	509	0.2%	113	0.3%	26	0.3%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	60	0.0%	13	0.0%	3	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	467	0.2%	86	0.2%	17	0.2%
100.316 INCIPIENT CATARACT, NUCLEUS	323	0.1%	65	0.2%	19	0.2%
100.317 INCIPIENT CATARACT, CAPSULAR	260	0.1%	130	0.3%	31	0.4%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	14	0.0%	23	0.1%	3	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	52	0.0%	56	0.1%	8	0.1%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	15	0.0%	15	0.0%	0	0.0%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	8	0.0%	12	0.0%	1	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	10	0.0%	18	0.0%	3	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	11	0.0%	17	0.0%	1	0.0%
100.328 Y-SUTURE TIP OPACITIES	207	0.1%	384	1.0%	83	1.0%
100.330 GENERALIZED/ COMPLETE CATARACT	350	0.2%	11	0.0%	1	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.0%	6	0.0%	1	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	51	0.0%	8	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***10,503***	***4.6%***	***3,835***	***9.9%***	***712***	***9.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	576	0.3%	134	0.3%	24	0.3%
110.135 PHPV/ PTVL	150	0.1%	16	0.0%	2	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	36	0.0%	24	0.1%	1	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	794	0.3%	158	0.4%	34	0.4%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	5,035	2.2%	419	1.1%	64	0.8%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1,985	0.9%	178	0.5%	40	0.5%
120.190 RETINAL DYSPLASIA, DETACHED	182	0.1%	14	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	985	0.4%	17	0.0%	5	0.1%
120.400 RETINAL HEMORRHAGE	34	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	73	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	6	0.0%	7	0.0%	2	0.0%
120.960 RETINOPATHY	58	0.0%	43	0.1%	4	0.1%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	0	0.0%	1	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	102	0.0%	21	0.1%	8	0.1%
130.120 OPTIC NERVE HYPOPLASIA	86	0.0%	5	0.0%	1	0.0%
130.150 OPTIC DISC COLOBOMA	43	0.0%	6	0.0%	1	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1,697	0.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	4,315	1.9%	49	0.1%	9	0.1%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1,951	0.8%	1,463	3.8%	288	3.6%
NORMAL						
.000 NORMAL GLOBE	198,224	86.2%	31,110	80.3%	6,391	80.8%

LAGOTTO ROMAGNOLO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D	Retinal atrophy (*prcd*)	Autosomal recessive	2	NO	Mutation of the *prcd* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Lagotto Romagnolo is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

3. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
LAGOTTO ROMAGNOLO

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		287		897		351	
Diagnostic Name		#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	0	0.0%	0	0.0%	1	0.3%
EYELIDS							
25.110	DISTICHIASIS	26	9.1%	79	8.8%	32	9.1%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.3%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.3%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	0	0.0%	0	0.0%	1	0.3%
UVEA							
93.120	IRIS CYST	0	0.0%	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	12	4.2%	40	4.5%	52	14.8%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	0	0.0%	1	0.3%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	3	1.0%	10	1.1%	10	2.8%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	0	0.0%	1	0.1%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	2.4%	21	2.3%	13	3.7%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	2	0.7%	12	1.3%	8	2.3%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	4	0.4%	3	0.9%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.7%	4	0.4%	1	0.3%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	3	0.3%	1	0.3%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.3%	6	0.7%	2	0.6%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.3%	1	0.1%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	6	0.7%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	2	0.2%	4	1.1%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	0	0.0%	1	0.3%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.7%	1	0.1%	1	0.3%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.1%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	1	0.1%	3	0.9%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.3%	2	0.2%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.3%	1	0.1%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	0.2%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.3%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	5	0.6%	1	0.3%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	0	0.0%	0	0.0%	1	0.3%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***11***	***3.8%***	***51***	***5.7%***	***25***	***7.1%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	7	0.8%	8	2.3%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	2	0.7%	4	0.4%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	0	0.0%	1	0.1%	0	0.0%
120.960	RETINOPATHY	0	0.0%	1	0.1%	1	0.3%
OPTIC NERVE							
130.110	MICROPAPILLA	0	0.0%	6	0.7%	0	0.0%
130.150	OPTIC DISC COLOBOMA	0	0.0%	0	0.0%	1	0.3%
OTHER							
900.000	OTHER, UNSPECIFIED	3	1.0%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	0	0.0%	1	0.1%	1	0.3%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	6	2.1%	15	1.7%	16	4.6%

OCULAR DISORDERS REPORT
LAGOTTO ROMAGNOLO

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	287		897		351	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	239	83.3%	720	80.3%	231	65.8%

LAKELAND TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder Option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Lens luxation	Autosomal recessive	2	NO	Mutation of the *ADAMTS17* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011; 14: 378-384. PMID: 22050825

OCULAR DISORDERS REPORT
LAKELAND TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 228 #	 %	2016-2020 39 #	 %	2021 15 #	 %
EYELIDS						
25.110 DISTICHIASIS	8	3.5%	4	10.3%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	0	0.0%	1	2.6%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	2	0.9%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	33	14.5%	5	12.8%	1	6.7%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.9%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	4	1.8%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.4%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	8	3.5%	6	15.4%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	5	2.2%	0	0.0%	1	6.7%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.4%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	1	2.6%	1	6.7%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	3	1.3%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	4	1.8%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	2.6%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	3	1.3%	1	2.6%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***11***	***4.8%***	***3***	***7.7%***	***1***	***6.7%***
RETINA						
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	0.4%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	2	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	6	2.6%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	174	76.3%	25	64.1%	13	86.7%

LANCASHIRE HEELER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membrane - iris to iris	Not defined	1	Breeder option	
B.	Lens luxation	Autosomal recessive	2-4	NO	Mutation of the *ADAMTS17* gene
C.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	5-7	NO	Deletion in the *NHEJ1* gene
D.	Retinal atrophy (*prcd*)	Autosomal recessive	8, 9	NO	Mutation of the *prcd* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

C. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve

(coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

D. Retinal Atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Lancashire Heeler is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Sargan DR, Withers D, Pettitt L, et al. Mapping the mutation causing lens luxation in several terrier breeds. *J Hered*. 2007;98:534-538. PMID: 17573382

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4. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384. PMID: 22050825

5. Bedford PG. Collie eye anomaly in the Lancashire Heeler. *Vet Rec*. 1998;143:354-356. PMID: 9800301

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8. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

9. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
LANCASHIRE HEELER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 143 #	 %	2016-2020 31 #	 %	2021 17 #	 %
EYELIDS						
25.110 DISTICHIASIS	1	0.7%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	0	0.0%	1	3.2%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	58	40.6%	4	12.9%	2	11.8%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.7%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	1.4%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	4	12.9%	2	11.8%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.7%	0	0.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	1	0.7%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.7%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***0.7%***	***0***	***0.0%***	***0***	***0.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	2	1.4%	0	0.0%	1	5.9%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	2.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	2	1.4%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	1	0.7%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.7%	0	0.0%	0	0.0%
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	6.5%	2	11.8%
NORMAL						
.000 NORMAL GLOBE	95	66.4%	22	71.0%	10	58.8%

LAPPONIAN HERDER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 2	NO	Mutation of the *prcd* gene
B.	Multifocal retinopathy - *cmr3*	Autosomal recessive	3	NO	Mutation of the *BEST1* gene
C.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	4	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Lapponian Herder is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

B. Multifocal retinopathy (*cmr3*)

Canine Multifocal Retinopathy type 3 (*cmr3*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal

thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

Clinically the disease is similar to that seen in the Bullmastiff and Coton deTulear, but the mutation in the Bestrophin 1 gene (*BEST1* alias *VMD2*) is different. The multifocal retinopathy seen in the Lapponian Herder is caused by a deletion at position 1,388 and a substitution at position 1,466 and is therefore called cmr3. A DNA test is available.

C. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Lapponian Herder. The conditions listed above are currently noted solely due to the availability of a genetic test for the disease.

1. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

2. Kaukonen M, Pettinen IT, Wickström K, Arumilli M, Donner J, Juhola IJ, Holopainen S, Turunen JA, Yoshihara M, Kere J, Lohi H. A missense variant in IFT122 associated with a canine model of retinitis pigmentosa. Hum Genet. 2021 Nov;140(11):1569-1579. doi: 10.1007/s00439-021-02266-3. Epub 2021 Feb 19. PMID: 33606121

3. Zangerl B, Wickstrom K, Slavik J, et al. Assessment of canine BEST1 variations identifies new mutations and establishes an independent bestrophinopathy model (cmr3). *Mol Vis*. 2010;16:2791-2804. PMID: 21197113

4. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi:

10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
LAPPONIAN HERDER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	**0**		**3**		**0**	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0		1	33.3%	0	
NORMAL						
.000 NORMAL GLOBE	0		2	66.7%	0	

LARGE MUNSTERLANDER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the LARGE MUNSTERLANDER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
LARGE MUNSTERLANDER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		1		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	0		1	100.0%	0	

LEONBERGER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Ectropion	Not defined	1	Breeder option
B.	Entropion	Not defined	1, 2	Breeder option
C.	Distichiasis	Not defined	1	Breeder option
D.	Nictitans cartilage anomaly/eversion	Not defined	1	Breeder option
E.	Uveal cysts	Not defined	1	Breeder option
F.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined		Passes with no notation
G.	Cataract	Not defined	1	NO
H.	Retinal dysplasia – folds	Not defined	1	Breeder option

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds.

Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Nictitans cartilage anomaly/eversion

A scroll-like curling of the cartilage of the third eyelid, usually everting the margin. This condition may occur in one or both eyes and may cause mild ocular irritation.

E. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

There is usually no effect on vision unless the cysts are heavily clustered and impinge on the pupillary area. Less frequently, the cysts may rupture and adhere to the cornea or anterior lens capsule. Multiple cysts may occlude the iridocorneal angle and cause glaucoma.

F. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

G. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Heinrich CL, Lakhani KH, Featherstone HJ, et al. Cataract in the UK Leonberger population. *Vet Ophthalmol.* 2006 Sep-Oct;9:350-356. PMID: 15762923

OCULAR DISORDERS REPORT
LEONBERGER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1,835		661		160	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
20.160 MACROPALPEBRAL FISSURE	35	1.9%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	58	3.2%	31	4.7%	10	6.3%
22.000 ECTROPION, UNSPECIFIED	26	1.4%	11	1.7%	2	1.3%
25.110 DISTICHIASIS	45	2.5%	13	2.0%	4	2.5%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.1%	0	0.0%	0	0.0%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	23	1.3%	13	2.0%	7	4.4%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	2	0.3%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	5	0.3%	0	0.0%	0	0.0%
UVEA						
93.110 IRIS HYPOPLASIA	1	0.1%	1	0.2%	0	0.0%
93.120 IRIS CYST	15	0.8%	5	0.8%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	0	0.0%	5	0.8%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	393	21.4%	159	24.1%	32	20.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.1%	0	0.0%	1	0.6%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.1%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.1%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	10	0.5%	8	1.2%	2	1.3%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	1	0.2%	0	0.0%
93.810 UVEAL MELANOMA	1	0.1%	0	0.0%	0	0.0%
95.120 CILIARY BODY CYST	0	0.0%	0	0.0%	1	0.6%
LENS						
100.200 CATARACT, UNSPECIFIED	2	0.1%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	155	8.4%	52	7.9%	15	9.4%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	30	1.6%	30	4.5%	3	1.9%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	27	1.5%	12	1.8%	1	0.6%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	5	0.3%	1	0.2%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	9	0.5%	4	0.6%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	12	0.7%	9	1.4%	1	0.6%
100.306 PUNCTATE CATARACT, NUCLEUS	12	0.7%	20	3.0%	5	3.1%
100.307 PUNCTATE CATARACT, CAPSULAR	19	1.0%	22	3.3%	2	1.3%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	9	0.5%	9	1.4%	1	0.6%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	30	1.6%	10	1.5%	1	0.6%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.1%	1	0.2%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	5	0.3%	1	0.2%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	9	0.5%	4	0.6%	1	0.6%
100.316 INCIPIENT CATARACT, NUCLEUS	21	1.1%	11	1.7%	6	3.8%
100.317 INCIPIENT CATARACT, CAPSULAR	3	0.2%	10	1.5%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.2%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	2	0.3%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.2%	1	0.6%
100.328 Y-SUTURE TIP OPACITIES	3	0.2%	6	0.9%	1	0.6%
100.330 GENERALIZED/ COMPLETE CATARACT	4	0.2%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	5	0.3%	3	0.5%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***202***	***11.0%***	***154***	***23.3%***	***23***	***14.4%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	3	0.2%	6	0.9%	2	1.3%

OCULAR DISORDERS REPORT
LEONBERGER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1,835		661		160	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
VITREOUS Continued						
110.135 PHPV/ PTVL	4	0.2%	1	0.2%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	1	0.2%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	4	0.2%	2	0.3%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	8	0.4%	9	1.4%	3	1.9%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	4	0.2%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	5	0.3%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.1%	1	0.2%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.1%	0	0.0%	1	0.6%
130.120 OPTIC NERVE HYPOPLASIA	2	0.1%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	32	1.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	53	2.9%	1	0.2%	1	0.6%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	22	1.2%	39	5.9%	13	8.1%
NORMAL						
.000 NORMAL GLOBE	1,208	65.8%	337	51.0%	81	50.6%

LHASA APSO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Cataract	Not defined	2	NO	
C.	Retinal atrophy (prcd)	Autosomal recessive	3	NO	Mutation in the *prcd* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. *Vet Ophthalmol*. 2005;8:101-111. PMID: 32894063

3. Hitti-Malin RJ, Burmeister LM, Ricketts SL, Lewis TW, Pettitt L, Boursnell M, Schofield EC, Sargan D, Mellersh CS. A LINE-1 insertion situated in the promoter of IMPG2 is associated with autosomal recessive progressive retinal atrophy in Lhasa Apso dogs. BMC Genet. 2020 Sep 7;21(1):100. doi: 10.1186/s12863-020-00911-w. PMID: 32894063; PMCID: PMC7487703.

OCULAR DISORDERS REPORT
LHASA APSO

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	794		92		46	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.1%	0	0.0%	0	0.0%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	3	0.4%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	11	1.4%	3	3.3%	0	0.0%
25.110	DISTICHIASIS	32	4.0%	2	2.2%	1	2.2%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.1%	0	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	3	0.4%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.1%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	4	0.5%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	8	1.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	20	2.5%	3	3.3%	0	0.0%
70.700	CORNEAL DYSTROPHY	16	2.0%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	1	0.1%	0	0.0%	0	0.0%
93.120	IRIS CYST	1	0.1%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	10	1.3%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	2	2.2%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	6	0.8%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	27	3.4%	2	2.2%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	7	0.9%	1	1.1%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	5	0.6%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	3	0.4%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.1%	1	1.1%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.1%	0	0.0%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	13	1.6%	3	3.3%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	14	1.8%	1	1.1%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	3	0.4%	1	1.1%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	4	0.5%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.3%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	3	0.4%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.1%	1	2.2%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	1.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	1	1.1%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	18	2.3%	1	1.1%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***81***	***10.2%***	***11***	***12.0%***	***1***	***2.2%***
VITREOUS							
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.5%	1	1.1%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	6	0.8%	0	0.0%	1	2.2%

OCULAR DISORDERS REPORT
LHASA APSO

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 794 #	 %	Year Examined: 2016-2020 Total # Dogs: 92 #	 %	Year Examined: 2021 Total # Dogs: 46 #	 %
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	4	0.5%	3	3.3%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	3	0.4%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	7	0.9%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.1%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	2	0.3%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	0	0.0%
OTHER						
900.100 OTHER, NOT INHERITED	12	1.5%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	20	2.5%	4	4.3%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	609	76.7%	67	72.8%	43	93.5%

LLEWELLIN SETTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the LLEWELLIN SETTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
LLEWELLIN SETTER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		17		7	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
22.000 ECTROPION, UNSPECIFIED	0	0.0%	0	0.0%	1	14.3%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	5.9%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	0	0.0%	2	28.6%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	5.9%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	1	5.9%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	5.9%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	5.9%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	1	5.9%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	5.9%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	5.9%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	2	11.8%	1	14.3%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***9***	***52.9%***	***3***	***42.9%***
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	0	0.0%	1	14.3%
NORMAL						
.000 NORMAL GLOBE	1	100.0%	12	70.6%	3	42.9%

LOUISIANA CATAHOULA LEOPARD DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris coloboma and persistent pupillary membranes.

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
LOUISIANA CATAHOULA LEOPARD DOG

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		372		73		25	
Diagnostic Name		#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	5	1.3%	0	0.0%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	3	0.8%	0	0.0%	0	0.0%
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	0	0.0%	1	4.0%
70.700	CORNEAL DYSTROPHY	1	0.3%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	3	0.8%	1	1.4%	1	4.0%
93.150	IRIS COLOBOMA	12	3.2%	1	1.4%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	38	10.2%	6	8.2%	6	24.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.3%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	1	1.4%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	1	0.3%	0	0.0%	1	4.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.3%	1	1.4%	0	0.0%
97.120	COLOBOMA	2	0.5%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	1	0.3%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	5	1.3%	2	2.7%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	1	1.4%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.3%	1	1.4%	1	4.0%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	1.4%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	1.4%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	4	1.1%	2	2.7%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	2	0.5%	1	1.4%	1	4.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.5%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	1	1.4%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	2	2.7%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	0	0.0%	1	1.4%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***10***	***2.7%***	***11***	***15.1%***	***2***	***8.0%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.5%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	2	0.5%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	9	2.4%	0	0.0%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.5%	0	0.0%	0	0.0%
120.920	RETINAL DETACHMENT WITH DIALYSIS	1	0.3%	0	0.0%	0	0.0%
OPTIC NERVE							
130.150	OPTIC DISC COLOBOMA	2	0.5%	2	2.7%	2	8.0%
OTHER							
900.100	OTHER, NOT INHERITED	4	1.1%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	12	3.2%	3	4.1%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	304	81.7%	56	76.7%	16	64.0%

LOWCHEN

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
C.	Cataract	Not defined	1	NO
D.	Vitreous degeneration	Not defined	1	Breeder option
E.	Retinal atrophy - generalized	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely

(diffuse) or in a localized region.

D. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment and/or glaucoma.

E. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
LOWCHEN

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1,678		401		105	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
20.140 ECTOPIC CILIA	1	0.1%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	78	4.6%	27	6.7%	5	4.8%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	0	0.0%	1	0.2%	0	0.0%
CORNEA						
70.210 PANNUS	1	0.1%	0	0.0%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	2	0.1%	0	0.0%	0	0.0%
UVEA						
93.120 IRIS CYST	1	0.1%	0	0.0%	0	0.0%
93.150 IRIS COLOBOMA	1	0.1%	0	0.0%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	0	0.0%	1	0.2%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	130	7.7%	41	10.2%	18	17.1%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	3	0.2%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.1%	1	0.2%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	7	0.4%	10	2.5%	2	1.9%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	2	0.1%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	21	1.3%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	56	3.3%	11	2.7%	3	2.9%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	11	0.7%	5	1.2%	2	1.9%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	13	0.8%	1	0.2%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.2%	2	0.5%	1	1.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	6	0.4%	3	0.7%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	2	0.1%	0	0.0%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	3	0.2%	1	0.2%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	21	1.3%	5	1.2%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	24	1.4%	3	0.7%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	6	0.4%	3	0.7%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	4	0.2%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	1	0.1%	1	0.2%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	2	0.1%	0	0.0%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	1	0.2%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	0	0.0%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	3	0.7%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	16	1.0%	1	0.2%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***141***	***8.4%***	***29***	***7.2%***	***3***	***2.9%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	3	0.2%	3	0.7%	0	0.0%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.2%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	48	2.9%	4	1.0%	1	1.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	3	0.2%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
LOWCHEN

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,678 #	 %	2016-2020 401 #	 %	2021 105 #	 %
RETINA Continued						
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	0.2%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	38	2.3%	3	0.7%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	4	0.2%	2	0.5%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.1%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	13	0.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	39	2.3%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	0.4%	8	2.0%	2	1.9%
NORMAL						
.000 NORMAL GLOBE	1,344	80.1%	289	72.1%	76	72.4%

LUCAS TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1, 2	NO	Mutation of the *ADAMTS17* gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Lucas Terrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011; 14: 378-384.

2. Gould D, Pettitt L, McLaughlin B, Holmes N, Forman O, Thomas A, Ahonen S, Lohi H, O'Leary C, Sargan D, Mellersh C. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. Vet Ophthalmol. 2011 Nov;14(6):378-84. doi: 10.1111/j.1463-5224.2011.00892.x. Epub 2011 Aug 3. PMID: 22050825.

OCULAR DISORDERS REPORT
LUCAS TERRIER

There are no statistics available for this breed

MAGYAR AGAR

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the MAGYAR AGAR breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
MAGYAR AGAR

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	3		2		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	4	133.3%	2	100.0%	0	

MALTESE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Cataract	Not defined	2, 3	NO
C.	Vitreous degeneration	Not defined	1	Breeder option

Description and Comments

A. Entropion

A conformational defect resulting in inversion of the eyelid margin which may cause ocular irritation. It is likely that entropion is influenced by several factors defining the skin and other structures, which make up the eyelids, orbital contents, and conformation of the skull.

B. Distichiasis

The presence of abnormally oriented eyelashes, frequently protruding from Meibomian gland ductal openings.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. Vet Ophthalmol. 2005 Mar-Apr;8(2):101-11. doi: 10.1111/j.1463-5224.2005.00352.x. PMID: 15762923.

3. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

OCULAR DISORDERS REPORT
MALTESE

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		313		270		84	
Diagnostic Name		#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.3%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	4	1.3%	7	2.6%	2	2.4%
25.110	DISTICHIASIS	12	3.8%	3	1.1%	0	0.0%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.3%	0	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	2	0.6%	0	0.0%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.6%	2	0.7%	0	0.0%
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	4	1.5%	0	0.0%
70.700	CORNEAL DYSTROPHY	2	0.6%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	18	5.8%	2	0.7%	1	1.2%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	0.4%	0	0.0%
95.120	CILIARY BODY CYST	1	0.3%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	17	5.4%	0	0.0%	6	7.1%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	3	1.0%	4	1.5%	2	2.4%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	4	1.3%	2	0.7%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	3	1.0%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.3%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	4	1.3%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.3%	0	0.0%	1	1.2%
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.3%	1	0.4%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	9	2.9%	3	1.1%	6	7.1%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	9	2.9%	1	0.4%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.6%	1	0.4%	1	1.2%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.4%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.3%	1	0.4%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	2	0.6%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.3%	0	0.0%	1	1.2%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.4%	1	1.2%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.4%	1	1.2%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.4%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	2	0.6%	1	0.4%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	4	1.3%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***47***	***15.0%***	***18***	***6.7%***	***13***	***15.5%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.3%	0	0.0%	1	1.2%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.3%	1	0.4%	1	1.2%
110.320	VITREOUS DEGENERATION SYNERESIS	7	2.2%	6	2.2%	1	1.2%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	3	1.0%	1	0.4%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	5	1.6%	1	0.4%	0	0.0%
120.190	RETINAL DYSPLASIA, DETACHED	0	0.0%	1	0.4%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	4	1.3%	1	0.4%	0	0.0%
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.4%	0	0.0%

OCULAR DISORDERS REPORT
MALTESE

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 313 #	 %	Year Examined: 2016-2020 Total # Dogs: 270 #	 %	Year Examined: 2021 Total # Dogs: 84 #	 %
OTHER						
900.000 OTHER, UNSPECIFIED	8	2.6%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	6	1.9%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	1.0%	11	4.1%	3	3.6%
NORMAL						
.000 NORMAL GLOBE	230	73.5%	225	83.3%	66	78.6%

MANCHESTER TERRIER

Standard & Toy Varieties

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Retinal atrophy (*prcd*)	Autosomal recessive	1-3	NO	Mutation of the *prcd* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Retinal Atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Manchester Terrier is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with

signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

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OCULAR DISORDERS REPORT
MANCHESTER TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	198		135		55	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	1	0.5%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	1	0.5%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	12	6.1%	5	3.7%	2	3.6%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.5%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	4	2.0%	3	2.2%	2	3.6%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	1.0%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	6	3.0%	6	4.4%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.5%	3	2.2%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	1.0%	2	1.5%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.5%	1	0.7%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	2	1.5%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	1.0%	1	0.7%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.5%	1	0.7%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	0.7%	1	1.8%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	2	1.0%	0	0.0%	1	1.8%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	2	1.0%	3	2.2%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.5%	1	0.7%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	3	1.5%	1	0.7%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	0.5%	1	0.7%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***16***	***8.1%***	***17***	***12.6%***	***2***	***3.6%***
VITREOUS							
110.135	PHPV/ PTVL	3	1.5%	0	0.0%	1	1.8%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	1.5%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	4	2.0%	0	0.0%	1	1.8%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1	0.5%	1	0.7%	0	0.0%
120.960	RETINOPATHY	1	0.5%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	6	3.0%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	1.0%	5	3.7%	3	5.5%
NORMAL							
.000	NORMAL GLOBE	170	85.9%	109	80.7%	46	83.6%

MAREMMA SHEEPDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Corneal dystrophy	Not defined	1	Breeder option
C.	Chronic superficial keratitis/pannus	Not defined	1	NO
D.	Cataract	Not defined	1	NO
E.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Chronic superficial keratitis/pannus

A bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation follows the vascularization. If severe, vision impairment occurs. Pannus may be associated with plasma cell infiltration of the nictitans. This has been reported in the Italian population of the breed.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. This has been reported in the Italian population of the breed.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined. This has been reported in the Italian population of the breed.

References

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OCULAR DISORDERS REPORT
MAREMMA SHEEPDOG

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	13		20		2	
	Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	2	15.4%	0	0.0%	1	50.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	15.4%	1	5.0%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	1	5.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	5.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	5.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***0***	***0.0%***	***3***	***15.0%***	***0***	***0.0%***
VITREOUS							
110.320	VITREOUS DEGENERATION SYNERESIS	1	7.7%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	1	7.7%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	5.0%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	9	69.2%	17	85.0%	1	50.0%

MARKIESJE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (*prcd*)	Autosomal recessive	1	NO	Mutation of the *prcd* gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Markiesje is *prcd*, which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Markiesje breed. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Genetic test available; no references

OCULAR DISORDERS REPORT
MARKIESJE

There are no statistics available for this breed

MASTIFF

(English)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Ectropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Uveal cysts	Not defined	1	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
	- endothelial opacity/no strands	Not defined	1	NO	
F.	Cataract	Not defined	1	NO	
G.	Retinal atrophy *(RHO)*	Autosomal dominant	1, 2, 3	NO	Mutation of the *RHO* gene
H.	Multifocal retinopathy - *cmr1*	Autosomal recessive	4	Breeder option	Mutation of the *BEST1* gene
I.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Entropion in the Mastiff is severe and may require multiple surgical corrections.

B. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin

covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

There is usually no effect on vision unless the cysts are heavily clustered and impinge on the pupillary area. Less frequently, the cysts may rupture and adhere to the cornea or anterior lens capsule. Multiple cysts may occlude the iridocorneal angle and cause glaucoma.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Mastiff, the strands most often bridge from the iris to the cornea and may potentially cause vision impairment. Thus, the strong recommendations against breeding animals with any form of this abnormality.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

G. Retinal atrophy - *RHO*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. The ERG is normal at 3-6 months of age, but abnormal by 13 months of age. Increased exposure to bright light causes more rapid loss of neurons. PRA in the Mastiff is inherited as an autosomal dominant trait. The mutation is a single nucleotide transversion of the *RHO* gene. A DNA test is available.

H. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (cmr1) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff. A DNA test is available.

I. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

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2. Kijas JW, Miller BJ, Pearce-Kelling SE, et al. Canine models of ocular disease: outcross breedings define a dominant disorder present in the English mastiff and bull mastiff dog breeds. *J Hered*. 2003;94:27-30.

3. Miyadera K, Acland GM, Aguirre GD. Genetic and phenotypic variations of inherited retinal diseases in dogs: the power of within- and across-breed studies. *Mamm Genome*. 2012;23:40-61.

4. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci*. 2007;48:1959-1967.

OCULAR DISORDERS REPORT
MASTIFF

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	8,817		778		184	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	19	0.2%	3	0.4%	0	0.0%
10.000	GLAUCOMA	2	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	344	3.9%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	387	4.4%	50	6.4%	17	9.2%
22.000	ECTROPION, UNSPECIFIED	622	7.1%	62	8.0%	17	9.2%
25.110	DISTICHIASIS	92	1.0%	4	0.5%	2	1.1%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	4	0.0%	3	0.4%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	11	0.1%	1	0.1%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	18	0.2%	2	0.3%	0	0.0%
CORNEA							
70.210	PANNUS	3	0.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	3	0.0%	1	0.1%	0	0.0%
70.700	CORNEAL DYSTROPHY	37	0.4%	4	0.5%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	51	0.6%	1	0.1%	0	0.0%
UVEA							
90.250	PIGMENTARY UVEITIS	1	0.0%	0	0.0%	0	0.0%
93.120	IRIS CYST	84	1.0%	7	0.9%	2	1.1%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	7	0.1%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	3	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	6	0.1%	4	0.5%	2	1.1%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	275	3.1%	27	3.5%	5	2.7%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	59	0.7%	3	0.4%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	455	5.2%	22	2.8%	3	1.6%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	19	0.2%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	7	0.1%	3	0.4%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	41	0.5%	14	1.8%	3	1.6%
93.810	UVEAL MELANOMA	3	0.0%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	4	0.0%	1	0.1%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	19	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	402	4.6%	36	4.6%	5	2.7%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	85	1.0%	24	3.1%	5	2.7%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	15	0.2%	3	0.4%	1	0.5%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	8	0.1%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	15	0.2%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	13	0.1%	5	0.6%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	16	0.2%	6	0.8%	1	0.5%
100.307	PUNCTATE CATARACT, CAPSULAR	18	0.2%	12	1.5%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	70	0.8%	8	1.0%	1	0.5%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	43	0.5%	2	0.3%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	20	0.2%	5	0.6%	1	0.5%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	8	0.1%	1	0.1%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	6	0.1%	1	0.1%	0	0.0%

OCULAR DISORDERS REPORT
MASTIFF

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 8,817 #	 %	2016-2020 778 #	 %	2021 184 #	 %
LENS Continued						
100.316 INCIPIENT CATARACT, NUCLEUS	38	0.4%	10	1.3%	2	1.1%
100.317 INCIPIENT CATARACT, CAPSULAR	11	0.1%	3	0.4%	1	0.5%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	2	0.3%	2	1.1%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.1%	1	0.5%
100.326 INCOMPLETE CATARACT, NUCLEUS	2	0.0%	1	0.1%	1	0.5%
100.327 INCOMPLETE CATARACT, CAPSULAR	2	0.0%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	3	0.0%	4	0.5%	2	1.1%
100.330 GENERALIZED/ COMPLETE CATARACT	40	0.5%	1	0.1%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	5	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***433***	***4.9%***	***90***	***11.6%***	***18***	***9.8%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	9	0.1%	1	0.1%	0	0.0%
110.135 PHPV/ PTVL	5	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	10	0.1%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	653	7.4%	36	4.6%	4	2.2%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	51	0.6%	2	0.3%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	5	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	151	1.7%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	4	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	8	0.1%	2	0.3%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	4	0.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	2	0.0%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	4	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	59	0.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	164	1.9%	5	0.6%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	92	1.0%	29	3.7%	10	5.4%
NORMAL						
.000 NORMAL GLOBE	6,008	68.1%	498	64.0%	127	69.0%

MC NAB

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the MC NAB breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
MC NAB

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		3		4	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0		1	33.3%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	0		1	33.3%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	0		2	66.7%	4	100.0%

MI-KI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Vitreous degeneration - syneresis - anterior chamber	 Not defined Not defined	 1 1	 Breeder option Breeder option	
F.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 2	NO	Mutation in the *prcd* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make strong recommendations with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral. In the Mi-Ki, lesions are circular or semicircular central crystalline deposits in the anterior corneal stroma that appear between 2 and 5 years of age. It may be associated with exophthalmos and lagophthalmos common in these dogs.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose

the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

F. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Mi-Ki is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
MI-KI

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1,354		424		28	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
20.140 ECTOPIC CILIA	1	0.1%	0	0.0%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	2	0.1%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	10	0.7%	1	0.2%	0	0.0%
25.110 DISTICHIASIS	188	13.9%	66	15.6%	1	3.6%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	4	0.3%	0	0.0%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	2	0.5%	0	0.0%
CORNEA						
70.210 PANNUS	1	0.1%	0	0.0%	0	0.0%
70.220 PIGMENTARY KERATITIS	3	0.2%	2	0.5%	1	3.6%
70.700 CORNEAL DYSTROPHY	24	1.8%	4	0.9%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	1	0.1%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	171	12.6%	26	6.1%	4	14.3%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.1%	1	0.2%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	1	0.1%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	117	8.6%	23	5.4%	3	10.7%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	7	0.5%	4	0.9%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	8	0.6%	0	0.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.2%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	39	2.9%	15	3.5%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	2	0.5%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	0.1%	2	0.5%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	3	0.2%	4	0.9%	1	3.6%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	6	0.4%	1	0.2%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	12	0.9%	1	0.2%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	22	1.6%	2	0.5%	2	7.1%
100.316 INCIPIENT CATARACT, NUCLEUS	3	0.2%	1	0.2%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	0	0.0%	1	0.2%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.2%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.2%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	11	0.8%	2	0.5%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	1	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***115***	***8.5%***	***38***	***9.0%***	***3***	***10.7%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.1%	1	0.2%	1	3.6%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	36	2.7%	7	1.7%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	91	6.7%	22	5.2%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	11	0.8%	2	0.5%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	8	0.6%	1	0.2%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	5	0.4%	2	0.5%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.1%	1	0.2%	0	0.0%
120.960 RETINOPATHY	6	0.4%	6	1.4%	0	0.0%

OCULAR DISORDERS REPORT
MI-KI

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,354 #	%	2016-2020 424 #	%	2021 28 #	%
OPTIC NERVE						
130.110 MICROPAPILLA	2	0.1%	1	0.2%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	2	0.1%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	2	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	24	1.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	55	4.1%	2	0.5%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	33	2.4%	31	7.3%	3	10.7%
NORMAL						
.000 NORMAL GLOBE	863	63.7%	267	63.0%	17	60.7%

MINIATURE AMERICAN SHEPHERD (AKC)/ MINIATURE AUSTRALIAN SHEPHERD

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmia with multiple ocular defects	Presumed autosomal recessive with incomplete penetrance	1-6	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
D.	Iris Coloboma	Not defined	1	NO	
D.	Iris hypoplasia	Not defined	1	Breeder option	
E.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
F.	Cataract	Autosomal co-dominant	1, 7, 8	NO	Mutation of the *HSF4* gene
G.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 9, 10	NO	Mutation of the *prcd* gene
H.	Cone degeneration - day blindness	Autosomal recessive	11, 12	NO	Mutation of the *CNGB3* gene
I.	Multifocal retinopathy - *cmr1*	Autosomal recessive	11, 12	Breeder option	Mutation of the *BEST1* gene

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
J.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/coloboma	Autosomal recessive	1, 13-16	NO	Mutation of the *NHEJ1* gene
K.	Coloboma/staphyloma without microphthalmia	Not defined	1	NO	

Description and Comments

A. Microphthalmia with multiple ocular defects

Microphthalmia is a congenital defect characterized by a small eye with associated defects of the cornea, iris (coloboma), anterior chamber, lens (cataract) and/or retina (dysplasia). In the Australian Shepherd, microphthalmia has long been suspected to be associated with merled coat coloration but a definitive genetic relationship has not been established. The eyes of affected homozygous merle (usually white) dogs have extreme forms of this entity and are usually blind at birth. Affected heterozygous merle-coated dogs demonstrate less severe manifestations.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Iris hypoplasia

A congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as a partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the OFA form.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress

normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Australian Shepherd, a mutation in *HSF4* (heat shock transcription factor 4), the HSF4-2 mutation, has been shown to increase the likelihood of cataract formation. The mutation is inherited in a co-dominant manner. Dogs with one copy of the mutation develop bilateral posterior cataracts and homozygotes develop a nuclear cataract that typically progresses to a mature cataract. A DNA test is available for this mutation. Other genetic factors can contribute to cataract formation in this breed and will not be detected by this test.

G. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Miniature American/Australian Shepherd is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

H. Cone degeneration - day blindness or hemeralopia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Affected puppies develop day blindness, color blindness, and photophobia between 8 and 12 weeks of age. Affected dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. Genetically, the condition results from a mutation in the *CNGB3* gene. A DNA test is available.

I. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal

detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff.

J. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

K. Coloboma/staphyloma (unassociated with microphthalmia)

A coloboma is a congenital defect which may affect the iris, choroid or optic disc. Iris colobomas are seen as notches in the pupillary margin. Scleral ectasia is defined as a congenital thinning and secondary distention of the sclera; when lined by uveal tissue it is called a staphyloma. These may be anteriorly located, apparent as a bulge beneath the upper eyelid or posteriorly located, requiring visualization with an ophthalmoscope. These conditions may or may not be genetically related to the same anomalies seen associated with microphthalmia (entity "A" above).

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1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

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OCULAR DISORDERS REPORT
MINIATURE AMERICAN(AKC)/MINIATURE AUSTRALIAN SHEPHERD

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	13,514		5,581		1,657	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	18	0.1%	10	0.2%	0	0.0%
10.000	GLAUCOMA	1	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	0	0.0%	1	0.0%	0	0.0%
25.110	DISTICHIASIS	639	4.7%	153	2.7%	53	3.2%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	3	0.1%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	1	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	2	0.0%	0	0.0%	1	0.1%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	0	0.0%	0	0.0%	1	0.1%
CORNEA							
70.220	PIGMENTARY KERATITIS	2	0.0%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	92	0.7%	117	2.1%	8	0.5%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	5	0.0%	1	0.0%	1	0.1%
UVEA							
90.250	PIGMENTARY UVEITIS	1	0.0%	0	0.0%	0	0.0%
93.110	IRIS HYPOPLASIA	51	0.4%	87	1.6%	14	0.8%
93.120	IRIS CYST	0	0.0%	1	0.0%	1	0.1%
93.150	IRIS COLOBOMA	259	1.9%	115	2.1%	30	1.8%
93.180	IIRIS SPHINCTER DYSPLASIA	3	0.0%	13	0.2%	4	0.2%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1,234	9.1%	717	12.8%	205	12.4%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	19	0.1%	17	0.3%	1	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	7	0.1%	2	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	9	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.0%	0	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	3	0.0%	1	0.0%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	5	0.0%	3	0.1%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	24	0.2%	13	0.2%	1	0.1%
97.120	COLOBOMA	8	0.1%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	149	1.1%	65	1.2%	29	1.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	25	0.2%	23	0.4%	9	0.5%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	12	0.1%	4	0.1%	2	0.1%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	8	0.1%	6	0.1%	3	0.2%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.0%	3	0.1%	1	0.1%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	18	0.1%	23	0.4%	1	0.1%
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.0%	15	0.3%	4	0.2%
100.307	PUNCTATE CATARACT, CAPSULAR	12	0.1%	13	0.2%	3	0.2%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	25	0.2%	15	0.3%	4	0.2%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	25	0.2%	8	0.1%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	7	0.1%	6	0.1%	2	0.1%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.0%	1	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	5	0.0%	3	0.1%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	6	0.0%	12	0.2%	2	0.1%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	3	0.1%	0	0.0%

OCULAR DISORDERS REPORT
MINIATURE AMERICAN(AKC)/MINIATURE AUSTRALIAN SHEPHERD

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	13,514		5,581		1,657	
	Diagnostic Name	#	%	#	%	#	%
LENS Continued							
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.0%	3	0.1%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	0.0%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.0%	1	0.1%
100.327	INCOMPLETE CATARACT, CAPSULAR	1	0.0%	1	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	2	0.0%	19	0.3%	14	0.8%
100.330	GENERALIZED/ COMPLETE CATARACT	5	0.0%	1	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***162***	***1.2%***	***162***	***2.9%***	***46***	***2.8%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	40	0.3%	46	0.8%	14	0.8%
110.135	PHPV/ PTVL	13	0.1%	2	0.0%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	13	0.1%	10	0.2%	3	0.2%
110.320	VITREOUS DEGENERATION SYNERESIS	62	0.5%	14	0.3%	5	0.3%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	45	0.3%	14	0.3%	2	0.1%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.0%	0	0.0%	0	0.0%
120.190	RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	28	0.2%	1	0.0%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.0%	1	0.1%
120.960	RETINOPATHY	2	0.0%	3	0.1%	0	0.0%
OPTIC NERVE							
130.110	MICROPAPILLA	65	0.5%	14	0.3%	6	0.4%
130.120	OPTIC NERVE HYPOPLASIA	19	0.1%	5	0.1%	2	0.1%
130.150	OPTIC DISC COLOBOMA	23	0.2%	8	0.1%	2	0.1%
OTHER							
900.000	OTHER, UNSPECIFIED	129	1.0%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	180	1.3%	6	0.1%	4	0.2%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	85	0.6%	148	2.7%	34	2.1%
NORMAL							
.000	NORMAL GLOBE	11,451	84.7%	4,200	75.3%	1,282	77.4%

MINIATURE BULL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to lens	Not defined	1	NO	
	- iris to cornea	Not defined	1	NO	
B.	Cataract	Not defined	1	NO	
C.	Lens luxation	Autosomal recessive	2-4	NO	Mutation of the *ADAMTS17* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Although the total number of Miniature Bull Terriers presented for OFA/CERF examination is not large, the incidence of PPM in this breed is approximately 10% in recent years. Some of these PPM's have been iris to cornea and iris to lens. Considerable discretion should be used before breeding a dog with the latter more severe forms of PPM.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

Two loci with potentially enhancing effects on the ADAMTS17 mutation are associated with primary lens luxation (PLL) in Australian Miniature Bull Terriers. PLL associated allele of the BICF2G630420272 SNP increases the risk of PLL in the presence of the ADAMTS17 mutation. Candidate genes in the two regions of interest included CPE on chromosome 15 and CTCF on chromosome 1. The ADAMTS17 mutation is also associated with abnormal foot and nail shapes, pedal hyperkeratosis, and persistent pupillary membranes. Association of the ADAMTS17 mutation with possible pedal skeletal abnormalities in the Miniature Bull Terriers supports primary lens luxation in this breed and Marchesani syndrome-like disease in humans as being homologous diseases.

References

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4. Gould D, Pettitt L, McLaughlin B, Holmes N, Forman O, Thomas A, Ahonen S, Lohi H, O'Leary C, Sargan D, Mellersh C. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. Vet Ophthalmol. 2011 Nov;14(6):378-84. doi: 10.1111/j.1463-5224.2011.00892.x. Epub 2011 Aug 3. PMID: 22050825.

OCULAR DISORDERS REPORT
MINIATURE BULL TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,229		105		17	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	3	0.2%	0	0.0%	0	0.0%
10.000	GLAUCOMA	1	0.1%	0	0.0%	0	0.0%
EYELIDS							
22.000	ECTROPION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	0	0.0%	1	1.0%	0	0.0%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	5	0.4%	1	1.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	3	0.2%	2	1.9%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	13	1.1%	0	0.0%	0	0.0%
UVEA							
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	4	0.3%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	80	6.5%	0	0.0%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	52	4.2%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	81	6.6%	2	1.9%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	8	0.7%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	6	0.5%	3	2.9%	1	5.9%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	14	1.1%	2	1.9%	1	5.9%
LENS							
100.200	CATARACT, UNSPECIFIED	2	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	51	4.1%	4	3.8%	2	11.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	14	1.1%	2	1.9%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.2%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.2%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	1	5.9%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.1%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	6	0.5%	2	1.9%	1	5.9%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	15	1.2%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	5	0.4%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.1%	1	1.0%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	12	1.0%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	4	0.3%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	51	4.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***66***	***5.4%***	***5***	***4.8%***	***2***	***11.8%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.1%	0	0.0%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.3%	1	1.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	20	1.6%	1	1.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	3	0.2%	0	0.0%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.1%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	13	1.1%	0	0.0%	0	0.0%
120.960	RETINOPATHY	0	0.0%	2	1.9%	0	0.0%

OCULAR DISORDERS REPORT
MINIATURE BULL TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,229 #	 %	2016-2020 105 #	 %	2021 17 #	 %
OPTIC NERVE						
130.110 MICROPAPILLA	12	1.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	3	0.2%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	9	0.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	33	2.7%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	22	1.8%	2	1.9%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	910	74.0%	88	83.8%	13	76.5%

MINIATURE PINSCHER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Autosomal recessive	1, 2	NO	Mutation in the *HS4-1* gene
D.	Vitreous degeneration	Not defined	1	Breeder option	

Description and Comments

A. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. The condition is inherited as an autosomal recessive mutation in the HSF4 gene (*HSF4-1*). A DNA test is available.

D. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

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1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
MINIATURE PINSCHER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	746		311		54	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	3	0.4%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	3	0.4%	0	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	5	0.7%	1	0.3%	0	0.0%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	0	0.0%	1	0.3%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.3%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	2	0.3%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	2	0.3%	4	1.3%	0	0.0%
70.700	CORNEAL DYSTROPHY	41	5.5%	16	5.1%	1	1.9%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.3%	0	0.0%	0	0.0%
UVEA							
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.1%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	25	3.4%	5	1.6%	1	1.9%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.1%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	1	0.3%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	5	0.7%	9	2.9%	1	1.9%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	3	1.0%	0	0.0%
FUNDUS							
97.120	COLOBOMA	1	0.1%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	29	3.9%	6	1.9%	3	5.6%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	6	0.8%	5	1.6%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	5	0.7%	0	0.0%	1	1.9%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.1%	1	0.3%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	3	0.4%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.1%	3	1.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.1%	1	0.3%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	18	2.4%	9	2.9%	1	1.9%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	10	1.3%	1	0.3%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	3	0.4%	0	0.0%	1	1.9%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.3%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.1%	0	0.0%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	3	1.0%	1	1.9%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	2	0.6%	1	1.9%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	0.6%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	7	0.9%	0	0.0%	0	0.0%
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.3%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.4%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***60***	***8.0%***	***29***	***9.3%***	***5***	***9.3%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	4	0.5%	1	0.3%	0	0.0%

OCULAR DISORDERS REPORT
MINIATURE PINSCHER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 746 #	 %	2016-2020 311 #	 %	2021 54 #	 %
VITREOUS Continued						
110.135 PHPV/ PTVL	2	0.3%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	9	1.2%	1	0.3%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	34	4.6%	2	0.6%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	2	0.3%	1	0.3%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	12	1.6%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.4%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	3	1.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	9	1.2%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	12	1.6%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	26	3.5%	1	0.3%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	9	1.2%	23	7.4%	1	1.9%
NORMAL						
.000 NORMAL GLOBE	562	75.3%	230	74.0%	46	85.2%

MINIATURE SCHNAUZER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmia with congenital cataract	Autosomal recessive	1-4	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Autosomal recessive	1, 5-8	NO	
E.	Retinal dysplasia with Persistent hyperplastic primary vitreous (PHPV)	Autosomal recessive	11	NO	
F.	Retinal atrophy - generalized	Autosomal recessive	1, 9, 10, 12	NO	
	Retinal atrophy- *PPT1*	Autosomal recessive	13	NO	Mutation in the gene *PPT1*
G.	Ceroid lipofuscinosis	Presumed autosomal recessive	14, 15	NO	

Description and Comments

A. Microphthalmia with congenital cataract

Congenital nuclear and posterior cortical lens opacities that progress slowly. In some cases, these cataracts appear similar to the congenital cataracts described in "E" below. An associated abnormality in this defect is microphthalmia that is often mild and is accompanied by a 1-3 mm reduction in the axial length of the globe as determined by ultrasonography. The cataracts often do not become mature and cause blindness until the dogs reach 3-5 years of age. Congenital cataracts and microphthalmia are inherited as an autosomal recessive disorder.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Congenital cataracts in the Miniature Schnauzer are bilateral and appear prior to 6 weeks of age. At this time they may already involve the entire lens. Others will first appear as posterior subcapsular opacities and usually progress to complete cataracts. These congenital cataracts are inherited as an autosomal recessive trait. Later-onset cataracts may represent a genetically distinct entity. There are other types of cataract in the breed which are also likely hereditary.

Note: It is not certain whether A and F are genetically distinct, or different manifestations of the same entity, as eyes affected with cataracts are often smaller than normal.

E. Retinal dysplasia with persistent hyperplastic primary vitreous (PHPV)

In the Miniature Schnauzer PHPV is associated with retinal dysplasia in some dogs. In this association it may be unilateral or bilateral and most often manifests as small white posterior lens capsule plaques accompanied by white primary vitreous mass extending to the optic disc. Patent hyaloid arteries and posterior lens capsule vessels may also be present.

F. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent

clinically. With limited exceptions, most forms of PRA are inherited as recessive traits.

A form of PRA in the Miniature Schnauzer was previously characterized and called photoreceptor dysplasia (now called Type A PRA). The dysplasia results from the abnormal development of visual cells followed by their degeneration. The disorder appears to affect the generation of an electrical signal within the retinal photoreceptor cells. Although fundus abnormalities usually are not present until 2-3 years of age, abnormalities of the electroretinogram can be demonstrated by 8-10 weeks of age. Clinical signs include mildly impaired night vision and variable rate of progression.

Initial studies suggested a mutation in phosducin was responsible, but this was disproven. This disease is extremely rare. The causative gene for Type A PRA has not been published although a DNA test is available. Another more common autosomal recessive form of PRA appears to be present in the Miniature Schnauzer, but the causative gene has not yet been determined; it also affects dogs ~2-4 years of age. Lastly, cases of late-onset PRA in the breed are recognized clinically but the inheritance pattern is unknown. (G. Aguirre personal communication 2016).

PPT1 mutations have been identified to segregate with PRA in Miniature Schnauzers. Age of onset is variable, and more than one variant may be causative. Penetrance of the mutation may be incomplete so care should be taken in interpretation of genetic testing results.

G. Ceroid lipofuscinosis

An inherited disease of man and animals characterized by the accumulation of lipopigment in various tissues of the body including the eye. It results in progressive neurologic disease including blindness. (Also called Batten's disease). This disease is very rare.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, Samuelson DA, Barrie KP, et al. Biometry and clinical characteristics of congenital cataracts and microphthalmia in the Miniature Schnauzer. *J Am Vet Med Assoc*. 1983;183:99-102.

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OCULAR DISORDERS REPORT
MINIATURE SCHNAUZER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	28,807		6,043		1,237	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	23	0.1%	2	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	5	0.0%	9	0.1%	0	0.0%
25.110	DISTICHIASIS	603	2.1%	104	1.7%	14	1.1%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	2	0.0%	1	0.1%
40.910	KERATOCONJUNCTIVITIS SICCA	6	0.0%	2	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.0%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	4	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	2	0.0%	1	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	7	0.0%	1	0.0%	2	0.2%
70.700	CORNEAL DYSTROPHY	149	0.5%	19	0.3%	6	0.5%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	17	0.1%	1	0.0%	0	0.0%
UVEA							
90.250	PIGMENTARY UVEITIS	2	0.0%	0	0.0%	0	0.0%
93.110	IRIS HYPOPLASIA	0	0.0%	2	0.0%	0	0.0%
93.120	IRIS CYST	1	0.0%	0	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	10	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	0	0.0%	1	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	473	1.6%	98	1.6%	16	1.3%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	49	0.2%	4	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	80	0.3%	6	0.1%	2	0.2%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	12	0.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	76	0.3%	76	1.3%	16	1.3%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	13	0.0%	1	0.0%	1	0.1%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	4	0.0%	1	0.0%	0	0.0%
97.120	COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	61	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	593	2.1%	124	2.1%	18	1.5%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	130	0.5%	50	0.8%	5	0.4%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	57	0.2%	14	0.2%	1	0.1%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	45	0.2%	13	0.2%	1	0.1%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	15	0.1%	2	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	79	0.3%	35	0.6%	2	0.2%
100.306	PUNCTATE CATARACT, NUCLEUS	17	0.1%	11	0.2%	1	0.1%
100.307	PUNCTATE CATARACT, CAPSULAR	43	0.1%	24	0.4%	2	0.2%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	110	0.4%	31	0.5%	2	0.2%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	139	0.5%	30	0.5%	2	0.2%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	63	0.2%	20	0.3%	2	0.2%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	8	0.0%	3	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	38	0.1%	1	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	26	0.1%	17	0.3%	2	0.2%

OCULAR DISORDERS REPORT
MINIATURE SCHNAUZER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	28,807		6,043		1,237	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.317 INCIPIENT CATARACT, CAPSULAR	30	0.1%	8	0.1%	4	0.3%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	9	0.0%	11	0.2%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	13	0.0%	13	0.2%	1	0.1%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	2	0.0%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	4	0.1%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	15	0.1%	14	0.2%	1	0.1%
100.327 INCOMPLETE CATARACT, CAPSULAR	2	0.0%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	16	0.1%	13	0.2%	9	0.7%
100.330 GENERALIZED/ COMPLETE CATARACT	152	0.5%	4	0.1%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.0%	1	0.0%	1	0.1%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	7	0.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,071***	***3.7%***	***321***	***5.3%***	***36***	***2.9%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	36	0.1%	14	0.2%	4	0.3%
110.135 PHPV/ PTVL	23	0.1%	1	0.0%	1	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	40	0.1%	10	0.2%	2	0.2%
110.320 VITREOUS DEGENERATION SYNERESIS	135	0.5%	19	0.3%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	66	0.2%	4	0.1%	1	0.1%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	48	0.2%	1	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	32	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	150	0.5%	4	0.1%	2	0.2%
120.400 RETINAL HEMORRHAGE	6	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	14	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	1	0.0%	0	0.0%
120.960 RETINOPATHY	3	0.0%	3	0.0%	1	0.1%
OPTIC NERVE						
130.110 MICROPAPILLA	43	0.1%	16	0.3%	2	0.2%
130.120 OPTIC NERVE HYPOPLASIA	15	0.1%	2	0.0%	1	0.1%
130.150 OPTIC DISC COLOBOMA	1	0.0%	1	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	158	0.5%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	340	1.2%	5	0.1%	1	0.1%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	161	0.6%	122	2.0%	34	2.7%
NORMAL						
.000 NORMAL GLOBE	26,235	91.1%	5,390	89.2%	1,112	89.9%

MUDI

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
MUDI

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 58 #	%	2016-2020 173 #	%	2021 65 #	%
EYELIDS						
25.110 DISTICHIASIS	2	3.4%	0	0.0%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	0	0.0%	1	0.6%	0	0.0%
70.700 CORNEAL DYSTROPHY	0	0.0%	1	0.6%	1	1.5%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	5	8.6%	19	11.0%	3	4.6%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	0.6%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	3.4%	4	2.3%	4	6.2%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	2	1.2%	3	4.6%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	1.7%	6	3.5%	2	3.1%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	0	0.0%	1	1.5%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	0.6%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	0	0.0%	1	1.5%
100.316 INCIPIENT CATARACT, NUCLEUS	1	1.7%	1	0.6%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	1.7%	5	2.9%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***3***	***5.2%***	***15***	***8.7%***	***7***	***10.8%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	0	0.0%	1	1.5%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	0	0.0%	0	0.0%	1	1.5%
OTHER						
900.000 OTHER, UNSPECIFIED	1	1.7%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	1.7%	16	9.2%	5	7.7%
NORMAL						
.000 NORMAL GLOBE	50	86.2%	130	75.1%	53	81.5%

MUNSTERLANDER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the MUNSTERLANDER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
MUNSTERLANDER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		1		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	0		1	100.0%	0	

NATIVE AMERICAN INDIAN DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NATIVE AMERICAN INDIAN DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
NATIVE AM. INDIAN DOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS						
100.326 INCOMPLETE CATARACT, NUCLEUS	1	100.0%	0		0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***100.0%***	***0***		***0***	

NATIVE AMERICAN VILLAGE DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NATIVE AMERICAN VILLAGE DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
NATIVE AM. VILLAGE DOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2		0		1	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	50.0%	0		0	0.0%
NORMAL						
.000 NORMAL GLOBE	1	50.0%	0		1	100.0%

NEAPOLITAN MASTIFF

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Ectropion	Not defined	1	Breeder option

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
NEAPOLITAN MASTIFF

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	66		36		1	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
20.160 MACROPALPEBRAL FISSURE	14	21.2%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	13	19.7%	13	36.1%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	22	33.3%	20	55.6%	0	0.0%
25.110 DISTICHIASIS	7	10.6%	4	11.1%	0	0.0%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	1	1.5%	0	0.0%	0	0.0%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	1	1.5%	1	2.8%	0	0.0%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	4	6.1%	2	5.6%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	2	3.0%	1	2.8%	0	0.0%
70.700 CORNEAL DYSTROPHY	1	1.5%	0	0.0%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	0	0.0%	1	2.8%	0	0.0%
UVEA						
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	1.5%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	1.5%	3	8.3%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	1	1.5%	2	5.6%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	2.8%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	1	1.5%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	1	1.5%	0	0.0%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	3	4.5%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***6***	***9.1%***	***3***	***8.3%***	***0***	***0.0%***
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	2	3.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	1.5%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1	1.5%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	0	0.0%	1	2.8%	1	100.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	6.1%	6	16.7%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	22	33.3%	10	27.8%	0	0.0%

NEDERLANDSE KOOIKERHONDJE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NEDERLANDSE KOOIKERHONDJE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
NEDERLANDSE KOOIKERHONDJE

Diagnostic Name		Year Examined: 1991-2016 Total # Dogs: 78 #	 %	Year Examined: 2016-2020 Total # Dogs: 142 #	 %	Year Examined: 2021 Total # Dogs: 34 #	 %
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	1.3%	3	2.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	1.3%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	0	0.0%	1	2.9%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	6	7.7%	5	3.5%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.7%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.7%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.7%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	2.6%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	1.3%	2	1.4%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	3	3.8%	1	0.7%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	1.3%	0	0.0%	2	5.9%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***7***	***9.0%***	***6***	***4.2%***	***2***	***5.9%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	1.3%	2	1.4%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	2	2.6%	3	2.1%	0	0.0%
RETINA							
120.960	RETINOPATHY	0	0.0%	1	0.7%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	2	2.6%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	5	6.4%	9	6.3%	1	2.9%
NORMAL							
.000	NORMAL GLOBE	65	83.3%	123	86.6%	31	91.2%

NEW ZEALAND HUNTAWAY

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NEW ZEALAND HUNTAWAY breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
NEW ZEALAND HUNTAWAY

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	50.0%	0		0	
NORMAL						
.000 NORMAL GLOBE	2	100.0%	0		0	

NEWFOUNDLAND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	2	NO
B.	Entropion	Not defined	1	Breeder option
C.	Ectropion	Not defined	1	Breeder option
D.	Uveal cysts	Not defined	1	Breeder option
E.	Cataract	Not defined	1	NO
F.	Retinal atrophy - generalized	Not defined	3	NO

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening examination.

Some Newfoundlands have an abnormality of the iridocorneal angle termed goniodysgenesis. This abnormality is not visible during routine ophthalmic examination using a slitlamp biomicroscope and an indirect ophthalmoscope. There appears to be an association between goniodysgenesis and glaucoma, but the mechanism by which the angle defect results in glaucoma has not been determined. The inheritance of goniodysgenesis in the Newfoundland is not known. Until the inheritance is determined, control should be directed towards removing dogs from breeding that have glaucoma and have goniodysgenesis, as well as those dogs that produce progeny afflicted with glaucoma.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation

due to exposure. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

D. Uveal cysts

A pigmented, fluid-filled epithelial-lined structure arising from the posterior iris or ciliary body epithelium. Cysts may remain attached to the pupil margin, iris, or ciliary body, or may detach and be free-floating within the anterior chamber. They may rupture and adhere to the cornea or anterior lens capsule. Uveal cysts may occur in any breed. Uveal cysts are commonly benign, although they may be associated with other pathologic conditions is various breeds.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Strom AR, Hassig M, Iburg TM, et al. Epidemiology of canine glaucoma presented to University of Zurich from 1995 to 2009. Part 1: Congenital and primary glaucoma (4 and 123 cases). *Vet Ophthalmol*. 2011 Mar;14:121-126.

3. Dekomien G and Epplen JT. Evaluation of the canine RPE65 gene in affected dogs with generalized progressive retinal atrophy. *Mol Vis*. 2003 Nov 11;9:601-605.

OCULAR DISORDERS REPORT
NEWFOUNDLAND

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	3,078		492		116	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	5	0.2%	1	0.2%	0	0.0%
10.000	GLAUCOMA	1	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	128	4.2%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	204	6.6%	34	6.9%	16	13.8%
22.000	ECTROPION, UNSPECIFIED	221	7.2%	21	4.3%	3	2.6%
25.110	DISTICHIASIS	21	0.7%	1	0.2%	1	0.9%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	14	0.5%	3	0.6%	1	0.9%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	9	0.3%	2	0.4%	3	2.6%
CORNEA							
70.210	PANNUS	1	0.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	2	0.1%	0	0.0%	2	1.7%
70.700	CORNEAL DYSTROPHY	1	0.0%	1	0.2%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	0	0.0%	1	0.2%	0	0.0%
UVEA							
93.120	IRIS CYST	45	1.5%	6	1.2%	3	2.6%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	3	0.1%	2	0.4%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	21	0.7%	2	0.4%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	5	0.2%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.2%	1	0.2%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.1%	0	0.0%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	4	0.1%	1	0.2%	1	0.9%
LENS							
100.200	CATARACT, UNSPECIFIED	11	0.4%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	101	3.3%	13	2.6%	6	5.2%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	8	0.3%	7	1.4%	2	1.7%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	13	0.4%	2	0.4%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	5	0.2%	3	0.6%	1	0.9%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	10	0.3%	2	0.4%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	4	0.1%	0	0.0%	1	0.9%
100.307	PUNCTATE CATARACT, CAPSULAR	5	0.2%	3	0.6%	1	0.9%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	21	0.7%	4	0.8%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	87	2.8%	14	2.8%	1	0.9%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	19	0.6%	6	1.2%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	3	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	12	0.4%	2	0.4%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	12	0.4%	2	0.4%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	8	0.3%	3	0.6%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	2	0.4%	1	0.9%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	5	0.2%	2	0.4%	2	1.7%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	0	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.2%	1	0.9%

OCULAR DISORDERS REPORT
NEWFOUNDLAND

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 3,078 #	 %	2016-2020 492 #	 %	2021 116 #	 %
LENS Continued						
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.2%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.0%	2	0.4%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	38	1.2%	0	0.0%	4	3.4%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	0	0.0%	1	0.9%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***264***	***8.6%***	***56***	***11.4%***	***15***	***12.9%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	4	0.1%	1	0.2%	0	0.0%
110.135 PHPV/ PTVL	4	0.1%	0	0.0%	1	0.9%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	4	0.1%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	26	0.8%	3	0.6%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	2	0.1%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	0	0.0%	1	0.9%
120.960 RETINOPATHY	1	0.0%	0	0.0%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	7	0.2%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	29	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	72	2.3%	3	0.6%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	44	1.4%	15	3.0%	5	4.3%
NORMAL						
.000 NORMAL GLOBE	2,331	75.7%	370	75.2%	81	69.8%

NORFOLK TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	2, 3	NO	Mutation in the *ADAMTS17* gene
E.	Optic nerve hypoplasia	Not defined	1	NO	

Description and Comments

A. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

E. Optic nerve hypoplasia

A congenital anomaly, which results in a small optic disk diameter and vision loss.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011; 14: 378-384.

3. Komaromy A. Genetics of canine primary glaucomas. Vet Clin Small Anim. 2015; 45: 1159-1182.

OCULAR DISORDERS REPORT
NORFOLK TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,313 #	 %	Year Examined: 2016-2020 Total # Dogs: 390 #	 %	Year Examined: 2021 Total # Dogs: 95 #	 %
EYELIDS						
20.160 MACROPALPEBRAL FISSURE	1	0.1%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	6	0.5%	0	0.0%	1	1.1%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	0	0.0%	1	1.1%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	2	0.2%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	12	0.9%	7	1.8%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	1	0.1%	2	0.5%	0	0.0%
UVEA						
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.1%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	269	20.5%	101	25.9%	17	17.9%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.1%	1	0.3%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	4	0.3%	2	0.5%	1	1.1%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	8	0.6%	7	1.8%	4	4.2%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.2%	4	1.0%	3	3.2%
FUNDUS						
97.120 COLOBOMA	1	0.1%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	44	3.4%	2	0.5%	6	6.3%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	5	0.4%	1	0.3%	1	1.1%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	5	0.4%	0	0.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	8	0.6%	0	0.0%	1	1.1%
100.306 PUNCTATE CATARACT, NUCLEUS	2	0.2%	0	0.0%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	4	0.3%	0	0.0%	1	1.1%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	7	0.5%	5	1.3%	1	1.1%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	16	1.2%	4	1.0%	1	1.1%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	6	0.5%	1	0.3%	3	3.2%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.2%	1	0.3%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	0	0.0%	0	0.0%	1	1.1%
100.317 INCIPIENT CATARACT, CAPSULAR	4	0.3%	2	0.5%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.3%	1	1.1%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.2%	0	0.0%	1	1.1%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	0.3%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	4	0.3%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***67***	***5.1%***	***16***	***4.1%***	***11***	***11.6%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	6	0.5%	2	0.5%	1	1.1%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	8	0.6%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	7	0.5%	0	0.0%	1	1.1%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	2	0.2%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	10	0.8%	1	0.3%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
NORFOLK TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,313 #	 %	2016-2020 390 #	 %	2021 95 #	 %
OPTIC NERVE						
130.110 MICROPAPILLA	10	0.8%	4	1.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	18	1.4%	8	2.1%	1	1.1%
130.150 OPTIC DISC COLOBOMA	19	1.4%	1	0.3%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	14	1.1%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	38	2.9%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	22	1.7%	14	3.6%	2	2.1%
NORMAL						
.000 NORMAL GLOBE	947	72.1%	246	63.1%	60	63.2%

NORBOTTENSPETS

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Cataract	Not defined	1	NO	
B.	Retinal atrophy (*prcd*)	Autosomal recessive	2	NO	Mutation of the *prcd* gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Norbottenspets is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Correction: Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2019 Jan 18;15(1):e1007938. doi: 10.1371/journal.pgen.1007938. Erratum for: PLoS Genet. 2018 Apr 30;14(4):e1007361. PMID: 30657768; PMCID: PMC6338350.

OCULAR DISORDERS REPORT
NORRBOTTENSPETS

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	99		22		5	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	1	1.0%	1	4.5%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	1	1.0%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	6	6.1%	2	9.1%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	1.0%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	2	9.1%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	5	5.1%	2	9.1%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	2	2.0%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	1.0%	1	4.5%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	1	1.0%	0	0.0%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	7	7.1%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	9	9.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	1	1.0%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	3	3.0%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	0	0.0%	1	20.0%
100.330 GENERALIZED/ COMPLETE CATARACT	1	1.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***25***	***25.3%***	***1***	***4.5%***	***1***	***20.0%***
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	1	1.0%	1	4.5%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	2.0%	0	0.0%	0	0.0%
OTHER						
900.100 OTHER, NOT INHERITED	3	3.0%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	4.5%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	75	75.8%	17	77.3%	4	80.0%

NORTH AMERICAN SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NORTH AMERICAN SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
NORTH AMERICAN SHEPHERD

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	6		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
VITREOUS						
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	16.7%	0		0	
NORMAL						
.000 NORMAL GLOBE	5	83.3%	0		0	

NORTHERN INUIT

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal dysplasia - folds/geographic/detached (with skeletal defects)	Autosomal recessive	1, 2	NO	Mutation in the *COL9A3* gene

Description and Comments

A. Retinal dysplasia - folds or detachment with skeletal defects

This condition is also known as oculo-skeletal dysplasia (OSD) or dwarfism with retinal dysplasia type 1 (DRD1)also occurs in the Labrador Retriever. A similar condition, DRD2, occurs in the Samoyed. The condition is autosomal recessive and homozygous affected dogs have shortened forelimbs ("downhill" conformation) with valgus deformity. They have severe ocular defects including cataract, retinal folds/multifocal retinal dysplasia, vitreal degeneration and retinal detachment. The ocular abnormalities result in blindness in most dogs. Heterozygous dogs can have either a normal ocular exam or have multiple retinal folds, vitreal membranes, or vitreal degeneration suggesting a semi-dominant mechanism with respect to the eyes. It is important to note that generally the retinal folds present in heterozygous dogs tend to cluster around the major superior blood vessels of the central tapetal region. The condition is caused by a 1 base pair insertion of *COL9A3.* A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Stavinohova R, Hartley C, Burmeister LM, Ricketts SL, Pettitt L, Tetas Pont R, Hitti RJ, Schofield E, Oliver JAC, Mellersh CS. Clinical, histopathological and genetic characterisation of oculoskeletal dysplasia in the Northern Inuit Dog. PLoS One. 2019 Aug 15;14(8):e0220761. doi: 10.1371/journal.pone.0220761. PMID: 31415586; PMCID: PMC6695176.

OCULAR DISORDERS REPORT
NORTHERN INUIT

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2		12		6	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	8.3%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	8.3%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***1***	***8.3%***	***0***	***0.0%***
NORMAL						
.000 NORMAL GLOBE	2	100.0%	11	91.7%	6	100.0%

NORWEGIAN BUHUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Cataract	Not defined	1, 3	NO
B.	Cataract - pulverulent	Presumed autosomal dominant	2, 3	Breeder option
C.	Y-suture top opacity	Not defined	1	Breeder option

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

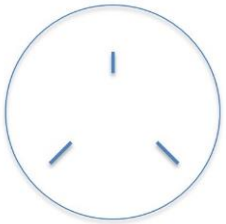
B. Cataract - pulverulent

With the pulverulent cataract in the Norwegian Buhund, initial lens changes may be visible as early as 6.5 weeks of age as small dots parallel to the suture lines behind the nucleus. By the age of 4 to 5.5 years, the opacities progress to involve the fetal nucleus which then resembles a ball of candy floss. The adult nucleus and the cortex remain clear. An autosomal dominant mode of inheritance with a high degree of penetrance has been suggested.

Rates of progression of these cataracts can vary, and have been noted to develop in older animals (over the age of 7) that were previously documented to be free from this condition.

C. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are



considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.

These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Bjerkas E and Haaland MB. Pulverulent nuclear cataract in the Norwegian Buhund. *J Small Anim Pract.* 1995;36:471-474.

3. Kristiansen E, Revold T, Lingaas F, Narfstrom K, Pedersen PB, Kielland C, Dahl S, Ropstad EO. (2017), Cataracts in the Norwegian Buhund – current prevalence and characteristics. Vet Ophthalmol, 20: 460-467. doi.10.1111/vop.12449.

OCULAR DISORDERS REPORT
NORWEGIAN BUHUND

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	653		292		75	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
10.000	GLAUCOMA	0	0.0%	1	0.3%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	2	0.3%	0	0.0%	1	1.3%
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	1	0.3%	0	0.0%
70.700	CORNEAL DYSTROPHY	5	0.8%	2	0.7%	2	2.7%
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	1	0.3%	0	0.0%
93.120	IRIS CYST	0	0.0%	1	0.3%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	2	0.3%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.2%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.2%	1	0.3%	1	1.3%
93.810	UVEAL MELANOMA	0	0.0%	0	0.0%	1	1.3%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	77	11.8%	34	11.6%	11	14.7%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	7	1.1%	7	2.4%	1	1.3%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	9	1.4%	4	1.4%	2	2.7%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.2%	0	0.0%	1	1.3%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.3%	0	0.0%	1	1.3%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	7	1.1%	12	4.1%	3	4.0%
100.306	PUNCTATE CATARACT, NUCLEUS	19	2.9%	16	5.5%	7	9.3%
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.2%	1	0.3%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	3	0.5%	4	1.4%	1	1.3%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	17	2.6%	7	2.4%	3	4.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	2	0.7%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	10	1.5%	3	1.0%	1	1.3%
100.316	INCIPIENT CATARACT, NUCLEUS	14	2.1%	8	2.7%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.2%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.2%	0	0.0%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.3%	0	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	9	1.4%	7	2.4%	1	1.3%
100.330	GENERALIZED/ COMPLETE CATARACT	6	0.9%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***108***	***16.5%***	***72***	***24.7%***	***21***	***28.0%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.2%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	0	0.0%	1	0.3%	2	2.7%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	8	1.2%	3	1.0%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	0	0.0%	1	1.3%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.5%	0	0.0%	2	2.7%
120.960	RETINOPATHY	3	0.5%	5	1.7%	1	1.3%
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.3%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	14	2.1%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	17	2.6%	6	2.1%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	13	2.0%	22	7.5%	2	2.7%
NORMAL							
.000	NORMAL GLOBE	491	75.2%	190	65.1%	52	69.3%

NORWEGIAN ELKHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma	Autosomal recessive	1-6	NO	Mutation of the *ADAMS10* gene
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy (*prcd)*	Autosomal recessive	1	NO	Mutation of the *prcd* gene
F.	Retinal atrophy - generalized				
	1. Rod dysplasia (*rd*)	Autosomal recessive	7-10	NO	
	2. Early retinal degeneration (*erd*)	Autosomal recessive	11-15	NO	Mutation of the *STK38L* gene
G.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine screening exam for certification.

In the Norwegian Elkhound, glaucoma appears to be familial. In most cases the drainage angle is reported to be open. A mutation has been found in *ADAMTS10* in some Norwegian Elkhounds with glaucoma, but a genetic test is not yet available.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that PRA in the Norwegian Elkhound is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

F. Retinal atrophy - generalized

1. **Rod dysplasia (*rd*)**: Inappropriate development of the visual cells resulting in vision impairment in dim light by 6 months and total blindness at 3-5 years. Ophthalmoscopic signs may be evident after 5 months of age, with signs of retinal vascular thinning after 2 years. An ERG can provide a diagnosis as early as 6 weeks of age. In the Norwegian Elkhound, this is an autosomal recessive trait.

2. **Early retinal degeneration (*erd*)**: Another form of PRA reported in the Norwegian Elkhound. Animals are night blind at 6 weeks and blind by 1 year of age. Clinical signs are

evident by 6 months. On histopathologic examination there is an abnormal structural development of the photoreceptors followed by rapid rod/cone degeneration. The mutation is found in the *STK38L* gene and is inherited as an autosomal recessive trait. While a DNA test is available, no Norwegian Elkhounds are thought to exist with this mutation anymore.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Ekesten B, Bjerkas E, Kongsengen Kea. Primary glaucoma in the Norwegian Elkhound. *Vet Comp Ophthalmol*. 1997;7:14-18.

3. Gelatt KN, MacKay EO. Prevalence of the breed-related glaucomas in pure-bred dogs in North America. *Vet Ophthalmol*. 2004;7:97-111.

4. Slater MR, Erb HN. Effects of risk factors and prophylactic treatment on primary glaucoma in the dog. *J Am Vet Med Assoc*. 1986;188:1028-1030.

5. Ahonen SJ, Kaukonen M, Nussdorfer FD, et al. A novel missense mutation in ADAMTS10 in Norwegian Elkhound primary glaucoma. *PLoS One*. 2014;9:e111941.

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7. Cogan DG, Kuwabara T. Photoreceptive Abiotrophy of the Retina in the Elkhound. *Pathol Vet*. 1965;2:101-128.

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9. Aguirre GD, Rubin LF. An electrophysiologic approach for early diagnosis of progressive retinal atrophy in Norwegian Elkhound. *J Am Anim Hosp Assoc*. 1971;7:136-142.

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11. Acland GM, Aguirre GD. Retinal degenerations in the dog: IV. Early retinal degeneration (erd) in Norwegian Elkhounds. *Exp Eye Res*. 1987;44:491-521.

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13. Ray K, Acland GM, Aguirre GD. Nonallelism of erd and prcd and exclusion of the canine RDS/peripherin gene as a candidate for both retinal degeneration loci. *Invest Ophthalmol Vis Sci*. 1996;37:783-794.

14. Kukekova AV, Aguirre GD, Acland GM. Cloning and characterization of canine SHARP1 and its evaluation as a positional candidate for canine early retinal degeneration (erd). *Gene*. 2003;312:335-343.

15. Goldstein O, Kukekova AV, Aguirre GD, et al. Exonic SINE insertion in STK38L causes canine early retinal degeneration (erd). *Genomics*. 2010;96:362-368.

OCULAR DISORDERS REPORT
NORWEGIAN ELKHOUND

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	2,546		254		28	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	4	0.2%	0	0.0%	0	0.0%
10.000	GLAUCOMA	2	0.1%	0	0.0%	0	0.0%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	16	0.6%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	5	0.2%	0	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	14	0.5%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	44	1.7%	2	0.8%	1	3.6%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	2	0.1%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.0%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	2	0.1%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	9	0.4%	2	0.8%	0	0.0%
UVEA							
93.120	IRIS CYST	6	0.2%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	34	1.3%	3	1.2%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	10	0.4%	1	0.4%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	6	0.2%	1	0.4%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	3	0.1%	4	1.6%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	23	0.9%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	107	4.2%	17	6.7%	1	3.6%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	10	0.4%	3	1.2%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	8	0.3%	2	0.8%	1	3.6%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.2%	1	0.4%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	1	3.6%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	11	0.4%	4	1.6%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.2%	4	1.6%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	2	0.1%	3	1.2%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	12	0.5%	1	0.4%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	37	1.5%	3	1.2%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	22	0.9%	4	1.6%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	3	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	7	0.3%	1	0.4%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	8	0.3%	4	1.6%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	9	0.4%	0	0.0%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	1	0.4%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.4%	0	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.4%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.4%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.4%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	2	0.1%	4	1.6%	3	10.7%
100.330	GENERALIZED/ COMPLETE CATARACT	7	0.3%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	4	0.2%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***173***	***6.8%***	***39***	***15.4%***	***5***	***17.9%***

OCULAR DISORDERS REPORT
NORWEGIAN ELKHOUND

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,546 #	 %	2016-2020 254 #	 %	2021 28 #	 %
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	7	0.3%	0	0.0%	0	0.0%
110.135 PHPV/ PTVL	2	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	7	0.3%	1	0.4%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	44	1.7%	6	2.4%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	2	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	10	0.4%	0	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	3	0.1%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	1	0.4%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	2	0.1%	1	0.4%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	22	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	32	1.3%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	16	0.6%	23	9.1%	1	3.6%
NORMAL						
.000 NORMAL GLOBE	2,191	86.1%	186	73.2%	22	78.6%

NORWEGIAN LUNDEHUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NORWEGIAN LUNDEHUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
NORWEGIAN LUNDEHUND

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	48		2		2	
	Diagnostic Name	#	%	#	%	#	%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	13	27.1%	0	0.0%	1	50.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	2.1%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	8	16.7%	0	0.0%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	2.1%	0	0.0%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	4.2%	0	0.0%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	2	4.2%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	2.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	2	4.2%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	3	6.3%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***11***	***22.9%***	***0***	***0.0%***	***0***	***0.0%***
VITREOUS							
110.320	VITREOUS DEGENERATION SYNERESIS	2	4.2%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	1	2.1%	0	0.0%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	29	60.4%	2	100.0%	1	50.0%

NORWICH TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	2	NO	
D.	Lens luxation	Autosomal recessive	2, 3	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to

be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci*. 2010;51:4716-4721.

3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384.

OCULAR DISORDERS REPORT
NORWICH TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	3,087		629		97	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	18	0.6%	13	2.1%	1	1.0%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	1	0.2%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	4	0.1%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	18	0.6%	5	0.8%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.1%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	1	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	177	5.7%	21	3.3%	1	1.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	4	0.1%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	8	0.3%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	4	0.1%	3	0.5%	1	1.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	5	0.2%	0	0.0%	1	1.0%
FUNDUS							
97.120	COLOBOMA	2	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	5	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	74	2.4%	12	1.9%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	14	0.5%	5	0.8%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	10	0.3%	2	0.3%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.1%	3	0.5%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.2%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	8	0.3%	1	0.2%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.1%	1	0.2%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.1%	4	0.6%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	17	0.6%	5	0.8%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	18	0.6%	5	0.8%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	13	0.4%	2	0.3%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	6	0.2%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	13	0.4%	4	0.6%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.0%	3	0.5%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	1	0.2%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.2%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	0.3%	2	2.1%
100.330	GENERALIZED/ COMPLETE CATARACT	12	0.4%	1	0.2%	0	0.0%
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.2%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***130***	***4.2%***	***42***	***6.7%***	***2***	***2.1%***

OCULAR DISORDERS REPORT
NORWICH TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	3,087		629		97	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	3	0.1%	0	0.0%	0	0.0%
110.135 PHPV/ PTVL	1	0.0%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	11	0.4%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	7	0.2%	0	0.0%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	4	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	14	0.5%	0	0.0%	0	0.0%
120.960 RETINOPATHY	4	0.1%	3	0.5%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	8	0.3%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	3	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	28	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	51	1.7%	1	0.2%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	24	0.8%	11	1.7%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	2,749	89.1%	547	87.0%	92	94.8%

NOVA SCOTIA DUCK TOLLING RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris - iris to lens - lens pigment foci/no strands	 Not defined Not defined Not defined	 1 1 1	 Breeder option NO Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
F.	Retinal atrophy (*prcd)*	Autosomal recessive	1	NO	Mutation of the *prcd* gene
G.	Choroidal hypoplasia (Collie eye anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	3, 4	NO	Mutation of the *NHEJ1* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

In the Nova Scotia Duck Tolling Retriever, many of the PPMs identified on routine screening examinations bridge from the iris to the lens where they are associated with focal cataract. This may result in vision impairment.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

F. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Nova Scotia Duck Tolling Retriever is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

G. Choroidal hypoplasia (Collie eye anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie eye anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Genome Res*. 2007 Nov;17:1562-1571.

3. Lowe JK, Kukekova AV, Kirkness EF, et al. Linkage mapping of the primary disease locus for Collie eye anomaly. *Genomics*. 2003;82:86-95.

4. Brown EA, Thomasy SM, Murphy CJ, Bannasch DL. Genetic analysis of optic nerve head coloboma in the Nova Scotia Duck Tolling Retriever identifies discordance with the NHEJ1 intronic deletion (collie eye anomaly mutation). Vet Ophthalmol. 2018 Mar;21(2):144-150. doi: 10.1111/vop.12488. Epub 2017 Jul 12. PMID: 28702949; PMCID: PMC5766432.

OCULAR DISORDERS REPORT
NOVA SCOTIA DUCK TOLLING RETRIEVER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	5,444		1,285		311	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.0%	2	0.2%	0	0.0%
10.000	GLAUCOMA	1	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	670	12.3%	153	11.9%	43	13.8%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	6	0.1%	7	0.5%	2	0.6%
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	5	0.1%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	5	0.1%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	141	2.6%	37	2.9%	6	1.9%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.1%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	20	0.4%	2	0.2%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	118	2.2%	37	2.9%	11	3.5%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	53	1.0%	1	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.0%	1	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	8	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	119	2.2%	82	6.4%	26	8.4%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.0%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	1	0.0%	0	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	2	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	18	0.3%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	309	5.7%	83	6.5%	20	6.4%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	43	0.8%	18	1.4%	2	0.6%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	30	0.6%	2	0.2%	1	0.3%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	12	0.2%	9	0.7%	1	0.3%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	4	0.3%	2	0.6%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	14	0.3%	12	0.9%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	19	0.3%	23	1.8%	6	1.9%
100.307	PUNCTATE CATARACT, CAPSULAR	23	0.4%	24	1.9%	5	1.6%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	20	0.4%	4	0.3%	2	0.6%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	36	0.7%	3	0.2%	1	0.3%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	20	0.4%	2	0.2%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.0%	1	0.1%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	4	0.1%	4	0.3%	1	0.3%
100.316	INCIPIENT CATARACT, NUCLEUS	12	0.2%	0	0.0%	3	1.0%
100.317	INCIPIENT CATARACT, CAPSULAR	10	0.2%	6	0.5%	3	1.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	3	0.1%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	1	0.1%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.1%	0	0.0%

OCULAR DISORDERS REPORT
NOVA SCOTIA DUCK TOLLING RETRIEVER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	5,444		1,285		311	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.328 Y-SUTURE TIP OPACITIES	6	0.1%	15	1.2%	10	3.2%
100.330 GENERALIZED/ COMPLETE CATARACT	7	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***280***	***5.1%***	***129***	***10.0%***	***37***	***11.9%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	9	0.2%	15	1.2%	3	1.0%
110.135 PHPV/ PTVL	7	0.1%	1	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	12	0.2%	1	0.1%	1	0.3%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	47	0.9%	5	0.4%	5	1.6%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	13	0.2%	0	0.0%	2	0.6%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	97	1.8%	1	0.1%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.0%	1	0.1%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	12	0.2%	1	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	13	0.2%	1	0.1%	0	0.0%
130.150 OPTIC DISC COLOBOMA	3	0.1%	1	0.1%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	98	1.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	279	5.1%	1	0.1%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	89	1.6%	82	6.4%	22	7.1%
NORMAL						
.000 NORMAL GLOBE	4,107	75.4%	830	64.6%	187	60.1%

OLD ENGLISH SHEEPDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Microphthalmia with multiple ocular anomalies	Not defined	1, 2	NO
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
D.	Cataract	Not defined	1, 3	NO
E.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Microphthalmia with multiple congenital ocular defects

Microphthalmia is a developmental anomaly in which the eyeball is abnormally small. This is often associated with other ocular malformations, including defects of the cornea, anterior chamber, lens and/or retina.

Microphthalmia with cataract and retinal abnormalities including retinal detachment, has been reported in litters of Old English Sheepdogs. Lesions were non-progressive. However, blindness did result in some dogs. The mode of inheritance is unknown, but affected dogs should not be bred.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. In one study of 66 interrelated Old English Sheepdogs, an autosomal recessive mode of inheritance was suggested. Retinal detachment was an associated finding in 5/43 affected dogs in this study. The location of the opacity within the lens and the age of onset was highly variable.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Barrie K. Posterior lenticonus, microphthalmia, cataracts and retinal folds in Old English Sheepdogs. *J Am Anim Hosp Assoc*. 1979;15:715.

3. Koch SA. Cataracts in interrelated Old English Sheepdogs. *J Am Vet Med Assoc*. 1972 Feb 1;160:299-301.

OCULAR DISORDERS REPORT
OLD ENGLISH SHEEPDOG

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	4,948		973		215	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	10	0.2%	0	0.0%	0	0.0%
10.000	GLAUCOMA	4	0.1%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	12	0.2%	1	0.1%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	2	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	84	1.7%	16	1.6%	4	1.9%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	2	0.0%	1	0.1%	1	0.5%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.0%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	18	0.4%	10	1.0%	0	0.0%
UVEA							
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	2	0.2%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	420	8.5%	151	15.5%	29	13.5%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	7	0.1%	3	0.3%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	9	0.2%	1	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	10	0.2%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.0%	3	0.3%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	3	0.1%	0	0.0%	0	0.0%
93.810	UVEAL MELANOMA	0	0.0%	1	0.1%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	0	0.0%	1	0.5%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	3	0.1%	1	0.1%	0	0.0%
97.120	COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	35	0.7%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	260	5.3%	63	6.5%	19	8.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	52	1.1%	33	3.4%	7	3.3%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	10	0.2%	4	0.4%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	9	0.2%	3	0.3%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	5	0.1%	6	0.6%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	6	0.1%	7	0.7%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	13	0.3%	8	0.8%	1	0.5%
100.307	PUNCTATE CATARACT, CAPSULAR	12	0.2%	22	2.3%	6	2.8%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	44	0.9%	10	1.0%	1	0.5%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	43	0.9%	8	0.8%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	17	0.3%	1	0.1%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	11	0.2%	1	0.1%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	13	0.3%	1	0.1%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	31	0.6%	3	0.3%	2	0.9%
100.317	INCIPIENT CATARACT, CAPSULAR	6	0.1%	3	0.3%	0	0.0%

OCULAR DISORDERS REPORT
OLD ENGLISH SHEEPDOG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 4,948 #	 %	2016-2020 973 #	 %	2021 215 #	 %
LENS Continued						
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	1	0.1%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.0%	2	0.2%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	1	0.1%	1	0.5%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.0%	5	0.5%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	61	1.2%	2	0.2%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	2	0.0%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	6	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***376***	***7.6%***	***122***	***12.5%***	***18***	***8.4%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	16	0.3%	3	0.3%	0	0.0%
110.135 PHPV/ PTVL	3	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	26	0.5%	0	0.0%	1	0.5%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	87	1.8%	8	0.8%	1	0.5%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	8	0.2%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	2	0.0%	0	0.0%	1	0.5%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	13	0.3%	0	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	9	0.2%	0	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	5	0.5%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	14	0.3%	9	0.9%	2	0.9%
130.120 OPTIC NERVE HYPOPLASIA	15	0.3%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	4	0.1%	0	0.0%	1	0.5%
OTHER						
900.000 OTHER, UNSPECIFIED	35	0.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	76	1.5%	2	0.2%	1	0.5%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	44	0.9%	38	3.9%	4	1.9%
NORMAL						
.000 NORMAL GLOBE	3,972	80.3%	668	68.7%	155	72.1%

OLD ENGLISH BULLDOGGE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the OLD ENGLISH BULLDOGGE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
OLDE ENGLISH BULLDOGGE

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	11		18		2	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	0	0.0%	2	11.1%	0	0.0%
25.110	DISTICHIASIS	5	45.5%	3	16.7%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	1	5.6%	0	0.0%
93.120	IRIS CYST	0	0.0%	1	5.6%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	9.1%	0	0.0%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	9.1%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	5.6%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	5.6%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	5.6%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***0***	***0.0%***	***2***	***11.1%***	***0***	***0.0%***
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	0	0.0%	1	5.6%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	5.6%	0	0.0%
OTHER							
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	11.1%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	5	45.5%	9	50.0%	2	100.0%

OTTERHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the OTTERHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
OTTERHOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	6		2		1	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
93.120 IRIS CYST	0	0.0%	1	50.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	16.7%	0	0.0%	0	0.0%
LENS						
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	0	0.0%	1	100.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	0	0.0%	1	100.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***0***	***0.0%***	***2***	***200.0%***
NORMAL						
.000 NORMAL GLOBE	6	100.0%	1	50.0%	0	0.0%

PAPILLON

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Vitreous degeneration	Not defined	1	Breeder option	
F.	Retinal atrophy (*CNGB1)*	Autosomal recessive	1, 2-5	NO	Mutation in the *CNGB1* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Nuclear and posterior cortical cataracts have been reported in the Papillon.

E. Vitreous degeneration

A liquefaction of the vitreous gel, which may predispose to retinal detachment resulting in blindness.

F. Retinal atrophy - *CNGB1*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. In one study of 707 dogs in Sweden, an autosomal recessive mode of inheritance was suggested. Clinical onset is reported at 5-6 years of age. In approximately 70% of cases of PRA in the Papillon, a *CNGB1* mutation is present, leading to an abnormal *CNGA1* protein in the rod outer segments. The mode of transmission is autosomal recessive. A genetic test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Haakanson N, Narfstrom K. Progressive retinal atrophy in Papillon dogs in Sweden: A clinical survey. *Prog Vet Comp Ophthal*. 1995;5:83.

3. Narfstrom K, Ekesten B. Electroretinographic evaluation of Papillons with and without hereditary retinal degeneration. *Am J Vet Res.* 1998;59:221-226.

4. Ahonen SJ, Arumilli M, Lohi H. A CNGB1 frameshift mutation in Papillon and Phalene dogs with progressive retinal atrophy. *PLoS One.* 2013;8:e72122.

5. Winkler PA, Ekenstedt KJ, Occelli LM, et al. A large animal model for CNGB1 autosomal recessive retinitis pigmentosa. *PLoS One*. 2013;8:e72229.

OCULAR DISORDERS REPORT
PAPILLON

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	10,551		1,434		345	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	9	0.1%	1	0.1%	0	0.0%
10.000	GLAUCOMA	1	0.0%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	16	0.2%	5	0.3%	1	0.3%
25.110	DISTICHIASIS	145	1.4%	28	2.0%	6	1.7%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	3	0.0%	7	0.5%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	1	0.1%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	3	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	5	0.0%	1	0.1%	0	0.0%
70.220	PIGMENTARY KERATITIS	2	0.0%	0	0.0%	2	0.6%
70.700	CORNEAL DYSTROPHY	99	0.9%	34	2.4%	1	0.3%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.0%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	2	0.0%	1	0.1%	0	0.0%
93.120	IRIS CYST	4	0.0%	0	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	312	3.0%	57	4.0%	11	3.2%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	7	0.1%	1	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	8	0.1%	1	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	6	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	13	0.1%	5	0.3%	3	0.9%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	5	0.0%	3	0.2%	1	0.3%
93.810	UVEAL MELANOMA	0	0.0%	3	0.2%	1	0.3%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	0	0.0%	1	0.1%	0	0.0%
97.120	COLOBOMA	2	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	19	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	341	3.2%	60	4.2%	20	5.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	68	0.6%	30	2.1%	6	1.7%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	19	0.2%	9	0.6%	2	0.6%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	12	0.1%	2	0.1%	2	0.6%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	7	0.1%	3	0.2%	2	0.6%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	9	0.1%	9	0.6%	1	0.3%
100.306	PUNCTATE CATARACT, NUCLEUS	23	0.2%	16	1.1%	3	0.9%
100.307	PUNCTATE CATARACT, CAPSULAR	17	0.2%	9	0.6%	3	0.9%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	82	0.8%	11	0.8%	5	1.4%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	52	0.5%	8	0.6%	3	0.9%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	32	0.3%	5	0.3%	4	1.2%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	6	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	10	0.1%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	22	0.2%	3	0.2%	2	0.6%
100.317	INCIPIENT CATARACT, CAPSULAR	12	0.1%	2	0.1%	0	0.0%

OCULAR DISORDERS REPORT
PAPILLON

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 10,551 #	 %	Year Examined: 2016-2020 Total # Dogs: 1,434 #	 %	Year Examined: 2021 Total # Dogs: 345 #	 %
LENS Continued						
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	1	0.1%	3	0.9%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.0%	2	0.1%	3	0.9%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	2	0.6%
100.326 INCOMPLETE CATARACT, NUCLEUS	3	0.0%	0	0.0%	1	0.3%
100.328 Y-SUTURE TIP OPACITIES	2	0.0%	5	0.3%	1	0.3%
100.330 GENERALIZED/ COMPLETE CATARACT	45	0.4%	3	0.2%	2	0.6%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	5	0.0%	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***446***	***4.2%***	***119***	***8.3%***	***45***	***13.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	38	0.4%	7	0.5%	0	0.0%
110.135 PHPV/ PTVL	14	0.1%	1	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	31	0.3%	11	0.8%	1	0.3%
110.320 VITREOUS DEGENERATION SYNERESIS	276	2.6%	23	1.6%	3	0.9%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	66	0.6%	5	0.3%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	11	0.1%	3	0.2%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	3	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	110	1.0%	8	0.6%	3	0.9%
120.400 RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	8	0.1%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	1	0.1%	0	0.0%
120.960 RETINOPATHY	1	0.0%	3	0.2%	1	0.3%
OPTIC NERVE						
130.110 MICROPAPILLA	8	0.1%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	10	0.1%	2	0.1%	0	0.0%
130.150 OPTIC DISC COLOBOMA	3	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	77	0.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	202	1.9%	3	0.2%	2	0.6%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	76	0.7%	56	3.9%	13	3.8%
NORMAL						
.000 NORMAL GLOBE	9,139	86.6%	1,119	78.0%	277	80.3%

PARSON RUSSELL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not define	1	Breeder options	
C.	Cataract	Not defined	1, 2	NO	
D.	Lens luxation	Autosomal recessive	3, 4	NO	Mutation in the *ADAMTS17* gene
E.	Vitreous degeneration	Not defined	1	Breeder option	
F.	Retinal atrophy - generalized	Not defined	1	NO	
G.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	5	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation may result in blinding retinal detachment and/or elevated intraocular pressure (glaucoma) causing vision impairment, pain, and blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

E. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment resulting in blindness.

F. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

G. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Oberbauer AM, Hollingsworth SR, Belanger JM, et al. Inheritance of cataracts and primary lens luxation in Jack Russell Terriers. *Am J Vet Res*. 2008;69:222-227.

3. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci*. 2010;51:4716-4721.

4. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384.

5. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
PARSON RUSSELL TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	2,619		306		52	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	64	2.4%	9	2.9%	1	1.9%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	0	0.0%	1	0.3%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	14	0.5%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.1%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	0	0.0%	1	1.9%
93.120	IRIS CYST	2	0.1%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	162	6.2%	35	11.4%	9	17.3%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.0%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.1%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	5	0.2%	3	1.0%	2	3.8%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	3	0.1%	2	0.7%	0	0.0%
FUNDUS							
97.120	COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	82	3.1%	12	3.9%	8	15.4%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	16	0.6%	8	2.6%	3	5.8%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	9	0.3%	1	0.3%	2	3.8%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.2%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.1%	3	1.0%	1	1.9%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	7	0.3%	5	1.6%	3	5.8%
100.306	PUNCTATE CATARACT, NUCLEUS	6	0.2%	1	0.3%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	5	0.2%	3	1.0%	2	3.8%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	15	0.6%	2	0.7%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	39	1.5%	5	1.6%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	6	0.2%	1	0.3%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	13	0.5%	4	1.3%	1	1.9%
100.316	INCIPIENT CATARACT, NUCLEUS	1	0.0%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	9	0.3%	2	0.7%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.3%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.1%	1	0.3%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	0.7%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	11	0.4%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***146***	***5.6%***	***39***	***12.7%***	***12***	***23.1%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	4	0.2%	2	0.7%	3	5.8%
110.135	PHPV/ PTVL	1	0.0%	0	0.0%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	9	0.3%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	36	1.4%	1	0.3%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	8	0.3%	2	0.7%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	2	0.1%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	25	1.0%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
PARSON RUSSELL TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,619 #	 %	Year Examined: 2016-2020 Total # Dogs: 306 #	 %	Year Examined: 2021 Total # Dogs: 52 #	 %
RETINA Continued						
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.3%	0	0.0%
120.960 RETINOPATHY	1	0.0%	0	0.0%	1	1.9%
OPTIC NERVE						
130.110 MICROPAPILLA	2	0.1%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	2	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	39	1.5%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	97	3.7%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	26	1.0%	21	6.9%	4	7.7%
NORMAL						
.000 NORMAL GLOBE	2,269	86.6%	218	71.2%	33	63.5%

PATTERDALE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Lens Luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Patterdale Terrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011; 14: 378-384.

OCULAR DISORDERS REPORT
PATTERDALE TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	15		5		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	1	6.7%	0	0.0%	0	
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	1	6.7%	0	0.0%	0	
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	6.7%	0	0.0%	0	
NORMAL						
.000 NORMAL GLOBE	13	86.7%	5	100.0%	0	

PEKINGESE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1-3	Breeder option
B.	Entropion	Not defined	1	Breeder option
C.	Exposure keratopathy syndrome	Not defined	1	Breeder option
D.	Cataract	Not defined	1	NO

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Exposure keratopathy syndrome

A corneal disease involving all or part of the cornea, resulting from inadequate blinking. This results from a combination of anatomic features including shallow orbits, exophthalmos, macroblepharon and lagophthalmos. Macroblepharon is defined as an exceptionally large palpebral fissure, macroblepharon in conjunction with laxity of the lateral canthal structures may lead to lower lid ectropion and upper lid entropion. Either of these conditions may lead to severe ocular irritation.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Barnett KC. Comparative aspects of canine hereditary eye disease. *Adv Vet Sci Comp Med.* 1976;20:39-67.

3. Gelatt KN. Pediatric ophthalmology in small animal practice. *Vet Clin North Am.* 1973;3:321.

4. Priester W. Canine progressive retinal atrophy: Occurrence by age, breed, and sex. *American Journal of Veterinary Research.* 1974;35:571-574.

OCULAR DISORDERS REPORT
PEKINGESE

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 198 #	 %	2016-2020 102 #	 %	2021 14 #	 %
GLOBE						
.110 MICROPHTHALMIA	1	0.5%	0	0.0%	0	0.0%
EYELIDS						
20.140 ECTOPIC CILIA	2	1.0%	0	0.0%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	12	6.1%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	11	5.6%	32	31.4%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	2	1.0%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	21	10.6%	6	5.9%	1	7.1%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	1	0.5%	1	1.0%	0	0.0%
CORNEA						
70.210 PANNUS	7	3.5%	0	0.0%	0	0.0%
70.220 PIGMENTARY KERATITIS	29	14.6%	18	17.6%	0	0.0%
UVEA						
90.250 PIGMENTARY UVEITIS	0	0.0%	1	1.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	1	1.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.5%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	3	1.5%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	1.5%	2	2.0%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	3	1.5%	1	1.0%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	2	1.0%	1	1.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	2.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.5%	0	0.0%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	5	2.5%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	3	1.5%	0	0.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	4	2.0%	1	1.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	3	1.5%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	1	0.5%	0	0.0%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	2	1.0%	0	0.0%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	1.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	2	1.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***27***	***13.6%***	***6***	***5.9%***	***0***	***0.0%***
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	1	0.5%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.5%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	1.5%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	1	1.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.5%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	6	3.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	11	5.6%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	3.5%	7	6.9%	5	35.7%
NORMAL						
.000 NORMAL GLOBE	110	55.6%	52	51.0%	8	57.1%

PEMBROKE WELSH CORGI

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- iris to cornea	Not defined	1	NO
C.	Cataract	Not defined	1	NO
D.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.
Persistent pupillary membranes are a significant problem in this breed with frequent documentation of strands bridging from the iris to the cornea noted on routine screening eye examinations. These may be associated with corneal opacity which may result in vision impairment, thus the recommendation against breeding Pembroke Welsh Corgis with PPM.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely

(diffuse) or in a localized region.

D. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
PEMBROKE WELSH CORGI

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	19,060		3,923		1,032	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	19	0.1%	2	0.1%	0	0.0%
10.000	GLAUCOMA	1	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	3	0.0%	0	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	331	1.7%	52	1.3%	13	1.3%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	3	0.0%	6	0.2%	1	0.1%
40.910	KERATOCONJUNCTIVITIS SICCA	6	0.0%	1	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.0%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	3	0.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	1	0.0%	1	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	64	0.3%	10	0.3%	4	0.4%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	67	0.4%	4	0.1%	1	0.1%
UVEA							
90.250	PIGMENTARY UVEITIS	0	0.0%	0	0.0%	1	0.1%
93.110	IRIS HYPOPLASIA	3	0.0%	3	0.1%	0	0.0%
93.120	IRIS CYST	8	0.0%	0	0.0%	1	0.1%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	8	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	5	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	3	0.0%	0	0.0%	3	0.3%
93.180	IIRIS SPHINCTER DYSPLASIA	1	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3,431	18.0%	850	21.7%	162	15.7%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	63	0.3%	13	0.3%	5	0.5%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	397	2.1%	40	1.0%	6	0.6%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	15	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.0%	1	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	49	0.3%	32	0.8%	12	1.2%
95.120	CILIARY BODY CYST	0	0.0%	0	0.0%	1	0.1%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	4	0.0%	1	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	79	0.4%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	433	2.3%	82	2.1%	35	3.4%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	69	0.4%	23	0.6%	6	0.6%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	58	0.3%	19	0.5%	2	0.2%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	30	0.2%	10	0.3%	4	0.4%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.0%	1	0.0%	1	0.1%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	27	0.1%	8	0.2%	1	0.1%
100.306	PUNCTATE CATARACT, NUCLEUS	63	0.3%	23	0.6%	11	1.1%
100.307	PUNCTATE CATARACT, CAPSULAR	31	0.2%	24	0.6%	6	0.6%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	97	0.5%	25	0.6%	5	0.5%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	176	0.9%	25	0.6%	4	0.4%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	67	0.4%	9	0.2%	4	0.4%

OCULAR DISORDERS REPORT
PEMBROKE WELSH CORGI

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	19,060		3,923		1,032	
	Diagnostic Name	#	%	#	%	#	%
LENS Continued							
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	7	0.0%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	19	0.1%	3	0.1%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	191	1.0%	29	0.7%	7	0.7%
100.317	INCIPIENT CATARACT, CAPSULAR	23	0.1%	12	0.3%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	5	0.0%	5	0.1%	1	0.1%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	4	0.0%	12	0.3%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	2	0.0%	5	0.1%	0	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	13	0.1%	14	0.4%	10	1.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	2	0.0%	1	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	3	0.0%	10	0.3%	2	0.2%
100.330	GENERALIZED/ COMPLETE CATARACT	76	0.4%	5	0.1%	0	0.0%
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	6	0.0%	3	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***1,046***	***5.5%***	***264***	***6.7%***	***64***	***6.2%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	66	0.3%	23	0.6%	6	0.6%
110.135	PHPV/ PTVL	20	0.1%	4	0.1%	1	0.1%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	8	0.0%	0	0.0%	1	0.1%
110.320	VITREOUS DEGENERATION SYNERESIS	82	0.4%	12	0.3%	2	0.2%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1,153	6.0%	172	4.4%	25	2.4%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	170	0.9%	15	0.4%	0	0.0%
120.190	RETINAL DYSPLASIA, DETACHED	3	0.0%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	35	0.2%	1	0.0%	0	0.0%
120.400	RETINAL HEMORRHAGE	7	0.0%	0	0.0%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.0%	0	0.0%	0	0.0%
120.920	RETINAL DETACHMENT WITH DIALYSIS	2	0.0%	4	0.1%	0	0.0%
120.960	RETINOPATHY	5	0.0%	6	0.2%	4	0.4%
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	0	0.0%	1	0.1%
OPTIC NERVE							
130.110	MICROPAPILLA	6	0.0%	0	0.0%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	9	0.0%	0	0.0%	0	0.0%
130.150	OPTIC DISC COLOBOMA	2	0.0%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	125	0.7%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	313	1.6%	5	0.1%	1	0.1%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	187	1.0%	120	3.1%	22	2.1%
NORMAL							
.000	NORMAL GLOBE	13,676	71.8%	2,560	65.3%	764	74.0%

PERRO DE PRESA CANARIO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Multifocal retinopathy - *cmr1*	Autosomal recessive	1	Breeder option	Mutation in the *CNGB3* gene

Description and Comments

A**.** Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

References

1. Yeh CY, Goldstein O, Kukekova AV, Holley D, Knollinger AM, Huson HJ, Pearce-Kelling SE, Acland GM, Komáromy AM. Genomic deletion of CNGB3 is identical by descent in multiple canine breeds and causes achromatopsia. BMC Genet. 2013 Apr 20;14:27. doi: 10.1186/1471-2156-14-27. PMID: 23601474

OCULAR DISORDERS REPORT
PERRO DE PRESA CANARIO

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	8		5		1	
	Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE							
10.000	GLAUCOMA	0	0.0%	1	20.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	25.0%	0	0.0%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	20.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	12.5%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	1	12.5%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	12.5%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***3***	***37.5%***	***1***	***20.0%***	***0***	***0.0%***
OTHER							
900.100	OTHER, NOT INHERITED	0	0.0%	1	20.0%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	6	75.0%	4	80.0%	1	100.0%

PERUVIAN INCA ORCHID

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Cataract	Not defined	1	NO

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
PERUVIAN INCA ORCHID

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	21		53		6	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	4.8%	1	1.9%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	4.8%	1	1.9%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	4.8%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	1	1.9%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	1.9%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	4	7.5%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.9%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	1.9%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	1	1.9%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	1.9%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.9%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	1.9%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***0***	***0.0%***	***12***	***22.6%***	***0***	***0.0%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	1	1.9%	0	0.0%
RETINA							
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	2	3.8%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	0	0.0%	3	5.7%	0	0.0%
120.960	RETINOPATHY	0	0.0%	2	3.8%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	1	4.8%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	0	0.0%	1	1.9%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	1.9%	1	16.7%
NORMAL							
.000	NORMAL GLOBE	21	100.0%	41	77.4%	5	83.3%

PETIT BASSET GRIFFON VENDEEN

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma – POAG	Autosomal recessive	2-5	NO	Mutation in the *ADAMTS17* gene
B.	Corneal dystrophy - endothelial	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
	- endothelial opacity/no strands	Not defined	1	NO	
D.	Cataract	Not defined	1	NO	
E.	Lens luxation	Not defined	5	NO	Mutation in the *ADAMTS17* gene
F.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

Primary Open Angle Glaucoma (POAG) in the Petit Basset Griffon Vendeen is caused by an inversion with a breakpoint disrupting the *ADAMTS17* gene. Pectinate ligament abnormalities are not present on gonioscopy and the iridocorneal angle remains open. The initial clinical features are noted around 3-4 years and include a small rise in intraocular pressure accompanied by lens subluxation. Retinal degeneration and optic nerve cupping noted in late stages when globe enlargement and vision disruption has occurred. A DNA test is available.

B. Corneal dystrophy - endothelial

Corneal endothelial dystrophy is an abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision. This usually does not occur until the animal is older.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Lens Luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee, 1999 and/or Data from OFA All-Breeds Report, 1991-1998.

2. Jeanes EC, Oliver JAC, Ricketts SL, Gould DJ, Mellersh CS. Glaucoma-causing *ADAMTS17* mutations are also reproducibly associated with height in two domestic dog breeds: selection for short stature may have contributed to increased prevalence of

glaucoma. Canine Genet Epidemiol. 2019 May 17;6:5. doi: 10.1186/s40575-019-0071-6. PMID: 31131111; PMCID: PMC6524303.

3. Forman OP, Pettitt L, Komaromy AM, et al. A Novel Genome-Wide Association Study Approach Using Genotyping by Exome Sequqncing Leads to the Indentification of a Primary Open Angle Glaucoma Association Inversion Disrupting ADAMTS17; PLoS one, 2015: 10(12):e0143546.

4. Jeanes EC, Oliver JAC, Ricketts SL, Gould DJ, Mellersh CS. Glaucoma-causing *ADAMTS17* mutations are also reproducibly associated with height in two domestic dog breeds: selection for short stature may have contributed to increased prevalence of glaucoma. Canine Genet Epidemiol. 2019 May 17;6:5. doi: 10.1186/s40575-019-0071-6. PMID: 31131111; PMCID: PMC6524303.

5. Bedford, PGC (2017), Open-angle glaucoma in the Petit Basset Griffon Vendeen. Vet Ophthalmol, 20: 98-102. doi.10.1111/vop.12369.

OCULAR DISORDERS REPORT
PETIT BASSET GRIFFON VENDEEN

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2,398		237		70	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
10.000 GLAUCOMA	3	0.1%	1	0.4%	0	0.0%
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	3	0.1%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	11	0.5%	0	0.0%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	1	0.0%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	17	0.7%	0	0.0%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	26	1.1%	0	0.0%	0	0.0%
UVEA						
93.120 IRIS CYST	3	0.1%	0	0.0%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.1%	0	0.0%	0	0.0%
93.150 IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	459	19.1%	50	21.1%	1	1.4%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	34	1.4%	2	0.8%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	210	8.8%	15	6.3%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	15	0.6%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	11	0.5%	8	3.4%	6	8.6%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	58	2.4%	17	7.2%	12	17.1%
95.120 CILIARY BODY CYST	1	0.0%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	2	0.1%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	110	4.6%	5	2.1%	2	2.9%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	37	1.5%	7	3.0%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	7	0.3%	0	0.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	3	0.1%	1	0.4%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	4	0.2%	0	0.0%	1	1.4%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	18	0.8%	2	0.8%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	3	0.1%	0	0.0%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	17	0.7%	6	2.5%	1	1.4%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	23	1.0%	3	1.3%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	7	0.3%	0	0.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	5	0.2%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	6	0.3%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	3	0.1%	1	0.4%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	12	0.5%	1	0.4%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.4%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	4	0.2%	2	0.8%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	12	0.5%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	8	0.3%	2	0.8%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***163***	***6.8%***	***24***	***10.1%***	***2***	***2.9%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	12	0.5%	1	0.4%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.2%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	9	0.4%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	108	4.5%	6	2.5%	3	4.3%

OCULAR DISORDERS REPORT
PETIT BASSET GRIFFON VENDEEN

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	2,398		237		70	
	Diagnostic Name	#	%	#	%	#	%
RETINA Continued							
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	11	0.5%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.1%	0	0.0%	0	0.0%
120.400	RETINAL HEMORRHAGE	2	0.1%	0	0.0%	0	0.0%
OPTIC NERVE							
130.110	MICROPAPILLA	3	0.1%	1	0.4%	0	0.0%
130.150	OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	38	1.6%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	76	3.2%	5	2.1%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	46	1.9%	4	1.7%	1	1.4%
NORMAL							
.000	NORMAL GLOBE	1,538	64.1%	148	62.4%	49	70.0%

PHARAOH HOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
PHARAOH HOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	370		148		21	
Diagnostic Name	#	%	#	%	#	%
EYELIDS						
25.110 DISTICHIASIS	7	1.9%	0	0.0%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.3%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	3	0.8%	1	0.7%	0	0.0%
UVEA						
93.120 IRIS CYST	1	0.3%	0	0.0%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.3%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	28	7.6%	12	8.1%	4	19.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.3%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	11	3.0%	3	2.0%	2	9.5%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.3%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	1	0.3%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	21	5.7%	10	6.8%	1	4.8%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	5	1.4%	3	2.0%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.3%	2	1.4%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.7%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.5%	0	0.0%	1	4.8%
100.306 PUNCTATE CATARACT, NUCLEUS	1	0.3%	0	0.0%	1	4.8%
100.307 PUNCTATE CATARACT, CAPSULAR	4	1.1%	3	2.0%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.3%	2	1.4%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	2	0.5%	1	0.7%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.5%	1	0.7%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	3	0.8%	1	0.7%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	1	0.3%	0	0.0%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.7%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.3%	1	0.7%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	1	0.3%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***25***	***6.8%***	***16***	***10.8%***	***2***	***9.5%***
VITREOUS						
110.320 VITREOUS DEGENERATION SYNERESIS	0	0.0%	1	0.7%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	3	0.8%	1	0.7%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	2	0.5%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.8%	0	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	3	2.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	4	1.1%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	7	1.9%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	0.8%	2	1.4%	2	9.5%
NORMAL						
.000 NORMAL GLOBE	303	81.9%	111	75.0%	13	61.9%

PICARDY SPANIEL

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PICARDY SPANIEL breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
PICARDY SPANIEL

There are no statistics available for this breed

PLOTT

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (*prcd*)	Autosomal recessive	1-3	NO	Mutation in the *prcd* gene

Description and Comments

A**.** Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Plott is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Plott. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

3. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
PLOTT

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		9		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	0		9	100.0%	0	

POINTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

Description and Comments

A. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
POINTER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	686		150		28	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	5	0.7%	0	0.0%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	4	0.6%	0	0.0%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	6	0.9%	6	4.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	11	1.6%	1	0.7%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.1%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.1%	0	0.0%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	0	0.0%	1	0.7%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	18	2.6%	4	2.7%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.1%	0	0.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	2	1.3%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	3	0.4%	3	2.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	3	0.4%	0	0.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	0	0.0%	2	1.3%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.7%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	2	1.3%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	2	1.3%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	0.7%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***10***	***1.5%***	***13***	***8.7%***	***0***	***0.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.1%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	7	1.0%	0	0.0%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	3	0.4%	1	0.7%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	0.3%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	4	0.6%	1	0.7%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	7	1.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	6	0.9%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	9	1.3%	10	6.7%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	620	90.4%	125	83.3%	28	100.0%

POLISH LOWLAND SHEEPDOG
(Polski Owczarek Nizinny)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Retinal atrophy - rod-cone dysplasia type 1 (*rcd4*)	Autosomal recessive	2	NO	Mutation in the *C2orf71* or *C17H2orf71* genes
E.	Ceroid lipofuscinosis	Not defined	3	NO	

Description and Comments

A. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is available.

A form of PRA, similar to that found in Gordon and Irish setters, has also been found in the the Polish Lowland Sheepdog. This form of PRA has been referred to as late-onset, slowly progressive PRA (LOPRA). Slight vascular attenuation, first seen between 4.5 -6 years of age precedes tapetal hyperreflectivity. All fundic changes were bilaterally symmetric and progressed slowly eventually causing clinical blindness, bilateral complete vascular attenuation, and tapetal hyperreflectivity by 12 years of age, on average. Almost all affected dogs were homozygous for the rcd4 mutation in *C17H2orf71* gene. A DNA test is available.

E. Ceroid lipofuscinosis

A systemic metabolic disorder that affects the retina and retinal pigment epithelium with accumulation of lipopigments resulting in retinal degeneration.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Downs LM, Bell JS, Freeman J, et al. Late-onset progressive retinal atrophy in the Gordon and Irish Setter breeds is associated with a frameshift mutation in C2orf71. *Anim Genet*. 2012;44:169-177.

3. Narfstrom K, Wrigstad A, Ekesten B, et al. Neuronal ceroid lipofuscinosis: clinical and morphologic findings in nine affected Polish Owczarek Nizinny (PON) dogs. *Vet Ophthalmol*. 2007;10:111-120.

OCULAR DISORDERS REPORT
POLISH LOWLAND SHEEPDOG

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		1,067		182		32	
	Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS							
25.110	DISTICHIASIS	17	1.6%	4	2.2%	1	3.1%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.1%	1	0.5%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	30	2.8%	7	3.8%	1	3.1%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.1%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	2	0.2%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	70	6.6%	21	11.5%	4	12.5%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	46	4.3%	7	3.8%	2	6.3%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	9	0.8%	12	6.6%	1	3.1%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	8	0.7%	2	1.1%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.2%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.3%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.2%	1	0.5%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.1%	1	0.5%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	2	0.2%	2	1.1%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	7	0.7%	1	0.5%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	4	0.4%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.1%	2	1.1%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	3	0.3%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	1	0.1%	1	0.5%	2	6.3%
100.317	INCIPIENT CATARACT, CAPSULAR	3	0.3%	0	0.0%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	2	1.1%	1	3.1%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	0.5%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***48***	***4.5%***	***25***	***13.7%***	***4***	***12.5%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.1%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	2	0.2%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	10	0.9%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	16	1.5%	5	2.7%	0	0.0%
120.920	RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	0	0.0%	1	3.1%
120.960	RETINOPATHY	1	0.1%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	5	0.5%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	24	2.2%	1	0.5%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	7	3.8%	3	9.4%
NORMAL							
.000	NORMAL GLOBE	905	84.8%	123	67.6%	20	62.5%

POLISH TATRA SHEEPDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the POLISH TATRA SHEEPDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
POLISH TATRA SHEEPDOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS						
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	50.0%	0		0	
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	50.0%	0		0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2***	***100.0%***	***0***		***0***	
NORMAL						
.000 NORMAL GLOBE	1	50.0%	0		0	

POMERANIAN

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Entropion	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy - rod-cone dysplasia type 3 (*rcd3*)	Autosomal recessive	1, 2	NO	Mutation in the *PDE6A* gene
F.	Retinal atrophy (*prcd*)	Autosomal recessive	2, 3	NO	Mutation in the *prcd* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Selection should be directed against entropion and toward head conformation that minimizes or eliminates the likelihood of the defect.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress

normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy - rod-cone dysplasia type 3 (*rcd3*)

PRA is an autosomal recessive trait caused by a one base pair deletion in the gene encoding the alpha subunit of cyclic GMP phosphodiesterase (rcd3). PRA begins early in life with clinical signs of night blindness and a lack of rod ERG responses is seen at 6-8 weeks of age. Dogs are completely blind by 2-3 years of age when ophthalmoscopic signs are first visible. The mutation is found in the *PDE6A* gene. A DNA test is available.

F. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Pomeranian is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

3. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

OCULAR DISORDERS REPORT
POMERANIAN

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,097		742		384	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	0.2%	4	0.5%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	3	0.3%	25	3.4%	40	10.4%
22.000	ECTROPION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	52	4.7%	21	2.8%	9	2.3%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.1%	1	0.1%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.1%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	1	0.1%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	2	0.2%	0	0.0%	1	0.3%
70.700	CORNEAL DYSTROPHY	3	0.3%	1	0.1%	2	0.5%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.2%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	1	0.1%	0	0.0%
93.150	IRIS COLOBOMA	0	0.0%	2	0.3%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	62	5.7%	75	10.1%	20	5.2%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	3	0.3%	1	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	4	0.4%	1	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	5	0.5%	7	0.9%	3	0.8%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	3	0.4%	0	0.0%
93.810	UVEAL MELANOMA	1	0.1%	0	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	1	0.1%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	28	2.6%	7	0.9%	3	0.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	7	0.6%	2	0.3%	2	0.5%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.2%	2	0.3%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.2%	1	0.1%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.2%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	3	0.3%	0	0.0%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	2	0.2%	3	0.4%	1	0.3%
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.1%	1	0.1%	2	0.5%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	11	1.0%	6	0.8%	1	0.3%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	6	0.5%	2	0.3%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	4	0.4%	2	0.3%	1	0.3%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.1%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	2	0.2%	1	0.1%	1	0.3%
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	3	0.4%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	0.1%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	11	1.0%	1	0.1%	0	0.0%
100.340	RESORBING/ HYPERMATURE CATARACT	1	0.1%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	0	0.0%	0	0.0%	1	0.3%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***55***	***5.0%***	***27***	***3.6%***	***8***	***2.1%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	3	0.3%	1	0.1%	0	0.0%
110.135	PHPV/ PTVL	1	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
POMERANIAN

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,097 #	 %	Year Examined: 2016-2020 Total # Dogs: 742 #	 %	Year Examined: 2021 Total # Dogs: 384 #	 %
VITREOUS Continued						
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.3%	3	0.4%	1	0.3%
110.320 VITREOUS DEGENERATION SYNERESIS	14	1.3%	3	0.4%	1	0.3%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	2	0.2%	5	0.7%	1	0.3%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	3	0.3%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	16	1.5%	1	0.1%	1	0.3%
120.400 RETINAL HEMORRHAGE	1	0.1%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.2%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.1%	0	0.0%
120.960 RETINOPATHY	0	0.0%	2	0.3%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	2	0.2%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	2	0.2%	1	0.1%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	10	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	27	2.5%	2	0.3%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	11	1.0%	23	3.1%	10	2.6%
NORMAL						
.000 NORMAL GLOBE	907	82.7%	575	77.5%	291	75.8%

POODLE

(Standard)

*Up until 2022, the toy/miniature/standard poodle conditions were assessed as a group, therefore statistics prior to this date may not reflect the real incidence within the breed subgroups. From 2021, the Standard Poodle is assessed separately from the Toy & Miniature varieties, and conditions may be added or removed from each page as statistics start to be generated.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	 Not defined Not defined	 1 1	 Breeder option Passes with no notation	
D.	Cataract	Not defined	1, 2-4	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Vitreous degeneration	Not defined	1	Breeder option	
G.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 10-20	NO	Mutation in the *prcd* gene
H.	Retinal atrophy - rod-cone dysplasia type 4 (*rcd4*)	Autosomal recessive	21	NO	Mutation in the *C2orf71* gene
I.	Day blindness/retinal degeneration	Autosomal recessive	1	NO	Mutation has not been published
J.	Micropapilla	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

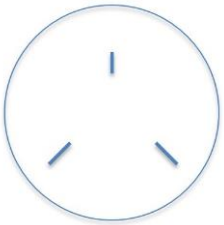
D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The Poodle cataract can involve the lens cortex and lens nucleus. The rate and degree of progression are variable. A familial form of cataract has been described in the Standard Poodle, beginning with an equatorial opacity initially observed in dogs prior to 2 years of age.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment and/or glaucoma. Either condition may cause blindness.

G. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that PRA in the Poodle is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available. It is important to note that in all breeds in which a molecular diagnostic test for the disease is available, it is possible to have dogs diagnosed clinically as affected, yet the DNA test results are normal. This suggests that other genetic causes of PRA exist or that the diagnosed affected dog has an acquired disease that mimics the inherited disorder.

H. Rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

I. Day blindness/tetinal degeneration

An autosomal recessive disorder of standard poodles and ‘Doodles’ (where the mix-bred dogs are backcrossed to standard poodles that carry the genetic defect); the disease also has been referred to as achromatopsia. The salient clinical findings is profound visual difficulty in bright light, day blindness, with subjective normal night vision. In the early stages of the disease, fundus examination is normal with some dogs showing focal hyperreflectivity of the cone-rich fovea like region of the retina; the photopic ERG is not recordable. In some older dogs, there is progression resulting in poor/absent vision under both dim and bright light conditions, markedly abnormal or non-recordable ERG, and a fundus appearance indicative of late stage retinal degeneration and indistinguishable from progressive retinal atrophy.

J. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

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OCULAR DISORDERS REPORT
POODLE, STANDARD

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	12,836		23,452		6,576	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	4	0.0%	0	0.0%	0	0.0%
10.000	GLAUCOMA	4	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	0	0.0%	4	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	36	0.3%	92	0.4%	16	0.2%
22.000	ECTROPION, UNSPECIFIED	0	0.0%	4	0.0%	0	0.0%
25.110	DISTICHIASIS	180	1.4%	372	1.6%	100	1.5%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	16	0.1%	12	0.1%	8	0.1%
40.910	KERATOCONJUNCTIVITIS SICCA	4	0.0%	8	0.0%	0	0.0%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	4	0.0%	0	0.0%	0	0.0%
51.100	THIRD EYELID CARTILAGE ANOMALY	36	0.3%	20	0.1%	4	0.1%
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	4	0.0%	4	0.1%
70.700	CORNEAL DYSTROPHY	60	0.5%	120	0.5%	36	0.5%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	12	0.1%	0	0.0%	0	0.0%
UVEA							
90.250	PIGMENTARY UVEITIS	0	0.0%	4	0.0%	0	0.0%
93.110	IRIS HYPOPLASIA	0	0.0%	4	0.0%	0	0.0%
93.120	IRIS CYST	4	0.0%	8	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	316	2.5%	576	2.5%	164	2.5%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	8	0.1%	8	0.0%	4	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	4	0.0%	8	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	312	2.4%	572	2.4%	152	2.3%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.0%	16	0.1%	0	0.0%
93.810	UVEAL MELANOMA	12	0.1%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1,036	8.1%	1,172	5.0%	224	3.4%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	552	4.3%	664	2.8%	96	1.5%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	104	0.8%	128	0.5%	8	0.1%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	124	1.0%	168	0.7%	16	0.2%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	76	0.6%	68	0.3%	28	0.4%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	164	1.3%	196	0.8%	12	0.2%
100.306	PUNCTATE CATARACT, NUCLEUS	88	0.7%	96	0.4%	28	0.4%
100.307	PUNCTATE CATARACT, CAPSULAR	180	1.4%	296	1.3%	80	1.2%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	108	0.8%	176	0.8%	24	0.4%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	56	0.4%	132	0.6%	16	0.2%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	100	0.8%	120	0.5%	20	0.3%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	4	0.0%	12	0.1%	8	0.1%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	20	0.2%	32	0.1%	24	0.4%
100.316	INCIPIENT CATARACT, NUCLEUS	24	0.2%	76	0.3%	12	0.2%
100.317	INCIPIENT CATARACT, CAPSULAR	24	0.2%	56	0.2%	4	0.1%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	12	0.1%	36	0.2%	4	0.1%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	12	0.1%	28	0.1%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	20	0.2%	20	0.1%	4	0.1%
100.326	INCOMPLETE CATARACT, NUCLEUS	12	0.1%	20	0.1%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	8	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	96	0.7%	176	0.8%	72	1.1%

OCULAR DISORDERS REPORT
POODLE, STANDARD

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	12,836		23,452		6,576	
	Diagnostic Name	#	%	#	%	#	%
LENS Continued							
100.330	GENERALIZED/ COMPLETE CATARACT	12	0.1%	12	0.1%	0	0.0%
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	8	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	4	0.0%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***1,788***	***13.9%***	***2,528***	***10.8%***	***456***	***6.9%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	40	0.3%	40	0.2%	12	0.2%
110.135	PHPV/ PTVL	8	0.1%	12	0.1%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	8	0.1%	4	0.0%	4	0.1%
110.320	VITREOUS DEGENERATION SYNERESIS	16	0.1%	44	0.2%	28	0.4%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	40	0.3%	124	0.5%	8	0.1%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	4	0.0%	4	0.1%
120.190	RETINAL DYSPLASIA, DETACHED	0	0.0%	4	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	8	0.1%	32	0.1%	0	0.0%
120.920	RETINAL DETACHMENT WITH DIALYSIS	4	0.0%	4	0.0%	0	0.0%
120.960	RETINOPATHY	20	0.2%	24	0.1%	0	0.0%
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	4	0.0%	0	0.0%
OPTIC NERVE							
130.110	MICROPAPILLA	60	0.5%	64	0.3%	24	0.4%
130.120	OPTIC NERVE HYPOPLASIA	4	0.0%	4	0.0%	0	0.0%
OTHER							
900.100	OTHER, NOT INHERITED	44	0.3%	56	0.2%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	680	5.3%	948	4.0%	228	3.5%
NORMAL							
.000	NORMAL GLOBE	9,916	77.3%	18,852	80.4%	5,528	84.1%

POODLE

(Miniature and Toy varieties)

*Up until 2022, the toy/miniature/standard poodle conditions were assessed as a group, therefore statistics prior to this date may not reflect the real incidence within the breed subgroups. From 2021, the Standard Poodle is assessed separately from the Toy & Miniature varieties, and conditions may be added or removed from each page as statistics start to be generated.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	 Not defined Not defined	 1 1	 Breeder option Passes with no notation	
D.	Cataract	Not defined	1, 2-4	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Vitreous degeneration	Not defined	1	Breeder option	
G.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 5-15	NO	Mutation in the *prcd* gene
H.	Retinal atrophy - rod-cone dysplasia type 4 (*rcd4*)	Autosomal recessive	16-20	NO	Mutation in the *C2orf71* gene *only in Miniatures
i.	Micropapilla	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

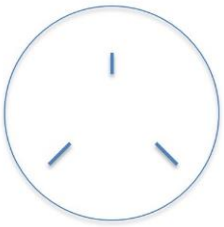
D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The Poodle cataract can involve the lens cortex and lens nucleus. The rate and degree of progression are variable. A familial form of cataract has been described in the Standard Poodle, beginning with an equatorial opacity initially observed in dogs prior to 2 years of age.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment and/or glaucoma. Either condition may cause blindness.

G. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that PRA in the Poodle is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available. It is important to note that in all breeds in which a molecular diagnostic test for the disease is available, it is possible to have dogs diagnosed clinically as affected, yet the DNA test results are normal. This suggests that other genetic causes of PRA exist or that the diagnosed affected dog has an acquired disease that mimics the inherited disorder.

H. Rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

I. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

References

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OCULAR DISORDERS REPORT
POODLE, TOY AND MINIATURE

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	7,532		15,780		4,692	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	0	0.0%	12	0.1%	8	0.2%
EYELIDS							
20.140	ECTOPIC CILIA	4	0.1%	28	0.2%	8	0.2%
21.000	ENTROPION, UNSPECIFIED	8	0.1%	12	0.1%	4	0.1%
22.000	ECTROPION, UNSPECIFIED	0	0.0%	4	0.0%	0	0.0%
25.110	DISTICHIASIS	764	10.1%	1,808	11.5%	476	10.1%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	8	0.1%	32	0.2%	20	0.4%
40.910	KERATOCONJUNCTIVITIS SICCA	4	0.1%	4	0.0%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	0	0.0%	4	0.0%	4	0.1%
CORNEA							
70.220	PIGMENTARY KERATITIS	8	0.1%	20	0.1%	0	0.0%
70.700	CORNEAL DYSTROPHY	28	0.4%	96	0.6%	24	0.5%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.1%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	4	0.0%	0	0.0%
93.120	IRIS CYST	0	0.0%	4	0.0%	0	0.0%
93.150	IRIS COLOBOMA	4	0.1%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	4	0.0%	0	0.0%
93.180	IIRIS SPHINCTER DYSPLASIA	0	0.0%	4	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	656	8.7%	1,692	10.7%	436	9.3%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	24	0.3%	80	0.5%	8	0.2%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	12	0.2%	8	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	88	1.2%	248	1.6%	112	2.4%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	0	0.0%	8	0.1%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	4	0.1%	4	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	404	5.4%	548	3.5%	108	2.3%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	188	2.5%	276	1.7%	44	0.9%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	72	1.0%	104	0.7%	12	0.3%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	40	0.5%	56	0.4%	8	0.2%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	4	0.1%	16	0.1%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	140	1.9%	156	1.0%	4	0.1%
100.306	PUNCTATE CATARACT, NUCLEUS	8	0.1%	36	0.2%	4	0.1%
100.307	PUNCTATE CATARACT, CAPSULAR	72	1.0%	116	0.7%	44	0.9%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	68	0.9%	128	0.8%	16	0.3%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	84	1.1%	88	0.6%	12	0.3%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	16	0.2%	52	0.3%	8	0.2%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	4	0.1%	4	0.0%	12	0.3%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	20	0.3%	52	0.3%	24	0.5%
100.316	INCIPIENT CATARACT, NUCLEUS	4	0.1%	28	0.2%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	8	0.1%	24	0.2%	4	0.1%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	28	0.4%	44	0.3%	8	0.2%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	36	0.5%	28	0.2%	20	0.4%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	4	0.1%	20	0.1%	0	0.0%
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	0	0.0%	4	0.0%	0	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	8	0.1%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	4	0.0%	0	0.0%

OCULAR DISORDERS REPORT
POODLE, TOY AND MINIATURE

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 7,532 #	 %	Year Examined: 2016-2020 Total # Dogs: 15,780 #	 %	Year Examined: 2021 Total # Dogs: 4,692 #	 %
LENS Continued						
100.327 INCOMPLETE CATARACT, CAPSULAR	4	0.1%	4	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	44	0.6%	124	0.8%	72	1.5%
100.330 GENERALIZED/ COMPLETE CATARACT	36	0.5%	28	0.2%	4	0.1%
100.340 RESORBING/ HYPERMATURE CATARACT	8	0.1%	0	0.0%	4	0.1%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	8	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***888***	***11.8%***	***1,400***	***8.9%***	***300***	***6.4%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	40	0.5%	104	0.7%	12	0.3%
110.135 PHPV/ PTVL	0	0.0%	20	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	28	0.4%	24	0.2%	20	0.4%
110.320 VITREOUS DEGENERATION SYNERESIS	84	1.1%	136	0.9%	20	0.4%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	0	0.0%	12	0.1%	8	0.2%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	4	0.1%	4	0.0%	4	0.1%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	20	0.3%	20	0.1%	8	0.2%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	12	0.1%	0	0.0%
120.960 RETINOPATHY	12	0.2%	16	0.1%	8	0.2%
OPTIC NERVE						
130.110 MICROPAPILLA	128	1.7%	136	0.9%	16	0.3%
130.120 OPTIC NERVE HYPOPLASIA	68	0.9%	152	1.0%	24	0.5%
130.150 OPTIC DISC COLOBOMA	4	0.1%	20	0.1%	16	0.3%
OTHER						
900.100 OTHER, NOT INHERITED	48	0.6%	20	0.1%	4	0.1%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	324	4.3%	548	3.5%	140	3.0%
NORMAL						
.000 NORMAL GLOBE	5,040	66.9%	10,500	66.5%	3,312	70.6%

POODLE

(Unspecified variety)

*Up until 2022, the toy/miniature/standard poodle conditions were assessed as a group, therefore statistics prior to this date may not reflect the real incidence within the breed subgroups. From 2021, the Standard Poodle is assessed separately from the Toy & Miniature varieties, and conditions may be added or removed from each page as statistics start to be generated.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	 Not defined Not defined	 1 1	 Breeder option Passes with no notation	
D.	Cataract	Not defined	1, 2-4	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Vitreous degeneration	Not defined	1	Breeder option	
G.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 10-20	NO	Mutation in the *prcd* gene
H.	Retinal atrophy - rod-cone dysplasia type 4 (*rcd4*)	Autosomal recessive	5-9	NO	Mutation in the *C2orf71* gene *only in Standards & Miniatures
I.	Day blindness/retinal degeneration	Autosomal recessive	1	NO	Mutation has not been published *only in Standards
J.	Micropapilla	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

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E. Y-suture tip opacity

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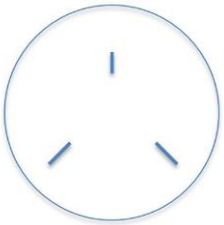

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F. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment and/or glaucoma. Either condition may cause blindness.

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I. Cone degeneration: Day Blindness/Retinal degeneration:

An autosomal recessive disorder of standard poodles and ‘Doodles’ (where the mix-bred dogs are backcrossed to standard poodles that carry the genetic defect); the disease also has been referred to as achromatopsia. The salient clinical findings is profound visual difficulty in bright light, day blindness, with subjective normal night vision. In the early stages of the disease, fundus examination is normal with some dogs showing focal hyperreflectivity of the cone-rich fovea like region of the retina; the photopic ERG is not recordable. In some older dogs, there is progression resulting in poor/absent vision under both dim and bright light conditions, markedly abnormal or non-recordable ERG, and a fundus appearance indicative of late stage retinal degeneration and indistinguishable from progressive retinal atrophy.

J. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

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OCULAR DISORDERS REPORT
POODLE, UNSPECIFIED VARIETY

Year Examined:		1991-2016		2016-2020		2021	
Total # Dogs:		171,660		4,068		1,356	
Diagnostic Name		#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	80	0.0%	12	0.3%	4	0.3%
10.000	GLAUCOMA	20	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.110	EYELID DERMOID	4	0.0%	0	0.0%	0	0.0%
20.140	ECTOPIC CILIA	132	0.1%	8	0.2%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	4	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	444	0.3%	4	0.1%	8	0.6%
22.000	ECTROPION, UNSPECIFIED	20	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	10,924	6.4%	152	3.7%	48	3.5%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	8	0.0%	0	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	32	0.0%	0	0.0%	4	0.3%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	124	0.1%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	72	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	156	0.1%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	100	0.1%	8	0.2%	0	0.0%
70.700	CORNEAL DYSTROPHY	964	0.6%	24	0.6%	8	0.6%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	32	0.0%	0	0.0%	0	0.0%
UVEA							
90.250	PIGMENTARY UVEITIS	8	0.0%	0	0.0%	0	0.0%
93.110	IRIS HYPOPLASIA	4	0.0%	4	0.1%	4	0.3%
93.120	IRIS CYST	28	0.0%	0	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	20	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	20	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	4,968	2.9%	200	4.9%	132	9.7%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	300	0.2%	4	0.1%	4	0.3%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	116	0.1%	4	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	152	0.1%	4	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	268	0.2%	60	1.5%	32	2.4%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	12	0.0%	0	0.0%	0	0.0%
93.810	UVEAL MELANOMA	4	0.0%	0	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	0	0.0%	4	0.3%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	12	0.0%	0	0.0%	0	0.0%
97.120	COLOBOMA	44	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	1,536	0.9%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	8,872	5.2%	116	2.9%	24	1.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1,644	1.0%	48	1.2%	8	0.6%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	708	0.4%	8	0.2%	8	0.6%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	456	0.3%	8	0.2%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	196	0.1%	4	0.1%	4	0.3%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	412	0.2%	68	1.7%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	140	0.1%	4	0.1%	4	0.3%
100.307	PUNCTATE CATARACT, CAPSULAR	144	0.1%	64	1.6%	4	0.3%

OCULAR DISORDERS REPORT
POODLE, UNSPECIFIED VARIETY

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 171,660 #	 %	2016-2020 4,068 #	 %	2021 1,356 #	 %
LENS Continued						
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	1,792	1.0%	24	0.6%	8	0.6%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1,500	0.9%	32	0.8%	8	0.6%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	948	0.6%	20	0.5%	4	0.3%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	140	0.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	332	0.2%	0	0.0%	4	0.3%
100.316 INCIPIENT CATARACT, NUCLEUS	244	0.1%	8	0.2%	4	0.3%
100.317 INCIPIENT CATARACT, CAPSULAR	136	0.1%	8	0.2%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	4	0.1%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	8	0.0%	12	0.3%	4	0.3%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	4	0.0%	8	0.2%	0	0.0%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	0	0.0%	0	0.0%	4	0.3%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	4	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	4	0.0%	44	1.1%	12	0.9%
100.330 GENERALIZED/ COMPLETE CATARACT	1,672	1.0%	8	0.2%	4	0.3%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	8	0.2%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	104	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***12,016***	***7.0%***	***384***	***9.4%***	***80***	***5.9%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	228	0.1%	16	0.4%	8	0.6%
110.135 PHPV/ PTVL	88	0.1%	4	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	120	0.1%	12	0.3%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	1,036	0.6%	32	0.8%	8	0.6%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	468	0.3%	12	0.3%	4	0.3%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	80	0.0%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	36	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2,300	1.3%	12	0.3%	0	0.0%
120.400 RETINAL HEMORRHAGE	12	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	108	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	16	0.0%	8	0.2%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	456	0.3%	8	0.2%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	768	0.4%	16	0.4%	4	0.3%
130.150 OPTIC DISC COLOBOMA	192	0.1%	8	0.2%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1,732	1.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	3,496	2.0%	4	0.1%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	836	0.5%	212	5.2%	32	2.4%
NORMAL						
.000 NORMAL GLOBE	140,408	81.8%	3,140	77.2%	1,024	75.5%

PORCELAINE HOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PORCELAINE HOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
PORCELAINE HOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	3		39		7	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	2.6%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	3	100.0%	38	97.4%	7	100.0%

PORTUGUESE PODENGO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PORTUGUESE PODENGO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
PORTUGUESE PODENGO

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	49		6		2	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
20.140 ECTOPIC CILIA	1	2.0%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	1	2.0%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3	6.1%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	4.1%	0	0.0%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	2.0%	0	0.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	1	16.7%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	16.7%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***2.0%***	***2***	***33.3%***	***0***	***0.0%***
VITREOUS						
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	2.0%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	1	2.0%	0	0.0%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	2	33.3%	0	0.0%
120.960 RETINOPATHY	1	2.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1	2.0%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	4.1%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	43	87.8%	3	50.0%	2	100.0%

PORTUGUESE PODENGO PEQUENO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Retinal atrophy - rod-cone dysplasia type 3 (*rcd3*)	Autosomal recessive	1	NO	Mutation in the *PDE6A* gene
E.	Retinal atrophy (*prcd*)	Autosomal recessive	2	NO	Mutation in the *prcd* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataracts

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal atrophy - rod-cone dysplasia type 3 (*rcd3*)

PRA in the Protuguese Podengo Pequeno is an autosomal recessive trait caused by a one base pair deletion in the gene encoding the alpha subunit of cyclic GMP phosphodiesterase (rcd3). PRA begins early in life with clinical signs of night blindness and a lack of rod ERG responses is seen at 6-8 weeks of age. Dogs are completely blind by 2-3 years of age when ophthalmoscopic signs are first visible. The mutation is found in the *PDE6A* gene. A DNA test is available.

E. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Other forms of retinal degeneration that are not *prcd* are recognized in the Portuguese Podengo Pequeno. The currently available genetic test will not detect these other forms of PRA.

References

1. ACVO Genetics Committee and Data from OFA All-Breeds Report.

2. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

3. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
PORTUGUESE PODENGO PEQUENO

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	158		244		24	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
20.140 ECTOPIC CILIA	0	0.0%	1	0.4%	0	0.0%
25.110 DISTICHIASIS	8	5.1%	13	5.3%	2	8.3%
CORNEA						
70.700 CORNEAL DYSTROPHY	0	0.0%	4	1.6%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	8	5.1%	15	6.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.6%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	0.4%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	6	3.8%	10	4.1%	1	4.2%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	2	1.3%	2	0.8%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.4%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	2	1.3%	6	2.5%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.6%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.6%	1	0.4%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	1	0.6%	1	0.4%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	0.6%	0	0.0%	1	4.2%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.6%	4	1.6%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	2	1.3%	1	0.4%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.4%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	2	0.8%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	0	0.0%	5	2.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	1	0.6%	0	0.0%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.4%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.6%	2	0.8%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	1	0.6%	0	0.0%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.6%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	2	1.3%	1	0.4%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***15***	***9.5%***	***27***	***11.1%***	***1***	***4.2%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.6%	1	0.4%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	1.3%	4	1.6%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	8	5.1%	4	1.6%	0	0.0%
RETINA						
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	0.4%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	1.3%	3	1.2%	0	0.0%
120.960 RETINOPATHY	2	1.3%	1	0.4%	0	0.0%
OTHER						
900.100 OTHER, NOT INHERITED	0	0.0%	1	0.4%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	2.5%	10	4.1%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	121	76.6%	179	73.4%	21	87.5%

PORTUGUESE POINTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PORTUGUESE POINTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
PORTUGUESE POINTER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	11		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS						
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	1	9.1%	0		0	
100.316 INCIPIENT CATARACT, NUCLEUS	1	9.1%	0		0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2***	***18.2%***	***0***		***0***	
NORMAL						
.000 NORMAL GLOBE	9	81.8%	0		0	

PORTUGUESE WATER DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmia with multiple ocular defects	Autosomal recessive	1-3	NO	Mutation is not yet published
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1 1	Breeder option Passes with no notation	
E.	Cataract	Not defined	1	NO	
F.	Retinal atrophy - early onset - *prcd*	Autosomal recessive Autosomal recessive	4 5, 6	NO NO	Mutation in the *CCDC66* gene Mutation in the *prcd* gene
G.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Microphthalmia with multiple congenital ocular defects

This is a congenital abnormality present bilaterally and characterized by a small globe and associated ocular defects which can affect the cornea, anterior chamber, lens and/or retina. These associated defects may be variable in severity. Several cases have been identified, all of which appeared to have a common ancestry. All affected animals so far identified have been the progeny of dogs that were phenotypically normal, suggesting that the defect is not dominantly inherited.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not

been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Portuguese Water Dog is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

A second, earlier onset form of PRA has also been identified recently in the Portuguese Water Dog. The onset of visual deficits occurs at 2-3 years of age, and, dogs show advanced retinal degeneration at the time visual deficits are recognized. The condition appears inherited as autosomal recessive. A DNA test is available.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Case records (1986-1994), Section of Medical Genetics, School of Veterinary Medicine, University of Pennsylvania.

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OCULAR DISORDERS REPORT
PORTUGUESE WATER DOG

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	28,983		8,691		1,623	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	15	0.1%	18	0.2%	0	0.0%
10.000	GLAUCOMA	6	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	3	0.0%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	53	0.2%	17	0.2%	4	0.2%
22.000	ECTROPION, UNSPECIFIED	3	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	1,066	3.7%	280	3.2%	44	2.7%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	2	0.0%	1	0.1%
40.910	KERATOCONJUNCTIVITIS SICCA	6	0.0%	5	0.1%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	0	0.0%	1	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	4	0.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	4	0.0%	3	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	189	0.7%	140	1.6%	13	0.8%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.0%	3	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	2	0.0%	2	0.0%	3	0.2%
93.120	IRIS CYST	10	0.0%	2	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	2	0.0%	0	0.0%	0	0.0%
93.180	IIRIS SPHINCTER DYSPLASIA	0	0.0%	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1,755	6.1%	708	8.1%	109	6.7%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	39	0.1%	14	0.2%	7	0.4%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	32	0.1%	4	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	43	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	33	0.1%	54	0.6%	10	0.6%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	8	0.0%	4	0.0%	2	0.1%
93.810	UVEAL MELANOMA	6	0.0%	1	0.0%	1	0.1%
95.120	CILIARY BODY CYST	1	0.0%	0	0.0%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	2	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	69	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1,901	6.6%	565	6.5%	102	6.3%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	412	1.4%	375	4.3%	58	3.6%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	91	0.3%	69	0.8%	9	0.6%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	76	0.3%	35	0.4%	4	0.2%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	48	0.2%	15	0.2%	10	0.6%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	71	0.2%	57	0.7%	4	0.2%
100.306	PUNCTATE CATARACT, NUCLEUS	23	0.1%	19	0.2%	1	0.1%
100.307	PUNCTATE CATARACT, CAPSULAR	62	0.2%	74	0.9%	14	0.9%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	114	0.4%	52	0.6%	12	0.7%

OCULAR DISORDERS REPORT
PORTUGUESE WATER DOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	28,983		8,691		1,623	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	89	0.3%	28	0.3%	2	0.1%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	86	0.3%	43	0.5%	5	0.3%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	13	0.0%	2	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	18	0.1%	5	0.1%	2	0.1%
100.316 INCIPIENT CATARACT, NUCLEUS	22	0.1%	9	0.1%	1	0.1%
100.317 INCIPIENT CATARACT, CAPSULAR	22	0.1%	14	0.2%	5	0.3%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	7	0.0%	13	0.1%	3	0.2%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	9	0.0%	9	0.1%	1	0.1%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	8	0.1%	1	0.1%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	2	0.0%	1	0.1%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	39	0.1%	60	0.7%	20	1.2%
100.330 GENERALIZED/ COMPLETE CATARACT	70	0.2%	12	0.1%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.0%	2	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	11	0.0%	3	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,346***	***4.6%***	***904***	***10.4%***	***153***	***9.4%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	43	0.1%	20	0.2%	1	0.1%
110.135 PHPV/ PTVL	16	0.1%	3	0.0%	1	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	6	0.0%	6	0.1%	1	0.1%
110.320 VITREOUS DEGENERATION SYNERESIS	40	0.1%	7	0.1%	4	0.2%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	224	0.8%	92	1.1%	11	0.7%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	19	0.1%	1	0.0%	2	0.1%
120.190 RETINAL DYSPLASIA, DETACHED	2	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	173	0.6%	5	0.1%	0	0.0%
120.400 RETINAL HEMORRHAGE	8	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	2	0.0%	1	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.0%	5	0.1%	1	0.1%
OPTIC NERVE						
130.110 MICROPAPILLA	14	0.0%	6	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	11	0.0%	1	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	6	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	313	1.1%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	535	1.8%	5	0.1%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	279	1.0%	311	3.6%	51	3.1%
NORMAL						
.000 NORMAL GLOBE	24,403	84.2%	6,543	75.3%	1,283	79.1%

PUDELPOINTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PUDELPOINTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
PUDELPOINTER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	3		5		1	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	33.3%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	2	66.7%	5	100.0%	1	100.0%

PUG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Distichiasis	Not defined	1	Breeder option
C.	Pigmentary Keratitis/Pigmentary Keratopathy	Not defined	1-3	Breeder option
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
E.	Cataract	Not defined	1, 4	NO
F.	Vitreous degeneration	Not defined	1	Breeder option

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. In the Pug, entropion usually involves the medial canthal margin of the lower eyelid(s).

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Exposure/pigmentary keratitis/pigmentary keratopathy

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

The breed standard indicates the Pug should have a "large massive round head with very large, bold and prominent eyes." These characteristics give rise to the ocular exposure and irritative problems common in the breed.

Pigmentary keratopathy is a condition reported in Pugs in which the cornea becomes pigmented, often resulting in vision impairment. Development of pigmentary keratopathy is associated in some studies with low tear production (STT) and medial eyelid entropion.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally in the neonatal period. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Labelle AL, Dresser CB, Hamor RE, et al. Characteristics of, prevalence of, and risk factors for corneal pigmentation (pigmentary keratopathy) in Pugs. *J Am Vet Med Assoc*. 2013;243:667-674.

3. Maini, S., et al. (2019). "Pigmentary keratitis in pugs in the United Kingdom: prevalence and associated features." BMC Vet Res **15**(1): 384. PMID: 31666065

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OCULAR DISORDERS REPORT
PUG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2,574		728		242	
Diagnostic Name	#	%	#	%	#	%
GLOBE						
.110 MICROPHTHALMIA	3	0.1%	0	0.0%	0	0.0%
EYELIDS						
20.110 EYELID DERMOID	1	0.0%	0	0.0%	0	0.0%
20.140 ECTOPIC CILIA	14	0.5%	1	0.1%	1	0.4%
20.160 MACROPALPEBRAL FISSURE	67	2.6%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	482	18.7%	110	15.1%	26	10.7%
22.000 ECTROPION, UNSPECIFIED	11	0.4%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	228	8.9%	50	6.9%	14	5.8%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	1	0.1%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA	7	0.3%	2	0.3%	0	0.0%
NICTITANS						
50.210 PLASMOMA/ ATYPICAL PANNUS	1	0.0%	0	0.0%	0	0.0%
CORNEA						
70.210 PANNUS	80	3.1%	0	0.0%	0	0.0%
70.220 PIGMENTARY KERATITIS	789	30.7%	365	50.1%	89	36.8%
70.700 CORNEAL DYSTROPHY	14	0.5%	1	0.1%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	4	0.2%	0	0.0%	0	0.0%
UVEA						
90.250 PIGMENTARY UVEITIS	0	0.0%	1	0.1%	0	0.0%
93.120 IRIS CYST	1	0.0%	0	0.0%	0	0.0%
93.150 IRIS COLOBOMA	2	0.1%	1	0.1%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	1	0.0%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	265	10.3%	91	12.5%	27	11.2%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	8	0.3%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	16	0.6%	1	0.1%	1	0.4%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	0.1%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	6	0.2%	3	0.4%	1	0.4%
FUNDUS						
97.120 COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	4	0.2%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	52	2.0%	15	2.1%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	9	0.3%	5	0.7%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	5	0.2%	3	0.4%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	6	0.2%	0	0.0%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	8	0.3%	2	0.3%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	8	0.3%	3	0.4%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	4	0.2%	4	0.5%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	18	0.7%	4	0.5%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	16	0.6%	4	0.5%	1	0.4%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	8	0.3%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	8	0.3%	1	0.1%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	4	0.2%	0	0.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	7	0.3%	0	0.0%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	3	0.1%	1	0.1%	0	0.0%

OCULAR DISORDERS REPORT
PUG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,574 #	 %	Year Examined: 2016-2020 Total # Dogs: 728 #	 %	Year Examined: 2021 Total # Dogs: 242 #	 %
LENS Continued						
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.1%	0	0.0%	0	0.0%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.1%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	1	0.1%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	0.1%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	13	0.5%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***128***	***5.0%***	***30***	***4.1%***	***1***	***0.4%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	13	0.5%	3	0.4%	1	0.4%
110.135 PHPV/ PTVL	3	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.2%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	25	1.0%	2	0.3%	3	1.2%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	19	0.7%	2	0.3%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	11	0.4%	1	0.1%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	3	0.1%	0	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	36	1.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	162	6.3%	7	1.0%	1	0.4%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	90	3.5%	37	5.1%	14	5.8%
NORMAL						
.000 NORMAL GLOBE	1,056	41.0%	235	32.3%	116	47.9%

PULI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Lens luxation	Autosomal recessive	2, 3	NO	Mutation in the *ADAMTS17* gene
D.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 2, 4	NO	Mutation in the *prcd* gene
E.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation may result in blinding retinal detachment and/or elevated intraocular pressure (glaucoma) causing vision impairment, pain, and blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

D. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Puli is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384.

4. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

OCULAR DISORDERS REPORT
PULI

	Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,084 #	 %	2016-2020 169 #	 %	2021 35 #	 %
EYELIDS							
20.110	EYELID DERMOID	1	0.1%	0	0.0%	0	0.0%
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	1	0.1%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	8	0.7%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	7	0.6%	0	0.0%	0	0.0%
CORNEA							
70.220	PIGMENTARY KERATITIS	5	0.5%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	18	1.7%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.1%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	1	0.1%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	244	22.5%	36	21.3%	3	8.6%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	14	1.3%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	8	0.7%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	5	0.5%	3	1.8%	3	8.6%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	3	0.3%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	63	5.8%	6	3.6%	2	5.7%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	6	0.6%	6	3.6%	1	2.9%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	3	0.3%	2	1.2%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.6%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	9	0.8%	3	1.8%	2	5.7%
100.306	PUNCTATE CATARACT, NUCLEUS	4	0.4%	1	0.6%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	4	0.4%	0	0.0%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	8	0.7%	5	3.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	4	0.4%	2	1.2%	1	2.9%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	7	0.6%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	3	0.3%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.1%	0	0.0%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.6%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	3	1.8%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	2.9%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	3	1.8%	1	2.9%
100.330	GENERALIZED/ COMPLETE CATARACT	7	0.6%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***60***	***5.5%***	***27***	***16.0%***	***6***	***17.1%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.2%	0	0.0%	1	2.9%
110.135	PHPV/ PTVL	1	0.1%	0	0.0%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.6%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	1	0.1%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	45	4.2%	6	3.6%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	3	0.3%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	4	0.4%	0	0.0%	0	0.0%
120.400	RETINAL HEMORRHAGE	1	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
PULI

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,084 #	 %	Year Examined: 2016-2020 Total # Dogs: 169 #	 %	Year Examined: 2021 Total # Dogs: 35 #	 %
RETINA Continued						
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.2%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	2	0.2%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	3	0.3%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	13	1.2%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	46	4.2%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	0.6%	5	3.0%	1	2.9%
NORMAL						
.000 NORMAL GLOBE	735	67.8%	108	63.9%	25	71.4%

PUMI

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PUMI breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
PUMI

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 81 #	 %	Year Examined: 2016-2020 Total # Dogs: 66 #	 %	Year Examined: 2021 Total # Dogs: 13 #	 %
CORNEA						
70.700 CORNEAL DYSTROPHY	0	0.0%	1	1.5%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3	3.7%	4	6.1%	2	15.4%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	2.5%	2	3.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	4.9%	2	3.0%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	1.2%	0	0.0%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	3	4.5%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	1	1.2%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2***	***2.5%***	***3***	***4.5%***	***0***	***0.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	1.2%	1	1.5%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	0	0.0%	1	1.5%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	1	1.2%	1	1.5%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1	1.2%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	1.2%	2	3.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	78	96.3%	54	81.8%	11	84.6%

PYRENEAN MASTIFF

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PYRENEAN MASTIFF breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
PYRENEAN MASTIFF

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	3		13		5	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	1	33.3%	0	0.0%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	2	66.7%	1	7.7%	0	0.0%
25.110 DISTICHIASIS	1	33.3%	1	7.7%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	6	46.2%	1	20.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	15.4%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	0	0.0%	3	23.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***3***	***23.1%***	***0***	***0.0%***
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	7.7%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	0	0.0%	4	30.8%	4	80.0%

PYRENEAN SHEPHERD

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO
C.	Choroidal hypoplasia	Not defined	1	NO
D.	Retinal dysplasia – folds	Not defined	1	Breeder option

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Choroidal hypoplasia

Inadequate development of the choroid present at birth and non-progressive. This condition is more commonly identified in the Collie breed where it is a manifestation of "Collie Eye Anomaly."

D. Retinal dysplasia – folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and,

in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
PYRENEAN SHEPHERD

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	421		280		43	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
.110 MICROPHTHALMIA	0	0.0%	2	0.7%	0	0.0%
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	0	0.0%	1	0.4%	0	0.0%
25.110 DISTICHIASIS	0	0.0%	2	0.7%	0	0.0%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.2%	1	0.4%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.2%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	1	0.2%	2	0.7%	1	2.3%
UVEA						
93.110 IRIS HYPOPLASIA	1	0.2%	2	0.7%	0	0.0%
93.150 IRIS COLOBOMA	1	0.2%	1	0.4%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	26	6.2%	6	2.1%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.2%	0	0.0%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	17	4.0%	6	2.1%	1	2.3%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	12	2.9%	4	1.4%	1	2.3%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	4	1.0%	1	0.4%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.2%	1	0.4%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.2%	0	0.0%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.2%	3	1.1%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	5	1.2%	2	0.7%	1	2.3%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.2%	1	0.4%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.5%	1	0.4%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	4	1.0%	4	1.4%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.7%	2	0.7%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	0	0.0%	1	2.3%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.2%	1	0.4%	1	2.3%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	0.4%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.2%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***25***	***5.9%***	***17***	***6.1%***	***3***	***7.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	4	1.0%	2	0.7%	2	4.7%
110.135 PHPV/ PTVL	0	0.0%	4	1.4%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	1	0.2%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	9	2.1%	6	2.1%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	0.2%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.2%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.4%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	2	0.7%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	0	0.0%	1	0.4%	0	0.0%

OCULAR DISORDERS REPORT
PYRENEAN SHEPHERD

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 421 #	 %	2016-2020 280 #	 %	2021 43 #	 %
OTHER						
900.000 OTHER, UNSPECIFIED	9	2.1%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	11	2.6%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	1.0%	16	5.7%	2	4.7%
NORMAL						
.000 NORMAL GLOBE	351	83.4%	225	80.4%	37	86.0%

RAT TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1, 2	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci*. 2010;51:4716-4721.

2. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384.

OCULAR DISORDERS REPORT
RAT TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 278 #	 %	2016-2020 70 #	 %	2021 22 #	 %
EYELIDS						
25.110 DISTICHIASIS	4	1.4%	2	2.9%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	11	4.0%	2	2.9%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.4%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.7%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	5	1.8%	0	0.0%	1	4.5%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.4%	0	0.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.7%	0	0.0%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	1	0.4%	0	0.0%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	3	1.1%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	3	1.1%	0	0.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.7%	0	0.0%	1	4.5%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.4%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	1	0.4%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.4%	0	0.0%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	5	1.8%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	6	2.2%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***20***	***7.2%***	***0***	***0.0%***	***1***	***4.5%***
VITREOUS						
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.7%	1	1.4%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	3	1.1%	0	0.0%	0	0.0%
RETINA						
120.190 RETINAL DYSPLASIA, DETACHED	2	0.7%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.4%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	3	1.1%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.4%	2	2.9%	1	4.5%
NORMAL						
.000 NORMAL GLOBE	245	88.1%	63	90.0%	20	90.9%

REDBONE COONHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the REDBONE COONHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
REDBONE COONHOUND

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 21 #	 %	Year Examined: 2016-2020 Total # Dogs: 38 #	 %	Year Examined: 2021 Total # Dogs: 6 #	 %
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	0	0.0%	2	5.3%	0	0.0%
25.110 DISTICHIASIS	0	0.0%	1	2.6%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	0	0.0%	1	2.6%	0	0.0%
UVEA						
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	4.8%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	5.3%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	1	2.6%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	2.6%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***2***	***5.3%***	***0***	***0.0%***
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	0	0.0%	1	2.6%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	4.8%	0	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	1	2.6%	0	0.0%
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	4.8%	1	2.6%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	19	90.5%	30	78.9%	6	100.0%

RHODESIAN RIDGEBACK

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Entropion	Not defined	2	NO
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Y-suture tip opacity	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

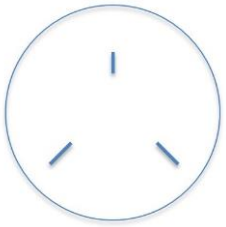
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Breed club request to ACVO Genetics Committee, 2008.

OCULAR DISORDERS REPORT
RHODESIAN RIDGEBACK

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	4,444		1,476		338	
Diagnostic Name	#	%	#	%	#	%
GLOBE						
.110 MICROPHTHALMIA	2	0.0%	0	0.0%	0	0.0%
EYELIDS						
20.140 ECTOPIC CILIA	0	0.0%	1	0.1%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	15	0.3%	2	0.1%	1	0.3%
22.000 ECTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	129	2.9%	31	2.1%	10	3.0%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	5	0.1%	1	0.1%	1	0.3%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	3	0.1%	0	0.0%	0	0.0%
CORNEA						
70.210 PANNUS	6	0.1%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	24	0.5%	9	0.6%	3	0.9%
UVEA						
93.110 IRIS HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
93.120 IRIS CYST	5	0.1%	1	0.1%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	4	0.1%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	267	6.0%	76	5.1%	14	4.1%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	6	0.1%	1	0.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.0%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	63	1.4%	51	3.5%	22	6.5%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	5	0.1%	0	0.0%	0	0.0%
93.810 UVEAL MELANOMA	2	0.0%	1	0.1%	0	0.0%
97.150 CHORIORETINAL COLOBOMA, CONGENITAL	1	0.0%	1	0.1%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	4	0.1%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	215	4.8%	52	3.5%	7	2.1%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	17	0.4%	8	0.5%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	50	1.1%	19	1.3%	2	0.6%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	6	0.1%	2	0.1%	1	0.3%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.0%	4	0.3%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	41	0.9%	14	0.9%	2	0.6%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	2	0.1%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	22	0.5%	20	1.4%	3	0.9%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	6	0.1%	6	0.4%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	82	1.8%	24	1.6%	4	1.2%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	11	0.2%	4	0.3%	3	0.9%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	14	0.3%	6	0.4%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	5	0.1%	1	0.1%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	20	0.5%	8	0.5%	1	0.3%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.1%	2	0.6%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	6	0.4%	2	0.6%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	0	0.0%	1	0.3%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	1	0.1%	1	0.3%
100.328 Y-SUTURE TIP OPACITIES	17	0.4%	18	1.2%	2	0.6%
100.330 GENERALIZED/ COMPLETE CATARACT	3	0.1%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
RHODESIAN RIDGEBACK

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	4,444		1,476		338	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***302***	***6.8%***	***144***	***9.8%***	***24***	***7.1%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	2	0.0%	8	0.5%	2	0.6%
110.135 PHPV/ PTVL	1	0.0%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	6	0.1%	4	0.3%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	6	0.1%	3	0.2%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	6	0.1%	4	0.3%	1	0.3%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	0.0%	1	0.1%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	4	0.1%	3	0.2%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.0%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	5	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	51	1.1%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	90	2.0%	3	0.2%	1	0.3%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	45	1.0%	37	2.5%	9	2.7%
NORMAL						
.000 NORMAL GLOBE	3,716	83.6%	1,165	78.9%	263	77.8%

ROTTWEILER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Uveal cysts	Not defined	1	Breeder option
B.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation
C.	Cataract	Not defined	1	NO
D.	Retinal atrophy - generalized	Not defined	1, 2	NO

Description and Comments

A. Uveal cysts

A pigmented, fluid-filled epithelial-lined structure arising from the posterior iris or ciliary body epithelium. Cysts may remain attached to the pupil margin, iris, or ciliary body, or may detach and be free-floating within the anterior chamber. They may rupture and adhere to the cornea or anterior lens capsule. Uveal cysts may occur in any breed. Uveal cysts are commonly benign, although they may be associated with other pathologic conditions is various breeds.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

A variety of cataracts have been observed in this breed ranging from the posterior polar cataract similar to that in the Golden Retriever and cataracts involving multiple areas of the

nucleus and cortex. Further studies need to be performed as to the exact mode of inheritance, but it is our recommendation that the individually afflicted dog should not be bred.

D. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Bjerkas E. Progressive retinal atrophy in dogs in Norway. *Norsk Veterinaertidsskrift.* 1991;103:601-610.

OCULAR DISORDERS REPORT
ROTTWEILER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	14,731		3,035		634	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
.110 MICROPHTHALMIA	3	0.0%	0	0.0%	0	0.0%
EYELIDS						
20.140 ECTOPIC CILIA	1	0.0%	0	0.0%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	10	0.1%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	115	0.8%	24	0.8%	6	0.9%
22.000 ECTROPION, UNSPECIFIED	29	0.2%	2	0.1%	1	0.2%
25.110 DISTICHIASIS	85	0.6%	20	0.7%	1	0.2%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	1	0.0%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA	3	0.0%	0	0.0%	0	0.0%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	4	0.0%	0	0.0%	0	0.0%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	15	0.1%	2	0.1%	0	0.0%
CORNEA						
70.210 PANNUS	3	0.0%	0	0.0%	0	0.0%
70.220 PIGMENTARY KERATITIS	2	0.0%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	135	0.9%	28	0.9%	5	0.8%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	7	0.0%	0	0.0%	0	0.0%
UVEA						
93.110 IRIS HYPOPLASIA	11	0.1%	4	0.1%	1	0.2%
93.120 IRIS CYST	232	1.6%	63	2.1%	20	3.2%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.150 IRIS COLOBOMA	51	0.3%	10	0.3%	2	0.3%
93.170 ANTERIOR CHAMBER CYST	18	0.1%	45	1.5%	9	1.4%
93.180 IIRIS SPHINCTER DYSPLASIA	0	0.0%	0	0.0%	1	0.2%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	119	0.8%	22	0.7%	5	0.8%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	38	0.3%	5	0.2%	1	0.2%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	51	0.3%	11	0.4%	2	0.3%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	8	0.1%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	113	0.8%	152	5.0%	27	4.3%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	10	0.1%	7	0.2%	1	0.2%
93.810 UVEAL MELANOMA	3	0.0%	1	0.0%	1	0.2%
95.120 CILIARY BODY CYST	14	0.1%	10	0.3%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	229	1.6%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	877	6.0%	204	6.7%	39	6.2%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	157	1.1%	159	5.2%	32	5.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	281	1.9%	55	1.8%	6	0.9%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	10	0.1%	6	0.2%	1	0.2%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	23	0.2%	11	0.4%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	87	0.6%	18	0.6%	1	0.2%
100.306 PUNCTATE CATARACT, NUCLEUS	36	0.2%	22	0.7%	6	0.9%
100.307 PUNCTATE CATARACT, CAPSULAR	72	0.5%	54	1.8%	9	1.4%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	109	0.7%	40	1.3%	11	1.7%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	518	3.5%	97	3.2%	20	3.2%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	37	0.3%	9	0.3%	2	0.3%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	12	0.1%	3	0.1%	0	0.0%

OCULAR DISORDERS REPORT
ROTTWEILER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 14,731 #	 %	2016-2020 3,035 #	 %	2021 634 #	 %
LENS Continued						
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	73	0.5%	16	0.5%	5	0.8%
100.316 INCIPIENT CATARACT, NUCLEUS	57	0.4%	9	0.3%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	45	0.3%	12	0.4%	8	1.3%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.0%	5	0.2%	2	0.3%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	6	0.0%	10	0.3%	3	0.5%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	0	0.0%	1	0.2%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	2	0.1%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	3	0.1%	1	0.2%
100.327 INCOMPLETE CATARACT, CAPSULAR	3	0.0%	2	0.1%	1	0.2%
100.328 Y-SUTURE TIP OPACITIES	8	0.1%	24	0.8%	3	0.5%
100.330 GENERALIZED/ COMPLETE CATARACT	48	0.3%	2	0.1%	1	0.2%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,815***	***12.3%***	***559***	***18.4%***	***113***	***17.8%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	21	0.1%	12	0.4%	2	0.3%
110.135 PHPV/ PTVL	7	0.0%	1	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	11	0.1%	4	0.1%	2	0.3%
110.320 VITREOUS DEGENERATION SYNERESIS	57	0.4%	7	0.2%	3	0.5%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	124	0.8%	27	0.9%	4	0.6%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	43	0.3%	11	0.4%	3	0.5%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.0%	1	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	174	1.2%	9	0.3%	1	0.2%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	0	0.0%	1	0.2%
120.960 RETINOPATHY	16	0.1%	14	0.5%	3	0.5%
OPTIC NERVE						
130.110 MICROPAPILLA	15	0.1%	4	0.1%	1	0.2%
130.120 OPTIC NERVE HYPOPLASIA	17	0.1%	1	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	2	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	137	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	330	2.2%	11	0.4%	1	0.2%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	227	1.5%	165	5.4%	35	5.5%
NORMAL						
.000 NORMAL GLOBE	11,726	79.6%	2,091	68.9%	429	67.7%

RUSSELL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	2	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing

vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011; 14: 378-384.

OCULAR DISORDERS REPORT
RUSSELL TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 268 #	 %	2016-2020 290 #	 %	2021 48 #	 %
EYELIDS						
25.110 DISTICHIASIS	10	3.7%	9	3.1%	1	2.1%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	1	0.3%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA	1	0.4%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	0	0.0%	1	0.3%	0	0.0%
UVEA						
93.120 IRIS CYST	1	0.4%	0	0.0%	0	0.0%
93.150 IRIS COLOBOMA	1	0.4%	0	0.0%	0	0.0%
93.180 IIRIS SPHINCTER DYSPLASIA	1	0.4%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	10	3.7%	20	6.9%	3	6.3%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	0.3%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.4%	1	0.3%	1	2.1%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	8	3.0%	23	7.9%	2	4.2%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	7	2.6%	7	2.4%	1	2.1%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.4%	1	0.3%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.4%	1	0.3%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.4%	8	2.8%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	4	1.4%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	3	1.0%	1	2.1%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	0	0.0%	1	2.1%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	0	0.0%	1	2.1%
100.317 INCIPIENT CATARACT, CAPSULAR	0	0.0%	1	0.3%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.3%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.7%	2	0.7%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.3%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.3%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	0.3%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***12***	***4.5%***	***31***	***10.7%***	***4***	***8.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	2	0.7%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	2	0.7%	1	0.3%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	0.4%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.4%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.4%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	2	0.7%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	2.6%	15	5.2%	2	4.2%
NORMAL						
.000 NORMAL GLOBE	230	85.8%	224	77.2%	40	83.3%

RUSSIAN TOY

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
RUSSIAN TOY

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	52		53		23	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	1	1.9%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	1	1.9%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	1.9%	5	9.4%	3	13.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	1.9%	8	15.1%	3	13.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	1.9%	0	0.0%	0	0.0%
97.150 CHORIORETINAL COLOBOMA, CONGENITAL	1	1.9%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	1.9%	2	3.8%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	3	5.8%	0	0.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	1.9%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	2	3.8%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	2	3.8%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	1.9%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***4***	***7.7%***	***5***	***9.4%***	***0***	***0.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	1.9%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	5.8%	1	1.9%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	1	1.9%	2	3.8%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	0	0.0%	0	0.0%	1	4.3%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	1.9%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	0	0.0%	1	1.9%	0	0.0%
120.960 RETINOPATHY	1	1.9%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	2	3.8%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	5.8%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	41	78.8%	37	69.8%	17	73.9%

Russian Tsvetnaya Bolonka
(Bolonka Zwetna)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
RUSSIAN TSVETNAYA BOLONKA

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	90		37		1	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	1	1.1%	0	0.0%	0	0.0%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	1	1.1%	0	0.0%	0	0.0%
CORNEA							
70.220	PIGMENTARY KERATITIS	2	2.2%	0	0.0%	0	0.0%
UVEA							
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	1.1%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	4.4%	1	2.7%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	3	8.1%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	2.2%	1	2.7%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	1	1.1%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	1.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	3	8.1%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	1	2.7%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	1.1%	5	13.5%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	1.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***5***	***5.6%***	***13***	***35.1%***	***0***	***0.0%***
VITREOUS							
110.135	PHPV/ PTVL	1	1.1%	0	0.0%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	7	7.8%	2	5.4%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	5	5.6%	3	8.1%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	1	1.1%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	2	2.2%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	5	13.5%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	77	85.6%	21	56.8%	1	100.0%

RUSSO-EUROPEAN LAIKA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 2	NO	Mutation in the *prcd* gene
B.	Glaucoma – POAG	Presumed autosomal recessive	2	NO	Mutation in the *ADAMTS10* gene

Description and Comments

A. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Russo-European Laika is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

B. Glaucoma

Glaucoma is an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

Primary open angle glaucoma is present in the breed, and extensive breeding studies have demonstrated its inheritance as autosomal recessive. By one year of age, the intraocular pressure (IOP) is elevated, but the filtration angle is open (early glaucoma). Animals with moderate glaucoma show sustained elevations of IOP, focal disinsertions of the lens zonules and focal closures of the iridocorneal angle. Later the globe enlarges,

the lens luxates and the eyes become blind and show the effects of chronic glaucoma. The causative mutation in *ADAMTS10* causes an arginine for glycine substitution at position 661. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Russo-European Laika. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
RUSSO-EUROPEAN LAIKA

There are no statistics available for this breed

ST. BERNARD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Ectropion	Not defined	1	Breeder option
B.	Entropion	Not defined	1, 2	Breeder option
C.	Distichiasis	Not defined	1	Breeder option
D.	Persistent pupillary membrane - iris to iris	Not defined	1	Breeder option
E.	Cataract	Not defined	1	NO

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelids which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. In this breed, entropion is associated with an exceptionally large palpebral fissure.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest

threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Priester WA. Congenital ocular defects in cattle, horses, cats, and dogs. *J Am Vet Med Assoc*. 1972 Jun 1;160:1504-1511.

OCULAR DISORDERS REPORT
SAINT BERNARD

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	219		130		63	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
20.160 MACROPALPEBRAL FISSURE	21	9.6%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	47	21.5%	33	25.4%	22	34.9%
22.000 ECTROPION, UNSPECIFIED	73	33.3%	34	26.2%	14	22.2%
25.110 DISTICHIASIS	14	6.4%	5	3.8%	3	4.8%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	1	0.5%	0	0.0%	0	0.0%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.5%	0	0.0%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	0	0.0%	1	0.8%	0	0.0%
70.700 CORNEAL DYSTROPHY	2	0.9%	0	0.0%	0	0.0%
UVEA						
93.120 IRIS CYST	2	0.9%	0	0.0%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	1	0.5%	1	0.8%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	22	10.0%	13	10.0%	2	3.2%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	0.8%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	2	1.5%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	0	0.0%	1	0.8%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	12	5.5%	5	3.8%	5	7.9%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	4	3.1%	2	3.2%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.9%	1	0.8%	3	4.8%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.9%	0	0.0%	1	1.6%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.5%	0	0.0%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	2	0.9%	1	0.8%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	0.5%	0	0.0%	1	1.6%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	3	1.4%	2	1.5%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	4	1.8%	1	0.8%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	5	2.3%	1	0.8%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	5	2.3%	0	0.0%	1	1.6%
100.317 INCIPIENT CATARACT, CAPSULAR	0	0.0%	1	0.8%	1	1.6%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.5%	0	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.5%	0	0.0%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	1.6%
100.328 Y-SUTURE TIP OPACITIES	1	0.5%	0	0.0%	1	1.6%
100.330 GENERALIZED/ COMPLETE CATARACT	9	4.1%	0	0.0%	1	1.6%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***37***	***16.9%***	***11***	***8.5%***	***12***	***19.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	3	1.4%	0	0.0%	1	1.6%
110.135 PHPV/ PTVL	1	0.5%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	5	2.3%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.5%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.5%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	3	1.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	6	2.7%	4	3.1%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	10	4.6%	8	6.2%	0	0.0%

OCULAR DISORDERS REPORT
SAINT BERNARD

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	219		130		63	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	85	38.8%	60	46.2%	27	42.9%

SALUKI

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SALUKI breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SALUKI

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 273 #	 %	2016-2020 61 #	 %	2021 24 #	 %
EYELIDS						
25.110 DISTICHIASIS	1	0.4%	3	4.9%	1	4.2%
CORNEA						
70.700 CORNEAL DYSTROPHY	1	0.4%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	6	2.2%	3	4.9%	2	8.3%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	1.1%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.7%	0	0.0%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.4%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	16	5.9%	6	9.8%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.4%	1	1.6%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	3	1.1%	1	1.6%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.4%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.4%	1	1.6%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	2	3.3%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	2	0.7%	3	4.9%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.4%	1	1.6%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.7%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	1	0.4%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	1.6%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	2	0.7%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***14***	***5.1%***	***10***	***16.4%***	***0***	***0.0%***
VITREOUS						
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	6	2.2%	2	3.3%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	2	0.7%	0	0.0%	0	0.0%
RETINA						
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	0.7%	0	0.0%	0	0.0%
OPTIC NERVE						
130.150 OPTIC DISC COLOBOMA	1	0.4%	1	1.6%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1	0.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	5	1.8%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	1.6%	2	8.3%
NORMAL						
.000 NORMAL GLOBE	233	85.3%	49	80.3%	19	79.2%

SAMOYED

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma	Not defined	1-7	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Not defined	1, 8	Breeder option	
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Retinal atrophy (*RPGR)*	X-linked recessive	1, 9, 10	NO	Mutation in the *RPGR* gene
G.	Retinal dysplasia - folds	Presumed autosomal recessive	1	NO (Breeder option requires Normal genetic test for mutation in COL9A2 gene)	Mutation in the *COL9A2* gene
H.	Retinal dysplasia - folds/geographic/ detached (with skeletal defects)	Autosomal recessive with incomplete dominance for the eyes	1, 11-14	NO	Mutation in the *COL9A2* gene
I.	Uveodermatologic syndrome	Not defined	1, 15, 16	NO	

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Samoyed, many of the PPMs identified on routine screening examinations bridge from the iris to the cornea where they may be associated with corneal opacity and vision impairment.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal atrophy - *RPGR*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. In the Samoyed, one form of PRA, known as XLPRA1, is due to a mutation in the *RPGR* gene and is inherited as a recessive, sex-linked trait. A DNA test is available.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness.
In the Samoyed, the presence of retinal folds may be seen in the heterozygous state described in "I" below. Thus the recommendation against breeding. The breeding advice for

Labrador Retrievers and Samoyeds diagnosed with "retinal dysplasia - folds" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog showing that it is not a carrier of the *COL9A2* mutation.

H. Retinal dysplasia - folds with skeletal defects in homozygous affected dogs

This condition is also known as oculo-skeletal dysplasia (OSD) or dwarfism with retinal dysplasia type 2 (DRD2) in the Samoyed. A similar condition, DRD1, occurs in the Labrador Retriever. The condition is autosomal recessive and homozygous affected dogs have shortened forelimbs ("downhill" conformation) with valgus deformity. They have severe ocular defects including cataract, retinal folds/multifocal retinal dysplasia, vitreal degeneration and retinal detachment. The ocular abnormalities result in blindness in most dogs. Heterozygous dogs can have either a normal ocular exam or have multiple retinal folds, vitreal membranes, or vitreal degeneration suggesting a semi-dominant mechanism with respect to the eyes. It is important to note that generally the retinal folds present in heterozygous dogs tend to cluster around the major superior blood vessels of the central tapetal region. The condition is caused by a 1,267 bp deletion of *COL9A2.* A DNA test is available.

I. Uveodermatologic syndrome

Uveodermatologic syndrome in the Samoyed bears many similarities to a condition in people called Vogt-Koyanagi-Harada (or VKH) syndrome. Thus, the condition in dogs is often referred to as VKH or VKH-like syndrome. It is an immune-mediated disease in which pigmented cells (melanocytes) in the eye and in the skin are destroyed by white blood cells (lymphocytes). The first clinical signs are usually inflammation of the intraocular structures (or uveitis) in both eyes. Adhesions between the iris and lens (posterior synechiae) and the peripheral iris and cornea (peripheral anterior synechiae) develop rapidly. Other complications include cataract development, retinal degeneration, retinal separation or detachment, optic disc atrophy and secondary glaucoma. The uveitis is very difficult to control medically and ultimately results in blindness in most affected dogs. Whitening of the hair (poliosis) and skin (vitiligo) may also be noted in advanced cases. Some veterinary ophthalmologists feel there is a prevalence of this entity in the Samoyed. Additional studies are needed to validate this experience and explore the possibility of a genetic basis.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Ekesten B, Narfstrom K. Correlation of morphologic features of the iridocorneal angle to intraocular pressure in Samoyeds. *Am J Vet Res*. 1991;52:1875-1878.

3. Ekesten B, Narfstrom K. Age-related changes in intraocular presure and iridocorneal angle in Samoyeds. *Prog Vet Comp Ophthal*. 1992;2:37-40.

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OCULAR DISORDERS REPORT
SAMOYED

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	23,045		5,608		1,211	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	20	0.1%	3	0.1%	0	0.0%
10.000	GLAUCOMA	10	0.0%	1	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	7	0.0%	2	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	6	0.0%	0	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	3	0.0%	1	0.0%	0	0.0%
25.110	DISTICHIASIS	1,331	5.8%	230	4.1%	28	2.3%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	10	0.0%	15	0.3%	1	0.1%
40.910	KERATOCONJUNCTIVITIS SICCA	14	0.1%	3	0.1%	1	0.1%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	4	0.0%	1	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	4	0.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	1	0.0%	1	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	793	3.4%	237	4.2%	40	3.3%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	15	0.1%	2	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	9	0.0%	4	0.1%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.0%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	456	2.0%	130	2.3%	20	1.7%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	24	0.1%	9	0.2%	3	0.2%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	35	0.2%	8	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	16	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	10	0.0%	7	0.1%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	12	0.1%	2	0.0%	2	0.2%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	2	0.0%	0	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	3	0.1%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	4	0.0%	0	0.0%	0	0.0%
97.120	COLOBOMA	7	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	100	0.4%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	771	3.3%	159	2.8%	50	4.1%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	104	0.5%	90	1.6%	23	1.9%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	161	0.7%	37	0.7%	10	0.8%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	15	0.1%	3	0.1%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	9	0.0%	8	0.1%	4	0.3%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	64	0.3%	17	0.3%	3	0.2%
100.306	PUNCTATE CATARACT, NUCLEUS	31	0.1%	11	0.2%	1	0.1%
100.307	PUNCTATE CATARACT, CAPSULAR	58	0.3%	56	1.0%	14	1.2%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	78	0.3%	40	0.7%	6	0.5%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	252	1.1%	50	0.9%	6	0.5%

OCULAR DISORDERS REPORT
SAMOYED

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 23,045 #	 %	Year Examined: 2016-2020 Total # Dogs: 5,608 #	 %	Year Examined: 2021 Total # Dogs: 1,211 #	 %
LENS Continued						
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	27	0.1%	7	0.1%	2	0.2%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	7	0.0%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	53	0.2%	8	0.1%	1	0.1%
100.316 INCIPIENT CATARACT, NUCLEUS	37	0.2%	11	0.2%	6	0.5%
100.317 INCIPIENT CATARACT, CAPSULAR	33	0.1%	18	0.3%	2	0.2%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	2	0.0%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	9	0.0%	16	0.3%	2	0.2%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	2	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	2	0.0%	2	0.2%
100.327 INCOMPLETE CATARACT, CAPSULAR	3	0.0%	5	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	6	0.0%	18	0.3%	1	0.1%
100.330 GENERALIZED/ COMPLETE CATARACT	66	0.3%	0	0.0%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.0%	2	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.0%	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,117***	***4.8%***	***403***	***7.2%***	***83***	***6.9%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	22	0.1%	7	0.1%	4	0.3%
110.135 PHPV/ PTVL	11	0.0%	3	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	2	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	93	0.4%	8	0.1%	1	0.1%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	483	2.1%	83	1.5%	15	1.2%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	168	0.7%	48	0.9%	11	0.9%
120.190 RETINAL DYSPLASIA, DETACHED	26	0.1%	6	0.1%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	56	0.2%	0	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	2	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	10	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	2	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.0%	8	0.1%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	18	0.1%	1	0.0%	2	0.2%
130.120 OPTIC NERVE HYPOPLASIA	13	0.1%	2	0.0%	1	0.1%
130.150 OPTIC DISC COLOBOMA	70	0.3%	5	0.1%	1	0.1%
OTHER						
900.000 OTHER, UNSPECIFIED	176	0.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	447	1.9%	9	0.2%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	225	1.0%	203	3.6%	37	3.1%
NORMAL						
.000 NORMAL GLOBE	18,959	82.3%	4,435	79.1%	1,001	82.7%

SCHAPENDOES

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Cataract	Not defined	1	NO	
B.	Retinal atrophy (*CCDC66)*	Autosomal recessive	2, 3	NO	Mutation in the *CCDC66* gene

Description and Comments

A. A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Retinal atrophy - *CCDC66*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

In the Schapendoes the age of onset is between 2-5 years of age. The causal mutation is a single base pair insertion in exon 6 of the gene coiled-coil domain containing 66 (*CCDC66)* that leads to a stop codon. The mutation is inherited as an autosomal recessive trait. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Dekomien G, Vollrath C, Petrasch-Parwez E, et al. Progressive retinal atrophy in Schapendoes dogs: mutation of the newly identified CCDC66 gene. *Neurogenetics.* 2010 May;11:163-174.

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OCULAR DISORDERS REPORT
SCHAPENDOES

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	76		47		14	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	1	1.3%	1	2.1%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	0	0.0%	1	2.1%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	1	2.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	1.3%	1	2.1%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	3.9%	4	8.5%	2	14.3%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	2	2.6%	4	8.5%	1	7.1%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	2.1%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	0	0.0%	2	14.3%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	3	6.4%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	2	4.3%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	1.3%	1	2.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	1.3%	2	4.3%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***4***	***5.3%***	***13***	***27.7%***	***3***	***21.4%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	2.6%	1	2.1%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	1	1.3%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	0	0.0%	0	0.0%	2	14.3%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	1.3%	0	0.0%	0	0.0%
OTHER							
900.100	OTHER, NOT INHERITED	6	7.9%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	4.3%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	65	85.5%	30	63.8%	10	71.4%

SCHIPPERKE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Vitreous degeneration	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
SCHIPPERKE

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1,458		243		88	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
.110 MICROPHTHALMIA	1	0.1%	0	0.0%	0	0.0%
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	0	0.0%	0	0.0%	1	1.1%
25.110 DISTICHIASIS	46	3.2%	5	2.1%	3	3.4%
CORNEA						
70.210 PANNUS	1	0.1%	0	0.0%	0	0.0%
70.220 PIGMENTARY KERATITIS	0	0.0%	1	0.4%	0	0.0%
70.700 CORNEAL DYSTROPHY	3	0.2%	0	0.0%	1	1.1%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	2	0.1%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	126	8.6%	21	8.6%	6	6.8%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	6	0.4%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.1%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	10	0.7%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	7	0.5%	1	0.4%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	4	0.3%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	62	4.3%	13	5.3%	2	2.3%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	16	1.1%	8	3.3%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.1%	1	0.4%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	6	0.4%	0	0.0%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	1	0.4%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.1%	1	0.4%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	9	0.6%	5	2.1%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	0.4%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	21	1.4%	5	2.1%	1	1.1%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	10	0.7%	1	0.4%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	8	0.5%	2	0.8%	1	1.1%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.4%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	5	0.3%	2	0.8%	2	2.3%
100.317 INCIPIENT CATARACT, CAPSULAR	1	0.1%	1	0.4%	1	1.1%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	0	0.0%	1	1.1%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.4%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.1%	3	1.2%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	8	0.5%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***95***	***6.5%***	***33***	***13.6%***	***6***	***6.8%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.1%	0	0.0%	0	0.0%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	17	1.2%	5	2.1%	1	1.1%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	9	0.6%	2	0.8%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	4	0.3%	0	0.0%	1	1.1%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	16	1.1%	1	0.4%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.4%	0	0.0%
120.960 RETINOPATHY	2	0.1%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
SCHIPPERKE

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,458 #	 %	2016-2020 243 #	 %	2021 88 #	 %
OTHER						
900.000 OTHER, UNSPECIFIED	16	1.1%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	51	3.5%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	16	1.1%	18	7.4%	2	2.3%
NORMAL						
.000 NORMAL GLOBE	1,170	80.2%	184	75.7%	69	78.4%

SCOTTISH DEERHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SCOTTISH DEERHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SCOTTISH DEERHOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	14		11		3	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
.110 MICROPHTHALMIA	0	0.0%	1	9.1%	0	0.0%
EYELIDS						
25.110 DISTICHIASIS	3	21.4%	2	18.2%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3	21.4%	1	9.1%	2	66.7%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	9.1%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	0	0.0%	1	9.1%	0	0.0%
LENS						
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1	7.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***7.1%***	***0***	***0.0%***	***0***	***0.0%***
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	7.1%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	11	78.6%	8	72.7%	1	33.3%

SCOTTISH TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- iris to lens	Not defined	1	NO
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
	- endothelial opacity/no strands	Not defined	1	NO
B.	Cataract	Not defined	1	NO
C.	Ligneous conjunctivitis	Not defined	2	NO

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Ligneous conjunctivitis

A rare type of conjunctivitis characterized by the formation of thick membranes covering conjunctiva of the nictitans and eyelids of affected dogs. This condition has been diagnosed in four unrelated Doberman Pinschers, three of which had life-threatening systemic disease. Ligneous conjunctivitis has also been reported in one Yorkshire Terrier.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Mason SL, McElroy P, Nuttall T. Ligneous membranitis in Scottish Terriers. Vet Rec. 2012; 171: 160.

OCULAR DISORDERS REPORT
SCOTTISH TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 756 #	 %	2016-2020 196 #	 %	2021 46 #	 %
EYELIDS						
25.110 DISTICHIASIS	3	0.4%	0	0.0%	0	0.0%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	1	0.1%	0	0.0%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	2	0.3%	0	0.0%	0	0.0%
CORNEA						
70.210 PANNUS	1	0.1%	0	0.0%	0	0.0%
70.220 PIGMENTARY KERATITIS	2	0.3%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	5	0.7%	1	0.5%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	2	0.3%	0	0.0%	0	0.0%
UVEA						
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	3	0.4%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	227	30.0%	51	26.0%	13	28.3%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	38	5.0%	5	2.6%	3	6.5%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	9	1.2%	2	1.0%	1	2.2%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	3	0.4%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	57	7.5%	79	40.3%	5	10.9%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.5%	7	3.6%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	73	9.7%	10	5.1%	1	2.2%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	7	0.9%	2	1.0%	1	2.2%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.3%	0	0.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.3%	2	1.0%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.3%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.1%	4	2.0%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	4	0.5%	1	0.5%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	3	0.4%	2	1.0%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	6	0.8%	1	0.5%	1	2.2%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	5	0.7%	1	0.5%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	3	0.4%	0	0.0%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.1%	1	0.5%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	9	1.2%	0	0.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	2	0.3%	1	0.5%	1	2.2%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.5%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.5%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.5%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.5%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	2	1.0%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	4	0.5%	1	0.5%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***52***	***6.9%***	***22***	***11.2%***	***3***	***6.5%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	4	0.5%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
SCOTTISH TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 756 #	 %	2016-2020 196 #	 %	2021 46 #	 %
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	5	0.7%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	8	1.1%	0	0.0%	0	0.0%
OPTIC NERVE						
130.150 OPTIC DISC COLOBOMA	2	0.3%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	13	1.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	60	7.9%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	19	2.5%	9	4.6%	1	2.2%
NORMAL						
.000 NORMAL GLOBE	398	52.6%	75	38.3%	25	54.3%

SEALYHAM TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	1-5	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to

be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Formston C. Observations on subluxation and luxation of the crystalline lens in the dog. *J Comp Pathol*. 1945;55:168-186.

3. Hodgman SFJ. Abnormalities and defects in pedigree dogs: I. An investigation into the existence of abnormalities in pedigree dogs in British Isles. *J Small Anim Pract*. 1963;4:447-456.

4. Curtis R, Barnett KC. Primary lens luxation in the dog. *J Small Anim Pract*. 1980;21:657-668.

5. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384.

OCULAR DISORDERS REPORT
SEALYHAM TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	487		37		9	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	27	5.5%	1	2.7%	1	11.1%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.2%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	31	6.4%	6	16.2%	1	11.1%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.4%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.2%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.4%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.2%	2	5.4%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.2%	0	0.0%	0	0.0%
FUNDUS							
97.120	COLOBOMA	1	0.2%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	2	0.4%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	20	4.1%	1	2.7%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	4	0.8%	1	2.7%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	3	0.6%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.2%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.4%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.6%	2	5.4%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	3	0.6%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	8	1.6%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.2%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.2%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	2	0.4%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.4%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	7	1.4%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	5	1.0%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***39***	***8.0%***	***3***	***8.1%***	***0***	***0.0%***
VITREOUS							
110.135	PHPV/ PTVL	2	0.4%	0	0.0%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.2%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	5	1.0%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	9	1.8%	0	0.0%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.2%	0	0.0%	0	0.0%
120.190	RETINAL DYSPLASIA, DETACHED	1	0.2%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	11	2.3%	0	0.0%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.2%	0	0.0%	0	0.0%
120.960	RETINOPATHY	0	0.0%	1	2.7%	0	0.0%
OPTIC NERVE							
130.110	MICROPAPILLA	0	0.0%	1	2.7%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	1	0.2%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	4	0.8%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	10	2.1%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	0.4%	2	5.4%	0	0.0%

OCULAR DISORDERS REPORT
SEALYHAM TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 487 #	%	2016-2020 37 #	%	2021 9 #	%
NORMAL						
.000 NORMAL GLOBE	408	83.8%	25	67.6%	7	77.8%

SEPPALA SIBERIAN SLED DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SEPPALA SIBERIAN SLED DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SEPPALA SIBERIAN SLED DOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		4		1	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	1	25.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	1	100.0%	3	75.0%	1	100.0%

SERBIAN HOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 2	NO	Mutation in the *prcd* gene

Description and Comments

A. Retinal atrophy – *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Serbian Hound is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Serbian Hound. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
SERBIAN HOUND

There are no statistics available for this breed

SHETLAND SHEEPDOG

(Sheltie)

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	1. Corneal dystrophy	Not defined	1, 2	Breeder option	
	2. Sheltie corneal dystrophy	Not defined	1, 2	NO	
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy (*CNGA1*)	Autosomal recessive	1, 3	NO	Mutation in the *CNGA1* gene
F.	Slowly progressing retinopathy	Not defined	4	NO	
G.	Choroidal hypoplasia (Collie eye anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/coloboma	Autosomal recessive	1, 5, 6	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

Distichiasis in the Shetland Sheepdog usually involves stiff lashes which require permanent epilation.

B. 1. Corneal dystrophy

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

2. Sheltie corneal dystrophy

The corneal changes in the Shetland Sheepdog are characterized grossly by multifocal, central, subepithelial and superficial stromal, grey-white, circular or irregular rings. Some affected animals develop corneal erosions. The preocular tear film in the majority of dogs is unstable and requires symptomatic therapy to keep the patients comfortable. Further studies are necessary to define this disorder.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms are seen in the Shetland sheepdog and pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy - *CNGA1*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA is inherited as an autosomal recessive trait in most breeds.

One form of PRA in the Shetland Sheepdog is caused by a 4bp exonic deletion in *CNGA1.* However multiple forms of PRA exist in the breed and slowly progressive retinopathy is also not genetically linked to this mutation. A DNA test is available; however it will only detect this mutation.

F. Slowly progressing retinopathy

A syndrome as yet not well defined. May be a variant of PRA.

G. Choroidal hypoplasia (Collie eye anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie eye anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Crispin SM, Barnett KC. Dystrophy, degeneration and infiltration of the canine cornea. *J Small Anim Pract*. 1983;24:63-83.

3. Wiik AC, Ropstad EO, Ekesten B, et al. Progressive retinal atrophy in Shetland Sheepdog is associated with a mutation in the CNGA1 gene. *Anim Genet*. 2015;46:515-521.

4. Karlstam L, Hertil E, Zeiss C, et al. A slowly progressive retinopathy in the Shetland Sheepdog. *Vet Ophthalmol*. 2011;14:227-238.

5. Barnett KC, Stades FC. Collie eye anomaly in the Shetland Sheepdog in the Netherlands. *J Small Anim Pract*. 1979;20:321-329.

6. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Gen Res*. 2007;17:1562-1571.

7. Fredholm M, Larsen RC, Jönsson M, Söderlund MA, Hardon T, Proschowsky HF. Discrepancy in compliance between the clinical and genetic diagnosis of choroidal hypoplasia in Danish Rough Collies and Shetland Sheepdogs. Anim Genet. 2016 Apr; 47(2): 250-2.

OCULAR DISORDERS REPORT
SHETLAND SHEEPDOG

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	38,411		5,186		1,047	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	64	0.2%	6	0.1%	1	0.1%
10.000	GLAUCOMA	2	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	9	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	7	0.0%	1	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	10	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	2,491	6.5%	252	4.9%	54	5.2%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	5	0.0%	2	0.0%	1	0.1%
40.910	KERATOCONJUNCTIVITIS SICCA	7	0.0%	0	0.0%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	7	0.0%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	4	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	9	0.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	5	0.0%	0	0.0%	1	0.1%
70.700	CORNEAL DYSTROPHY	1,048	2.7%	126	2.4%	29	2.8%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	35	0.1%	1	0.0%	1	0.1%
UVEA							
90.250	PIGMENTARY UVEITIS	1	0.0%	0	0.0%	0	0.0%
93.110	IRIS HYPOPLASIA	5	0.0%	2	0.0%	1	0.1%
93.120	IRIS CYST	20	0.1%	0	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	5	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	26	0.1%	2	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	5	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1,600	4.2%	279	5.4%	40	3.8%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	119	0.3%	9	0.2%	1	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	192	0.5%	16	0.3%	2	0.2%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	29	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	11	0.0%	9	0.2%	2	0.2%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	18	0.0%	10	0.2%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	4	0.0%	0	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	5	0.0%	6	0.1%	1	0.1%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	125	0.3%	25	0.5%	13	1.2%
97.120	COLOBOMA	82	0.2%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	73	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	594	1.5%	115	2.2%	17	1.6%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	88	0.2%	38	0.7%	4	0.4%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	69	0.2%	20	0.4%	1	0.1%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	32	0.1%	6	0.1%	2	0.2%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	10	0.0%	5	0.1%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	11	0.0%	8	0.2%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	47	0.1%	28	0.5%	5	0.5%
100.307	PUNCTATE CATARACT, CAPSULAR	32	0.1%	28	0.5%	3	0.3%

OCULAR DISORDERS REPORT
SHETLAND SHEEPDOG

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 38,411 #	 %	Year Examined: 2016-2020 Total # Dogs: 5,186 #	 %	Year Examined: 2021 Total # Dogs: 1,047 #	 %
LENS Continued						
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	142	0.4%	29	0.6%	3	0.3%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	93	0.2%	23	0.4%	5	0.5%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	55	0.1%	7	0.1%	2	0.2%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	5	0.0%	1	0.0%	1	0.1%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	13	0.0%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	36	0.1%	6	0.1%	1	0.1%
100.317 INCIPIENT CATARACT, CAPSULAR	32	0.1%	14	0.3%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	7	0.1%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.0%	6	0.1%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	4	0.1%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.0%	1	0.1%
100.327 INCOMPLETE CATARACT, CAPSULAR	1	0.0%	5	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	2	0.0%	8	0.2%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	45	0.1%	4	0.1%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.0%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	6	0.0%	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***791***	***2.1%***	***248***	***4.8%***	***28***	***2.7%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	90	0.2%	8	0.2%	0	0.0%
110.135 PHPV/ PTVL	17	0.0%	5	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.0%	1	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	131	0.3%	24	0.5%	2	0.2%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	87	0.2%	17	0.3%	2	0.2%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	16	0.0%	6	0.1%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	5	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	215	0.6%	8	0.2%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	18	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	0	0.0%	1	0.1%
120.960 RETINOPATHY	19	0.0%	5	0.1%	1	0.1%
OPTIC NERVE						
130.110 MICROPAPILLA	17	0.0%	3	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	25	0.1%	0	0.0%	1	0.1%
130.150 OPTIC DISC COLOBOMA	191	0.5%	11	0.2%	9	0.9%
OTHER						
900.000 OTHER, UNSPECIFIED	243	0.6%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	570	1.5%	10	0.2%	3	0.3%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	281	0.7%	166	3.2%	46	4.4%
NORMAL						
.000 NORMAL GLOBE	32,517	84.7%	4,128	79.6%	850	81.2%

SHIBA INU

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	1-3	NO
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Y-suture tip opacity	Not defined	1	Breeder option

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

A recent study found that a *SRBD1* polymorphism in exon 4 plays an important role in the development of glaucoma in the Shiba Inu. A genetic test is not yet available.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

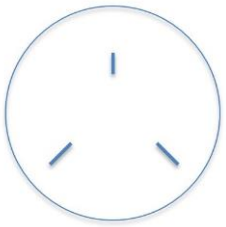
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and Data from OFA All-Breeds Report.

2. Kanemaki N, Tchedre KT, Imayasu M, et al. Dogs and humans share a common susceptibility gene SRBD1 for glaucoma risk. *PloS one*. 2013;8:e74372.

3. Kato K, Sasaki N, Matsunaga S, et al. Possible association of glaucoma with pectinate ligament dysplasia and narrowing of the iridocorneal angle in Shiba Inu dogs in Japan. *Vet Ophthalmol*. 2006;9:71-75.

OCULAR DISORDERS REPORT
SHIBA INU

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	4,414		1,092		288	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
10.000	GLAUCOMA	2	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	4	0.1%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	6	0.1%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	12	0.3%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	105	2.4%	19	1.7%	5	1.7%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	2	0.0%	0	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	0	0.0%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	4	0.1%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	10	0.2%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	32	0.7%	4	0.4%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	10	0.2%	1	0.1%	0	0.0%
UVEA							
93.120	IRIS CYST	0	0.0%	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	178	4.0%	46	4.2%	12	4.2%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	15	0.3%	1	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.0%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	1	0.1%	1	0.3%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	21	0.5%	43	3.9%	8	2.8%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	3	0.1%	0	0.0%	0	0.0%
95.120	CILIARY BODY CYST	0	0.0%	1	0.1%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	10	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	187	4.2%	67	6.1%	13	4.5%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	10	0.2%	5	0.5%	3	1.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	18	0.4%	7	0.6%	3	1.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	3	0.1%	2	0.2%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.1%	1	0.1%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	44	1.0%	60	5.5%	4	1.4%
100.306	PUNCTATE CATARACT, NUCLEUS	2	0.0%	0	0.0%	1	0.3%
100.307	PUNCTATE CATARACT, CAPSULAR	5	0.1%	8	0.7%	1	0.3%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	33	0.7%	8	0.7%	4	1.4%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	24	0.5%	2	0.2%	3	1.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	13	0.3%	1	0.1%	1	0.3%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	4	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	15	0.3%	10	0.9%	1	0.3%
100.316	INCIPIENT CATARACT, NUCLEUS	4	0.1%	2	0.2%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	4	0.1%	2	0.2%	1	0.3%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	2	0.2%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	0.3%
100.328	Y-SUTURE TIP OPACITIES	15	0.3%	55	5.0%	16	5.6%
100.330	GENERALIZED/ COMPLETE CATARACT	19	0.4%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.1%	1	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***226***	***5.1%***	***165***	***15.1%***	***39***	***13.5%***

OCULAR DISORDERS REPORT
SHIBA INU

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 4,414 #	 %	2016-2020 1,092 #	 %	2021 288 #	 %
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	19	0.4%	5	0.5%	2	0.7%
110.135 PHPV/ PTVL	4	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	29	0.7%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	7	0.2%	4	0.4%	2	0.7%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	2	0.0%	0	0.0%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	2	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	28	0.6%	1	0.1%	0	0.0%
120.400 RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.0%	1	0.1%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	7	0.2%	1	0.1%	1	0.3%
OTHER						
900.000 OTHER, UNSPECIFIED	31	0.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	95	2.2%	1	0.1%	1	0.3%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	39	0.9%	46	4.2%	6	2.1%
NORMAL						
.000 NORMAL GLOBE	3,717	84.2%	845	77.4%	226	78.5%

SHIH TZU

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Keratoconjunctivitis sicca	Not defined	1, 2	NO
B.	Glaucoma	Not defined	3	NO
C.	Entropion	Not defined	1	Breeder option
D.	Distichiasis	Not defined	1	Breeder option
E.	Ectopic cilia	Not defined	1	Breeder option
F.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
G.	Exposure keratitis	Not defined	1	Breeder option
H.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
I.	Cataract	Not defined	1	NO
J.	Vitreous degeneration - anterior chamber	Not defined	1, 4, 5	Breeder option
K.	Retinal detachment	Not defined	4, 6	NO
L.	Retinal atrophy - generalized	Not defined	1	NO
M.	Optic nerve hypoplasia	Not defined	7	NO
N.	Retinal degeneration	Not defined	6	NO

Description and Comments

A. Keratoconjunctivitis sicca (KCS)

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

A recent study found that a *SRBD1* polymorphism in intron 1 plays an important role in the development of glaucoma in the Shih Tzu. A genetic test is not yet available.

C. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

D. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

E. Ectopic cilia

Hair emerging through the eyelid conjunctiva. Ectopic cilia occur more frequently in younger dogs and cause discomfort and corneal disease.

F. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

G. Exposure keratitis

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

H. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

I. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

J. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

K. Retinal detachment

A separation of the sensory retina from the underlying tissue. It results in blindness when complete.

L. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

M. Optic nerve hypoplasia

A congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be unable to differentiate from micropapilla on a routine (dilated) screening ophthalmoscopic exam.

N. Retinal degeneration

A unilateral or bilateral retinal disease which can be progressive. When bilateral, the ophthalmoscopic lesions are sometimes asymmetrical, particularly in the early stages of the disease. Fundus examination shows initially single or multiple focal retinal lesions that appear active (local infiltrative inflammation or granulation) or inactive. The lesions can progress resulting in widespread retinal atrophy. The end-stage ophthalmoscopic lesions vary and may appear indistinguishable from PRA, or may be more characteristic of an inflammatory retinopathy. The asymmetry of the fundus abnormalities and the presence of inflammatory lesions in the retina and choroid help to differentiate this disorder from PRA. The mode of inheritance of this disease is not known; however, studies of different families suggest that it is possibly inherited. An intriguing aspect of the disease has been the preponderance of affected males compared to females. This has been confirmed in a recent unpublished survey.

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OCULAR DISORDERS REPORT
SHIH TZU

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	2,537		875		216	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	6	0.2%	1	0.1%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	41	1.6%	4	0.5%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	57	2.2%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	171	6.7%	104	11.9%	22	10.2%
22.000	ECTROPION, UNSPECIFIED	4	0.2%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	478	18.8%	109	12.5%	19	8.8%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	4	0.2%	3	0.3%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	17	0.7%	12	1.4%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	1	0.0%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	25	1.0%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	145	5.7%	60	6.9%	17	7.9%
70.700	CORNEAL DYSTROPHY	32	1.3%	3	0.3%	2	0.9%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	4	0.2%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	0	0.0%	1	0.5%
93.120	IRIS CYST	5	0.2%	0	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	4	0.2%	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	36	1.4%	20	2.3%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	4	0.2%	1	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.1%	2	0.2%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.0%	2	0.2%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	0	0.0%	1	0.1%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
97.120	COLOBOMA	2	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	16	0.6%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	58	2.3%	18	2.1%	1	0.5%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	16	0.6%	8	0.9%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	8	0.3%	3	0.3%	1	0.5%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	3	0.1%	3	0.3%	1	0.5%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.1%	2	0.2%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	18	0.7%	5	0.6%	2	0.9%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.0%	2	0.2%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	4	0.2%	4	0.5%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	21	0.8%	5	0.6%	1	0.5%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	20	0.8%	2	0.2%	1	0.5%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	14	0.6%	1	0.1%	2	0.9%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	6	0.2%	3	0.3%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	8	0.3%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.1%	0	0.0%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	2	0.2%	1	0.5%

OCULAR DISORDERS REPORT
SHIH TZU

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,537 #	 %	Year Examined: 2016-2020 Total # Dogs: 875 #	 %	Year Examined: 2021 Total # Dogs: 216 #	 %
LENS Continued						
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	1	0.1%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	0.2%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	2	0.2%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	8	0.9%	6	2.8%
100.330 GENERALIZED/ COMPLETE CATARACT	23	0.9%	3	0.3%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	0	0.0%	1	0.5%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	4	0.2%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***166***	***6.5%***	***57***	***6.5%***	***16***	***7.4%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	13	0.5%	8	0.9%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	30	1.2%	10	1.1%	2	0.9%
110.320 VITREOUS DEGENERATION SYNERESIS	138	5.4%	20	2.3%	5	2.3%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	11	0.4%	1	0.1%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	4	0.2%	1	0.1%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	0	0.0%	1	0.1%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	41	1.6%	1	0.1%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	9	0.4%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	1	0.0%	1	0.1%	0	0.0%
120.960 RETINOPATHY	2	0.1%	2	0.2%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	10	0.4%	1	0.1%	0	0.0%
130.150 OPTIC DISC COLOBOMA	4	0.2%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	43	1.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	97	3.8%	5	0.6%	1	0.5%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	89	3.5%	88	10.1%	24	11.1%
NORMAL						
.000 NORMAL GLOBE	1,505	59.3%	521	59.5%	136	63.0%

SHIKOKU

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defind	1	Passes with no notation

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
SHIKOKU

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 11 #	 %	2016-2020 48 #	 %	2021 10 #	 %
EYELIDS						
25.110 DISTICHIASIS	0	0.0%	1	2.1%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3	27.3%	23	47.9%	3	30.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	5	10.4%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	9.1%	3	6.3%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	2	18.2%	1	2.1%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	0	0.0%	2	4.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2***	***18.2%***	***3***	***6.3%***	***0***	***0.0%***
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	4	8.3%	2	20.0%
NORMAL						
.000 NORMAL GLOBE	4	36.4%	19	39.6%	5	50.0%

SHILOH SHEPHERD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option

Description and Comments

A. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
SHILOH SHEPHERD

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	244		79		20	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	2	0.8%	1	1.3%	0	0.0%
NICTITANS						
50.210 PLASMOMA/ ATYPICAL PANNUS	0	0.0%	2	2.5%	0	0.0%
CORNEA						
70.210 PANNUS	0	0.0%	3	3.8%	0	0.0%
70.700 CORNEAL DYSTROPHY	29	11.9%	9	11.4%	3	15.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	1	0.4%	0	0.0%	0	0.0%
UVEA						
93.120 IRIS CYST	1	0.4%	1	1.3%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	3	1.2%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	1.3%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	11	4.5%	2	2.5%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.4%	0	0.0%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.4%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.4%	1	1.3%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	0.4%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.4%	0	0.0%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.4%	0	0.0%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	1.3%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	1	0.4%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***7***	***2.9%***	***2***	***2.5%***	***0***	***0.0%***
RETINA						
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	2	0.8%	0	0.0%	1	5.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1	0.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	4	1.6%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.4%	3	3.8%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	209	85.7%	61	77.2%	17	85.0%

SHORTY BULL

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SHORTY BULL breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SHORTY BULL

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		2		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	0		2	100.0%	0	

SIBERIAN HUSKY

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma	Not defined	1-4	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy - epithelial/stromal	Presumed autosomal recessive	1, 5-8	NO	
D.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1, 4	NO	
F.	Retinal atrophy (*RPGR*)	X-linked	1, 9, 10	NO	Mutation in the *RPGR* gene
G.	Cone degeneration - (achromatopsia)	Autosomal recessive	11, 12	NO	Mutation in the *CNGB3* gene
H.	Uveodermatologic syndrome	Not defined	1, 13-15	NO	

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

In the Siberian Husky, the opacities are bilaterally symmetrical, round to oval and ring shaped. They occur early in life (0.5-2 years) and may progress to cause significant vision loss. When seen, it may be beneficial to feed a low fat diet and recheck the eyes the following year to see if the opacities resolve, ruling out inherited corneal dystrophy.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Siberian Husky, cataracts begin in the axial posterior cortex at approximately one year of age. Progression is variable and vision impairment may occur. In cases with rapid progression, secondary lens-induced uveitis and glaucoma may be associated with partial cataract resorption.

F. Retinal atrophy – (*RPGR*)

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. In the Siberian Husky, one form of PRA, known as XLPRA1, is due to a mutation in the *RPGR* gene and is inherited as a recessive, sex-linked trait. A DNA test is available.

G. Cone degeneration - hemeralopia/achromatopsia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Afflicted puppies develop day-blindness, colorblindness, and photophobia between 8 and 12 weeks of age. Afflicted dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. A missense mutation in the same gene (*CNGB3*) that has been identified in CD-affected Alaskan Malamute-derived dogs has been detected in German Shorthaired Pointers affected with a clinically identical allelic disorder. A DNA test is available.

H. Uveodermatologic syndrome

Uveodermatologic syndrome in the Siberian Husky bears many similarities to a condition in people called Vogt-Koyanagi-Harada (or VKH) syndrome. Thus, the condition in dogs is often referred to as VKH or VKH-like syndrome. It is an immune-mediated disease in which pigmented cells (melanocytes) in the eye and in the skin are destroyed by white blood cells (lymphocytes). The first clinical signs are usually inflammation of the intraocular structures (or uveitis) in both eyes. Adhesions between the iris and lens (posterior synechia) and the peripheral iris and cornea (peripheral anterior synechia) develop rapidly. Other complications include cataract development, retinal degeneration, retinal separation or detachment, optic disc atrophy and secondary glaucoma. The uveitis is very difficult to control medically and ultimately results in blindness in most affected dogs. Whitening of the hair (poliosis) and skin (vitiligo) may also be noted in advanced cases. The genetics of this condition are unclear, but some genetic predisposition is indicated by the higher prevalence of this disorder in Siberian Huskies compared with other dog breeds. Affected dogs are generally young, ranging in age between 1-1/2 to 4 years.

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OCULAR DISORDERS REPORT
SIBERIAN HUSKY

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 37,845 #	 %	2016-2020 6,063 #	 %	2021 1,291 #	 %
GLOBE						
.110 MICROPHTHALMIA	7	0.0%	0	0.0%	0	0.0%
10.000 GLAUCOMA	12	0.0%	3	0.0%	1	0.1%
EYELIDS						
20.110 EYELID DERMOID	4	0.0%	0	0.0%	0	0.0%
20.140 ECTOPIC CILIA	3	0.0%	0	0.0%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	19	0.1%	1	0.0%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	4	0.0%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	396	1.0%	61	1.0%	6	0.5%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	3	0.0%	1	0.1%
40.910 KERATOCONJUNCTIVITIS SICCA	3	0.0%	0	0.0%	0	0.0%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	2	0.0%	0	0.0%	0	0.0%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	2	0.0%	0	0.0%	0	0.0%
CORNEA						
70.210 PANNUS	21	0.1%	1	0.0%	0	0.0%
70.220 PIGMENTARY KERATITIS	3	0.0%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	997	2.6%	107	1.8%	20	1.5%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	37	0.1%	1	0.0%	1	0.1%
UVEA						
93.110 IRIS HYPOPLASIA	3	0.0%	2	0.0%	0	0.0%
93.120 IRIS CYST	18	0.0%	3	0.0%	1	0.1%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.150 IRIS COLOBOMA	8	0.0%	1	0.0%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	1	0.0%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	891	2.4%	197	3.2%	26	2.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	26	0.1%	3	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	50	0.1%	7	0.1%	1	0.1%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	5	0.0%	1	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	14	0.0%	13	0.2%	2	0.2%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	17	0.0%	2	0.0%	0	0.0%
93.810 UVEAL MELANOMA	1	0.0%	0	0.0%	0	0.0%
95.120 CILIARY BODY CYST	1	0.0%	0	0.0%	0	0.0%
97.150 CHORIORETINAL COLOBOMA, CONGENITAL	3	0.0%	1	0.0%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	47	0.1%	16	0.3%	0	0.0%
97.120 COLOBOMA	16	0.0%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	576	1.5%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	688	1.8%	144	2.4%	29	2.2%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	92	0.2%	59	1.0%	7	0.5%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	207	0.5%	26	0.4%	7	0.5%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	38	0.1%	10	0.2%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	11	0.0%	6	0.1%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	109	0.3%	17	0.3%	1	0.1%
100.306 PUNCTATE CATARACT, NUCLEUS	38	0.1%	36	0.6%	9	0.7%

OCULAR DISORDERS REPORT
SIBERIAN HUSKY

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 37,845 #	 %	2016-2020 6,063 #	 %	2021 1,291 #	 %
LENS Continued						
100.307 PUNCTATE CATARACT, CAPSULAR	56	0.1%	47	0.8%	6	0.5%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	135	0.4%	32	0.5%	13	1.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1,286	3.4%	118	1.9%	29	2.2%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	67	0.2%	16	0.3%	6	0.5%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	18	0.0%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	260	0.7%	5	0.1%	2	0.2%
100.316 INCIPIENT CATARACT, NUCLEUS	96	0.3%	14	0.2%	2	0.2%
100.317 INCIPIENT CATARACT, CAPSULAR	93	0.2%	27	0.4%	11	0.9%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	5	0.0%	9	0.1%	4	0.3%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	58	0.2%	91	1.5%	26	2.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.0%	10	0.2%	2	0.2%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	1	0.0%	2	0.0%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	6	0.0%	3	0.0%	3	0.2%
100.326 INCOMPLETE CATARACT, NUCLEUS	10	0.0%	19	0.3%	11	0.9%
100.327 INCOMPLETE CATARACT, CAPSULAR	7	0.0%	7	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	7	0.0%	13	0.2%	4	0.3%
100.330 GENERALIZED/ COMPLETE CATARACT	463	1.2%	14	0.2%	2	0.2%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.0%	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	13	0.0%	2	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***3,641***	***9.6%***	***582***	***9.6%***	***145***	***11.2%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	47	0.1%	16	0.3%	3	0.2%
110.135 PHPV/ PTVL	6	0.0%	1	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	37	0.1%	4	0.1%	1	0.1%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	91	0.2%	11	0.2%	1	0.1%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	50	0.1%	11	0.2%	2	0.2%
120.190 RETINAL DYSPLASIA, DETACHED	13	0.0%	1	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	162	0.4%	10	0.2%	1	0.1%
120.400 RETINAL HEMORRHAGE	7	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	27	0.1%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	2	0.0%	3	0.0%	1	0.1%
120.960 RETINOPATHY	21	0.1%	27	0.4%	3	0.2%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	1	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	3	0.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	7	0.0%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	3	0.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	354	0.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	753	2.0%	11	0.2%	1	0.1%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	479	1.3%	340	5.6%	61	4.7%
NORMAL						
.000 NORMAL GLOBE	32,013	84.6%	4,848	80.0%	1,062	82.3%

SILKEN WINDHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Cataract	Not defined	1	NO	
B.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	1, 2	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Choroidal hypoplasia (Collie Eye Anomaly)
- Staphyloma/coloboma
- Retinal detachment
- Retinal hemorrhage
- Optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Gen Res*. 2007;17:1562-1571.

OCULAR DISORDERS REPORT
SILKEN WINDHOUND

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	280		406		123	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	0	0.0%	1	0.2%	1	0.8%
EYELIDS							
25.110	DISTICHIASIS	3	1.1%	4	1.0%	1	0.8%
CORNEA							
70.700	CORNEAL DYSTROPHY	0	0.0%	0	0.0%	1	0.8%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	0.4%	3	0.7%	1	0.8%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	0	0.0%	1	0.8%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.4%	0	0.0%	1	0.8%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	16	5.7%	9	2.2%	5	4.1%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.4%	1	0.2%	1	0.8%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.7%	1	0.2%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.4%	0	0.0%	2	1.6%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.7%	3	0.7%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.4%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	5	1.8%	3	0.7%	1	0.8%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.4%	4	1.0%	1	0.8%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.2%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.4%	0	0.0%	1	0.8%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.4%	4	1.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.4%	0	0.0%	2	1.6%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	0.8%
100.328	Y-SUTURE TIP OPACITIES	1	0.4%	5	1.2%	2	1.6%
100.330	GENERALIZED/ COMPLETE CATARACT	0	0.0%	0	0.0%	1	0.8%
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	0	0.0%	1	0.8%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***17***	***6.1%***	***22***	***5.4%***	***13***	***10.6%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	0	0.0%	1	0.8%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.7%	3	0.7%	1	0.8%
110.320	VITREOUS DEGENERATION SYNERESIS	3	1.1%	4	1.0%	3	2.4%
RETINA							
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	3	1.1%	1	0.2%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.4%	0	0.0%	2	1.6%
120.960	RETINOPATHY	0	0.0%	5	1.2%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	2	0.7%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	0	0.0%	1	0.2%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	7	2.5%	20	4.9%	3	2.4%
NORMAL							
.000	NORMAL GLOBE	255	91.1%	354	87.2%	104	84.6%

SILKY TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1,2	NO	
D.	Vitreous degeneration	Not defined	1	Breeder option	
E.	Retinal atrophy (*prcd)*	Autosomal recessive	3	NO	Mutation in the *prcd* gene

Description and Comments

A. Entropion

A conformational defect resulting in an "in rolling" of one or more of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally in the neonatal period. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

E. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Silky Terrier is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, Samuelson DA, Barrie KP, et al. Biometry and clinical characteristics of congenital cataracts and microphthalmia in the Miniature Schnauzer. *J Am Vet Med Assoc*. 1983;183:99-102.

3. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT
SILKY TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	692		251		22	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	1	0.1%	8	3.2%	0	0.0%
25.110 DISTICHIASIS	3	0.4%	0	0.0%	0	0.0%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	2	0.8%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	0	0.0%	0	0.0%
CORNEA						
70.220 PIGMENTARY KERATITIS	0	0.0%	1	0.4%	0	0.0%
70.700 CORNEAL DYSTROPHY	8	1.2%	0	0.0%	0	0.0%
UVEA						
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.1%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	45	6.5%	19	7.6%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	0.1%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.4%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.1%	1	0.4%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	1	0.4%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	2	0.3%	1	0.4%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	4	0.6%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	35	5.1%	16	6.4%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	11	1.6%	5	2.0%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	4	0.6%	4	1.6%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	6	0.9%	4	1.6%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	1	0.4%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.1%	6	2.4%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	2	0.3%	4	1.6%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	4	1.6%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	12	1.7%	4	1.6%	1	4.5%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	18	2.6%	5	2.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	11	1.6%	1	0.4%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.3%	1	0.4%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	1	0.1%	1	0.4%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	1	0.1%	1	0.4%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	1	0.4%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.1%	1	0.4%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.4%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	4	1.6%	1	4.5%
100.330 GENERALIZED/ COMPLETE CATARACT	22	3.2%	1	0.4%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***99***	***14.3%***	***49***	***19.5%***	***2***	***9.1%***
VITREOUS						
110.135 PHPV/ PTVL	0	0.0%	1	0.4%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.3%	5	2.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	27	3.9%	14	5.6%	1	4.5%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	4	0.6%	1	0.4%	0	0.0%

OCULAR DISORDERS REPORT
SILKY TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 692 #	 %	2016-2020 251 #	 %	2021 22 #	 %
RETINA Continued						
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	0.1%	1	0.4%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	8	1.2%	1	0.4%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	1	0.4%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.1%	1	0.4%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	12	1.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	24	3.5%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	9	1.3%	10	4.0%	2	9.1%
NORMAL						
.000 NORMAL GLOBE	521	75.3%	173	68.9%	17	77.3%

SKYE TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SKYE TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SKYE TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	6		6		2	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	1	16.7%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1	16.7%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	5	83.3%	6	100.0%	2	100.0%

SLOUGHI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (*rcd1a*)	Autosomal recessive	1	NO	Mutation in the *PDE6B* gene

Description and Comments

A. Retinal atrophy - *rcd1a*

A later onset degenerative disease of the retinal visual cells with visual deficits detectable at 2 to 3 years of age and which progresses to blindness. This abnormality may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. It is inherited as an autosomal recessive trait.

In the Sloughi, the disease is due to an 8-bp insertion in exon 21 of the *PDE6B* gene causing the *rcd1a* form of PRA. The disease is genetically distinct from that in the Irish Setter and has a later age of onset. A DNA test is available.

References

1. Dekomien G, Runte M, Godde R, et al. Generalized progressive retinal atrophy of Sloughi dogs is due to an 8-bp insertion in exon 21 of the PDE6B gene. *Cytogenet Cell Gene*t. 2000;90:261-267.

OCULAR DISORDERS REPORT
SLOUGHI

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 32 #	 %	2016-2020 40 #	 %	2021 14 #	 %
EYELIDS						
25.110 DISTICHIASIS	0	0.0%	2	5.0%	0	0.0%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	1	3.1%	0	0.0%	0	0.0%
UVEA						
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	6.3%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	3.1%	3	7.5%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	2	5.0%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	0	0.0%	1	2.5%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	2.5%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	2.5%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***5***	***12.5%***	***0***	***0.0%***
VITREOUS						
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	3.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	1	3.1%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	31	96.9%	35	87.5%	14	100.0%

SLOVAKIAN WIREHAIRED POINTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SLOVAKIAN WIREHAIRED POINTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SLOVAKIAN WIREHAIRED POINTER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		0		1	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	0	0.0%	0		1	100.0%
NORMAL						
.000 NORMAL GLOBE	1	100.0%	0		0	0.0%

SMALL MUNSTERLANDER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SMALL MUNSTERLANDER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SMALL MUNSTERLANDER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	17		8		1	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
22.000	ECTROPION, UNSPECIFIED	1	5.9%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	0	0.0%	1	12.5%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	2	11.8%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	5.9%	1	12.5%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	11.8%	1	12.5%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	5.9%	2	25.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	1	12.5%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1	5.9%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***2***	***11.8%***	***3***	***37.5%***	***0***	***0.0%***
VITREOUS							
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	5.9%	0	0.0%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	12	70.6%	4	50.0%	1	100.0%

SMOOTH FOX TERRIER*

*The Smooth Fox Terrier and the Wire Fox Terrier were originally considered two varieties of the same breed. They became separate breeds in 1985. It is likely that the same genetic diseases exist in both breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma	Not defined	1, 2	NO	
B.	Lens luxation	Autosomal recessive	1, 3-7	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

B. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Martin CL and Wyman M. Primary glaucoma in the dog. *Vet Clin North Am*. 1978 May;8:257-286.

3. Lawson DD. Luxation of the crystalline lens in the dog. *J Small Anim Pract.* 1969;10:461.

4. Curtis R and Barnett KC. Primary lens luxation in the dog. *J Small Anim Pract*. 1980 Dec;21:657-668.

5. Hodgman SFJ. Abnormalities and defects in pedigree dogs: I. An investigation into the existence of abnormalities in pedigree dogs in British Isles. *J Small Anim Pract*. 1963;4:447.

6. Formston C. Observations on subluxation and luxation of the crystalline lens in the dog. *Journal of Comparative Pathology*. 1945;55:168.

7. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. Vet Ophthalmol. 2011; 14: 378-384.

OCULAR DISORDERS REPORT
SMOOTH FOX TERRIER

Diagnostic Name		Year Examined: 1991-2016 Total # Dogs: 270 #	%	2016-2020 68 #	%	2021 17 #	%
CORNEA							
70.700	CORNEAL DYSTROPHY	0	0.0%	1	1.5%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	13	4.8%	1	1.5%	5	29.4%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	0	0.0%	1	1.5%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	0	0.0%	1	1.5%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.4%	0	0.0%	1	5.9%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.4%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	1.1%	0	0.0%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	1	0.4%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	2	0.7%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	2	0.7%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***5***	***1.9%***	***0***	***0.0%***	***0***	***0.0%***
VITREOUS							
110.320	VITREOUS DEGENERATION SYNERESIS	3	1.1%	1	1.5%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1	0.4%	2	2.9%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	0.7%	1	1.5%	0	0.0%
120.960	RETINOPATHY	0	0.0%	1	1.5%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	1	0.4%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	6	2.2%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	1.1%	3	4.4%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	240	88.9%	57	83.8%	12	70.6%

SOFT-COATED WHEATEN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST AVAILABLE
A.	Microphthalmos	Autosomal recessive	2, 3	NO	Mutation in the *RBP4* gene
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1, 4	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1, 4	NO	
E.	Retinal dysplasia - folds	Not defined	1	Breeder option	

Description and Comments

A. Microphthalmos

Microphthalmia is a congenital defect characterized by a small eye often associated with other ocular malformations, including defects of the cornea, anterior chamber, lens and/or retina. A genetic test is available.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Kaukonen M, Woods S, Ahonen S. et al. Maternal inheritance of a recessive RBP for defect in canine congenital eyes disease. *Cell Reports* 2018; 23:2643–2652.

3. Kaukonen M, Woods S, Ahonen S, Lemberg S, Hellman M, Hytönen MK, Permi P, Glaser T, Lohi H. Maternal Inheritance of a Recessive RBP4 Defect in Canine Congenital Eye Disease. Cell Rep. 2018 May 29;23(9):2643-2652. doi: 10.1016/j.celrep.2018.04.118. PMID: 29847795; PMCID: PMC6546432.

4. Van der Woerdt A. Multiple ocular anomalies in two related litters of Soft-Coated Wheaten Terriers. *Prog Vet Comp Ophthal*. 1995;5:78.

OCULAR DISORDERS REPORT
SOFT COATED WHEATEN TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	7,294		1,253		209	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	0	0.0%	0	0.0%	1	0.5%
10.000	GLAUCOMA	2	0.0%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	0	0.0%	0	0.0%	1	0.5%
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	130	1.8%	39	3.1%	6	2.9%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	6	0.1%	4	0.3%	0	0.0%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	3	0.0%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	54	0.7%	6	0.5%	1	0.5%
UVEA							
93.120	IRIS CYST	13	0.2%	2	0.2%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	3	0.0%	0	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	241	3.3%	67	5.3%	16	7.7%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	18	0.2%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	3	0.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	42	0.6%	55	4.4%	11	5.3%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.1%	4	0.3%	0	0.0%
95.120	CILIARY BODY CYST	2	0.0%	2	0.2%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	0	0.0%	2	1.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	17	0.2%	0	0.0%	2	1.0%
97.120	COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	24	0.3%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	341	4.7%	71	5.7%	11	5.3%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	46	0.6%	32	2.6%	4	1.9%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	10	0.1%	9	0.7%	3	1.4%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	14	0.2%	8	0.6%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	6	0.1%	10	0.8%	1	0.5%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	4	0.1%	6	0.5%	1	0.5%
100.306	PUNCTATE CATARACT, NUCLEUS	5	0.1%	3	0.2%	1	0.5%
100.307	PUNCTATE CATARACT, CAPSULAR	17	0.2%	18	1.4%	3	1.4%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	29	0.4%	16	1.3%	1	0.5%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	29	0.4%	9	0.7%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	18	0.2%	6	0.5%	1	0.5%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.0%	1	0.1%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	11	0.2%	3	0.2%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	19	0.3%	2	0.2%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	15	0.2%	8	0.6%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	5	0.4%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	4	0.3%	1	0.5%
100.324	INCOMPLETE CATARACT, ANTERIOR SUTURES	0	0.0%	0	0.0%	1	0.5%

OCULAR DISORDERS REPORT
SOFT COATED WHEATEN TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 7,294 #	 %	2016-2020 1,253 #	 %	2021 209 #	 %
LENS Continued						
100.328 Y-SUTURE TIP OPACITIES	1	0.0%	6	0.5%	2	1.0%
100.330 GENERALIZED/ COMPLETE CATARACT	35	0.5%	0	0.0%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	4	0.1%	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***285***	***3.9%***	***147***	***11.7%***	***19***	***9.1%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	68	0.9%	8	0.6%	1	0.5%
110.135 PHPV/ PTVL	6	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.0%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	10	0.1%	2	0.2%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	70	1.0%	4	0.3%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	3	0.0%	1	0.1%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	2	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	14	0.2%	1	0.1%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.0%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	14	0.2%	0	0.0%	2	1.0%
130.120 OPTIC NERVE HYPOPLASIA	5	0.1%	0	0.0%	2	1.0%
130.150 OPTIC DISC COLOBOMA	9	0.1%	0	0.0%	4	1.9%
OTHER						
900.000 OTHER, UNSPECIFIED	49	0.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	183	2.5%	2	0.2%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	58	0.8%	59	4.7%	14	6.7%
NORMAL						
.000 NORMAL GLOBE	6,332	86.8%	949	75.7%	151	72.2%

SPANISH GREYHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SPANISH GREYHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SPANISH GREYHOUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2		1		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	2	100.0%	1	100.0%	0	

SPANISH MASTIFF

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SPANISH MASTIFF breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SPANISH MASTIFF

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	1	100.0%	0		0	

SPANISH WATER DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
B.	Retinal atrophy				
	- early onset	Autosomal recessive	3	NO	Mutation in the *PDE6B* gene
	- *prcd*	Autosomal recessive	2	NO	Mutation in the *prcd* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that one form of PRA in the Spanish Water Dog is PRCD which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and Data from OFA All-Breeds Report.

2. Winkler PA, Ramsey HD, Petersen-Jones SM. A novel mutation in PDE6B in Spanish Water Dogs with early-onset progressive retinal atrophy. Vet Ophthalmol. 2020 Sep;23(5):792-796. doi: 10.1111/vop.12792. Epub 2020 Jul 8. PMID: 32639685.

3. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT
SPANISH WATER DOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	215		216		47	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	2	0.9%	2	0.9%	2	4.3%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.5%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	2	0.9%	1	0.5%	0	0.0%
UVEA						
93.120 IRIS CYST	0	0.0%	1	0.5%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	7	3.3%	6	2.8%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.5%	0	0.0%	1	2.1%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	15	7.0%	10	4.6%	0	0.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.5%	1	0.5%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.5%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.5%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	4	1.9%	10	4.6%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	2	0.9%	0	0.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.9%	1	0.5%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	1	0.5%	0	0.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	1	0.5%	0	0.0%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.5%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	0	0.0%	0	0.0%	1	2.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***12***	***5.6%***	***14***	***6.5%***	***1***	***2.1%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.5%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	0	0.0%	2	0.9%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	5	2.3%	3	1.4%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	0.5%	3	1.4%	1	2.1%
120.190 RETINAL DYSPLASIA, DETACHED	1	0.5%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	5	2.3%	3	1.4%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	1	0.5%	1	2.1%
OTHER						
900.000 OTHER, UNSPECIFIED	4	1.9%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	7	3.3%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	0.9%	17	7.9%	2	4.3%
NORMAL						
.000 NORMAL GLOBE	181	84.2%	175	81.0%	40	85.1%

SPINONE ITALIANO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Ectropion	Not defined	1	Breeder option
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder options
D.	Cataract	Not defined	1	NO

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane,

persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
SPINONE ITALIANO

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2,060		409		67	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
.110 MICROPHTHALMIA	1	0.0%	0	0.0%	0	0.0%
EYELIDS						
20.160 MACROPALPEBRAL FISSURE	3	0.1%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	30	1.5%	2	0.5%	1	1.5%
22.000 ECTROPION, UNSPECIFIED	12	0.6%	6	1.5%	0	0.0%
25.110 DISTICHIASIS	25	1.2%	8	2.0%	1	1.5%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	1	0.0%	0	0.0%	0	0.0%
NICTITANS						
51.100 THIRD EYELID CARTILAGE ANOMALY	3	0.1%	0	0.0%	0	0.0%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	3	0.1%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	0	0.0%	0	0.0%	1	1.5%
UVEA						
90.250 PIGMENTARY UVEITIS	1	0.0%	0	0.0%	0	0.0%
93.120 IRIS CYST	1	0.0%	0	0.0%	0	0.0%
93.150 IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	1	0.0%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	86	4.2%	34	8.3%	3	4.5%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.1%	2	0.5%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.0%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.1%	1	0.2%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	6	0.3%	2	0.5%	1	1.5%
95.120 CILIARY BODY CYST	1	0.0%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	2	0.1%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	107	5.2%	24	5.9%	1	1.5%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	11	0.5%	5	1.2%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	4	0.2%	0	0.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.0%	1	0.2%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.1%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	3	0.1%	7	1.7%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	21	1.0%	5	1.2%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	3	0.1%	6	1.5%	1	1.5%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	13	0.6%	3	0.7%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	6	0.3%	0	0.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	5	0.2%	2	0.5%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	5	0.2%	2	0.5%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	10	0.5%	6	1.5%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	3	0.1%	4	1.0%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.0%	0	0.0%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.2%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.0%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.0%	5	1.2%	1	1.5%
100.330 GENERALIZED/ COMPLETE CATARACT	5	0.2%	0	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***100***	***4.9%***	***47***	***11.5%***	***2***	***3.0%***

OCULAR DISORDERS REPORT
SPINONE ITALIANO

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,060 #	 %	2016-2020 409 #	 %	2021 67 #	 %
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	2	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	7	0.3%	1	0.2%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	14	0.7%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	10	0.5%	0	0.0%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	0	0.0%	1	0.2%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.0%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	1	0.2%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	22	1.1%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	62	3.0%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	15	0.7%	17	4.2%	2	3.0%
NORMAL						
.000 NORMAL GLOBE	1,801	87.4%	308	75.3%	58	86.6%

STABYHOUN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the STABYHOUN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
STABYHOUN

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	3		2		2	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
CORNEA						
70.700 CORNEAL DYSTROPHY	0	0.0%	0	0.0%	1	50.0%
LENS						
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1	33.3%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	0	0.0%	1	50.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***33.3%***	***0***	***0.0%***	***1***	***50.0%***
RETINA						
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	33.3%	0	0.0%	0	0.0%
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	0	0.0%	1	50.0%
NORMAL						
.000 NORMAL GLOBE	2	66.7%	2	100.0%	0	0.0%

STAFFORDSHIRE BULL TERRIER*

* Please note that since 1972 the AKC considers the Staffordshire Bull Terrier a different breed from the American Staffordshire Terrier.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Autosomal recessive	1-4	NO	Mutation in the *HSF4* gene
D.	Persistent hyperplastic primary vitreous (PHPV)	Not defined	1, 5, 6	NO	
E.	Vitreous degeneration	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Staffordshire Bull Terrier, cataracts usually develop by one year of age. There is initial opacification of the suture lines progressing to nuclear and cortical cataract formation; complete cataracts and blindness develop by three years of age. The condition is inherited as an autosomal recessive mutation in the *HSF4* gene (*HSF4-1*). A DNA test is available.

D. Persistent hyperplastic primary vitreous (PHPV)

A congenital defect resulting from abnormalities in the development and regression of the hyaloid artery (the primary vitreous) and the interaction of this blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with persistent tunica vasculosa lentis (PTVL) which results from failure of regression of the embryologic vascular network which surrounds the developing lens.

The majority of affected dogs have a retrolental fibrovascular plaque and variable lenticular defects which include posterior lenticonus/globus, colobomata, intralenticular hemorrhage and/or secondary cataracts. Vision impairment may result. The disease is an inherited disorder in the breed, but the mode of inheritance has not been defined. The results of current studies cannot rule out autosomal recessive or a dominant trait with incomplete penetrance.

E. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Barnett KC. Hereditary cataract in the dog. *J Small Anim Pract*. 1978;19:109-120.

3. Barnett KC. The diagnosis and differential diagnosis of cataract in the dog. *J Small Anim Pract*. 1985;26:305-316.

4. Mellersh CS, McLaughlin B, Ahonen S, et al. Mutation in HSF4 is associated with hereditary cataract in the Australian Shepherd. *Vet Ophthalmol*. 2009;12:372-378.

5. Curtis R, Barnett KC, Leon A. Persistent hyperplastic primary vitreous in the Staffordshire Bull Terrier. *Vet Rec*. 1984;115:385.

6. Leon A, Curtis R, Barnett K. Hereditary persistent hyperplastic primary vitreous in the Staffordshire Bull Terrier. *J Am Anim Hosp Assoc*. 1986;22:765-774.

OCULAR DISORDERS REPORT
STAFFORDSHIRE BULL TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	847		489		193	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
25.110	DISTICHIASIS	73	8.6%	29	5.9%	8	4.1%
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	0	0.0%	1	0.5%
70.700	CORNEAL DYSTROPHY	2	0.2%	3	0.6%	3	1.6%
UVEA							
93.120	IRIS CYST	5	0.6%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.1%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	20	2.4%	16	3.3%	7	3.6%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.2%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	3	0.4%	13	2.7%	7	3.6%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	1	0.5%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	32	3.8%	17	3.5%	4	2.1%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	6	0.7%	12	2.5%	1	0.5%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.2%	4	0.8%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.1%	3	0.6%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	5	1.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	5	0.6%	2	0.4%	3	1.6%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	2	0.2%	6	1.2%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	6	0.7%	5	1.0%	1	0.5%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	4	0.5%	1	0.2%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.2%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.1%	2	0.4%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	3	0.4%	3	0.6%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.2%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	3	0.6%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.1%	0	0.0%	0	0.0%
100.340	RESORBING/ HYPERMATURE CATARACT	0	0.0%	1	0.2%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***32***	***3.8%***	***49***	***10.0%***	***5***	***2.6%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	4	0.5%	2	0.4%	1	0.5%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.2%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	18	2.1%	5	1.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	5	0.6%	3	0.6%	2	1.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	4	0.5%	2	0.4%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.1%	2	0.4%	0	0.0%
120.960	RETINOPATHY	0	0.0%	0	0.0%	1	0.5%
120.970	CMR/ CMR-LIKE RETINOPATY	0	0.0%	0	0.0%	1	0.5%
OTHER							
900.000	OTHER, UNSPECIFIED	9	1.1%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	20	2.4%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	15	1.8%	13	2.7%	13	6.7%
NORMAL							
.000	NORMAL GLOBE	695	82.1%	384	78.5%	152	78.8%

STANDARD SCHNAUZER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Corneal dystrophy – epithelial/stromal	Not defined	1	Breeder option
C.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Y-suture tip opacity	Not defined	1	Breeder option
F.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

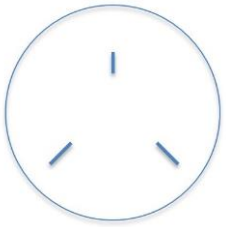
D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

There are apparently several forms of cataracts in the Standard Schnauzer: 1) posterior cortex and posterior/total nucleus involvement, with slow progression; 2) dense posterior polar opacity near the sub-capsular region which progresses rapidly to very dense posterior polar plaques in young animals; 3) dense posterior polar opacity like that reported in young animals but found in older animals with variable progression.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
STANDARD SCHNAUZER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	3,074		590		162	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.0%	0	0.0%	0	0.0%
10.000	GLAUCOMA	2	0.1%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	0	0.0%	1	0.2%	0	0.0%
25.110	DISTICHIASIS	64	2.1%	6	1.0%	2	1.2%
NASOLACRIMAL							
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	0	0.0%	0	0.0%
NICTITANS							
50.210	PLASMOMA/ ATYPICAL PANNUS	0	0.0%	0	0.0%	1	0.6%
51.100	THIRD EYELID CARTILAGE ANOMALY	2	0.1%	1	0.2%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	2	0.1%	0	0.0%	0	0.0%
CORNEA							
70.220	PIGMENTARY KERATITIS	0	0.0%	0	0.0%	1	0.6%
70.700	CORNEAL DYSTROPHY	21	0.7%	6	1.0%	1	0.6%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.0%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	2	0.1%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	14	0.5%	2	0.3%	1	0.6%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	3	0.1%	2	0.3%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.1%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	2	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	7	0.2%	7	1.2%	1	0.6%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	2	0.1%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	113	3.7%	31	5.3%	2	1.2%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	16	0.5%	18	3.1%	1	0.6%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	6	0.2%	5	0.8%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	6	0.2%	3	0.5%	1	0.6%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.1%	1	0.2%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	11	0.4%	8	1.4%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	7	0.2%	6	1.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	16	0.5%	3	0.5%	1	0.6%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	13	0.4%	6	1.0%	1	0.6%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	12	0.4%	2	0.3%	3	1.9%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	16	0.5%	4	0.7%	2	1.2%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	0.0%	1	0.2%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	9	0.3%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	4	0.1%	2	0.3%	1	0.6%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.2%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.2%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.2%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	2	0.1%	13	2.2%	1	0.6%
100.330	GENERALIZED/ COMPLETE CATARACT	13	0.4%	1	0.2%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***139***	***4.5%***	***76***	***12.9%***	***11***	***6.8%***

OCULAR DISORDERS REPORT
STANDARD SCHNAUZER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	3,074		590		162	
Diagnostic Name	#	%	#	%	#	%
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	3	0.1%	1	0.2%	3	1.9%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	5	0.2%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	13	0.4%	1	0.2%	1	0.6%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	30	1.0%	2	0.3%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	4	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	23	0.7%	1	0.2%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	5	0.2%	1	0.2%	1	0.6%
130.120 OPTIC NERVE HYPOPLASIA	3	0.1%	1	0.2%	1	0.6%
130.150 OPTIC DISC COLOBOMA	0	0.0%	1	0.2%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	31	1.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	71	2.3%	1	0.2%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	22	0.7%	42	7.1%	11	6.8%
NORMAL						
.000 NORMAL GLOBE	2,745	89.3%	474	80.3%	135	83.3%

SUSSEX SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Ectropion	Not defined	1	Breeder option
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent hyaloid artery remnant	Not defined	1	Breeder option
D.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

D. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
SUSSEX SPANIEL

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	424		68		29	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
20.160 MACROPALPEBRAL FISSURE	23	5.4%	0	0.0%	0	0.0%
21.000 ENTROPION, UNSPECIFIED	1	0.2%	0	0.0%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	30	7.1%	3	4.4%	0	0.0%
25.110 DISTICHIASIS	24	5.7%	5	7.4%	1	3.4%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	0	0.0%	1	1.5%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	2	0.5%	0	0.0%	0	0.0%
UVEA						
93.110 IRIS HYPOPLASIA	2	0.5%	1	1.5%	0	0.0%
93.150 IRIS COLOBOMA	7	1.7%	1	1.5%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	2	0.5%	3	4.4%	1	3.4%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	6	1.4%	1	1.5%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.2%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.5%	1	1.5%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	15	3.5%	2	2.9%	1	3.4%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.2%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	1	1.5%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	0.2%	0	0.0%	1	3.4%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	2	0.5%	0	0.0%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.5%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	4	0.9%	0	0.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	4	0.9%	4	5.9%	1	3.4%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	2	2.9%	1	3.4%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	1.5%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	2	0.5%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***16***	***3.8%***	***8***	***11.8%***	***3***	***10.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	36	8.5%	4	5.9%	4	13.8%
110.135 PHPV/ PTVL	4	0.9%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	1	0.2%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	42	9.9%	3	4.4%	2	6.9%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	2	0.5%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.2%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.2%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	3	0.7%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	10	2.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	20	4.7%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	5	1.2%	4	5.9%	2	6.9%
NORMAL						
.000 NORMAL GLOBE	266	62.7%	47	69.1%	18	62.1%

SWEDISH LAPPHUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy (*prcd*)	Autosomal recessive	1	NO	Mutation in the *prcd* gene

Description and Comments

A. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Swedish Lapphund is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Swedish Lapphund. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006 Nov;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT
SWEDISH LAPPHUND

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	3		8		2	
	Diagnostic Name	#	%	#	%	#	%
UVEA							
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	12.5%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	33.3%	0	0.0%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	33.3%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	33.3%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	1	33.3%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	33.3%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***4***	***133.3%***	***0***	***0.0%***	***0***	***0.0%***
RETINA							
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	33.3%	0	0.0%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	0	0.0%	7	87.5%	2	100.0%

SWEDISH VALLHUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Vitreous degeneration	Not defined	1	Breeder option	
F.	Retinopathy	Presumed autosomal recessive	1-4	NO	Mutation in the *MERTK* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral. In the Swedish Vallhund, lesions are circular or semicircular central crystalline deposits in the anterior corneal stroma that appear between 2 and 5 years of age. It may be associated with exophthalmos and lagophthalmos common in these dogs.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

F. Retinopathy

Swedish Vallhunds have a unique form of retinal degeneration compared to most forms of PRA. The condition is multifocal rather than diffuse and the age of onset and rate of progression vary dramatically, even between littermates. The clinical signs progress in three stages. (A. Komaromy, personal communication 2016)

- Stage one usually occurs between 2-3 years of age and is characterized by mottling or multifocal brown discoloration of the tapetal fundus – this should be marked as retinopathy even though visual deficits are not yet noted.

- In stage two, geographic thinning of the retina can be seen and subtle night vision deficits are observed.

- In stage three, the retinal thinning becomes more generalized with small islands of retinal sparing and deficits are noted in both photopic and scotopic vision. The disease has been associated with a mutation in the *MERTK* gene on canine chromosome 17. Dogs homozogous for the mutation have an 18 fold increased risk of developing the retinopathy. However, the actual causative mutation has not yet been identified.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Cooper AE, Ahonen S, Rowlan JS, et al. A novel form of progressive retinal atrophy in Swedish Vallhund dogs. *PloS one*. 2014;9:e106610.

3. Ahonen SJ, Arumilli M, Seppala E, et al. Increased expression of MERTK is associated with a unique form of canine retinopathy. *PloS one*. 2014;9:e114552.

4. Everson R, Pettitt L, Forman OP, et al. An intronic LINE-1 insertion in MRTK is strongly associated with retinopathy in Swedish Vallhund Dogs. PLoS one. 2017; 12(8):e0183021

OCULAR DISORDERS REPORT
SWEDISH VALLHUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1,398		353		50	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
20.140 ECTOPIC CILIA	1	0.1%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	36	2.6%	2	0.6%	1	2.0%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	1	0.1%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	16	1.1%	7	2.0%	1	2.0%
UVEA						
93.120 IRIS CYST	5	0.4%	0	0.0%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.1%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	238	17.0%	77	21.8%	19	38.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	7	0.5%	3	0.8%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.1%	1	0.3%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.1%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	5	0.4%	7	2.0%	2	4.0%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
93.810 UVEAL MELANOMA	2	0.1%	0	0.0%	0	0.0%
95.120 CILIARY BODY CYST	0	0.0%	1	0.3%	0	0.0%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	0	0.0%	1	0.3%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	209	14.9%	34	9.6%	5	10.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	17	1.2%	10	2.8%	3	6.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	7	0.5%	3	0.8%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	3	0.2%	3	0.8%	0	0.0%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.3%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	26	1.9%	11	3.1%	6	12.0%
100.306 PUNCTATE CATARACT, NUCLEUS	30	2.1%	14	4.0%	2	4.0%
100.307 PUNCTATE CATARACT, CAPSULAR	5	0.4%	6	1.7%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	17	1.2%	8	2.3%	1	2.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	4	0.3%	1	0.3%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	10	0.7%	0	0.0%	0	0.0%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	2	0.6%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	6	0.4%	0	0.0%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	16	1.1%	3	0.8%	1	2.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	1	0.3%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.3%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	5	0.4%	10	2.8%	1	2.0%
100.330 GENERALIZED/ COMPLETE CATARACT	7	0.5%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***157***	***11.2%***	***74***	***21.0%***	***14***	***28.0%***
VITREOUS						
110.135 PHPV/ PTVL	1	0.1%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	10	0.7%	1	0.3%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	36	2.6%	8	2.3%	1	2.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	23	1.6%	3	0.8%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	4	0.3%	2	0.6%	0	0.0%

OCULAR DISORDERS REPORT
SWEDISH VALLHUND

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,398 #	 %	2016-2020 353 #	 %	2021 50 #	 %
RETINA Continued						
120.190 RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	45	3.2%	2	0.6%	0	0.0%
120.960 RETINOPATHY	40	2.9%	15	4.2%	2	4.0%
120.970 CMR/ CMR-LIKE RETINOPATY	0	0.0%	0	0.0%	1	2.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	0.1%	4	1.1%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	10	20.0%
OTHER						
900.000 OTHER, UNSPECIFIED	47	3.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	71	5.1%	2	0.6%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	50	3.6%	31	8.8%	1	2.0%
NORMAL						
.000 NORMAL GLOBE	897	64.2%	176	49.9%	22	44.0%

TAMASKAN

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	1	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
TAMASKAN

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 20 #	%	2016-2020 88 #	%	2021 19 #	%
EYELIDS						
25.110 DISTICHIASIS	0	0.0%	1	1.1%	1	5.3%
CORNEA						
70.700 CORNEAL DYSTROPHY	0	0.0%	2	2.3%	0	0.0%
UVEA						
93.120 IRIS CYST	0	0.0%	1	1.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	0	0.0%	2	2.3%	0	0.0%
95.120 CILIARY BODY CYST	0	0.0%	1	1.1%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	0	0.0%	1	5.3%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.1%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	1	1.1%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.1%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	0	0.0%	0	0.0%	1	5.3%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	5.0%	0	0.0%	0	0.0%
100.327 INCOMPLETE CATARACT, CAPSULAR	0	0.0%	1	1.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***5.0%***	***4***	***4.5%***	***1***	***5.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	1	1.1%	0	0.0%
RETINA						
120.960 RETINOPATHY	0	0.0%	1	1.1%	0	0.0%
OTHER						
900.100 OTHER, NOT INHERITED	0	0.0%	1	1.1%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	4	4.5%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	19	95.0%	73	83.0%	17	89.5%

TEDDY ROOSEVELT TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Teddy Roosevelt Terrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011; 14: 378-384.

OCULAR DISORDERS REPORT
TEDDY ROOSEVELT TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	4		2		2	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS						
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	1	25.0%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1	25.0%	0	0.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	1	25.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***3***	***75.0%***	***0***	***0.0%***	***0***	***0.0%***
VITREOUS						
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	50.0%	0	0.0%
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	50.0%	0	0.0%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	1	25.0%	1	50.0%	2	100.0%

TENTERFIELD TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Tenterfield Terrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011; 14: 378-384.

OCULAR DISORDERS REPORT
TENTERFIELD TERRIER

There are no statistics available for this breed

TIBETAN MASTIFF

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
B.	Cataract	Not defined	1	NO

Description and Comments

A. Persistent pupillary membranes (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
TIBETAN MASTIFF

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	44		46		8	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	3	6.8%	0	0.0%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	0	0.0%	1	2.2%	0	0.0%
25.110	DISTICHIASIS	1	2.3%	4	8.7%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	1	2.3%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	4	9.1%	7	15.2%	1	12.5%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	5	11.4%	0	0.0%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	2.3%	2	4.3%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	2.3%	0	0.0%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	2.3%	1	2.2%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	2	4.3%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	0	0.0%	2	4.3%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	1	2.2%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	2	4.3%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	4.3%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***2***	***4.5%***	***10***	***21.7%***	***0***	***0.0%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	1	2.2%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	2	4.5%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	3	6.5%	1	12.5%
NORMAL							
.000	NORMAL GLOBE	32	72.7%	31	67.4%	7	87.5%

TIBETAN SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment	Not defined	1	Passes with no notation	
	foci/no strands				
D.	Cataract	Not defined	1	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Retinal atrophy *FAM161A*	Autosomal recessive	1-3	NO	Mutation in the *FAM161A* gene

Descriptions and Comments

A. Entropion

A conformational defect resulting in an "in rolling" of one or more of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

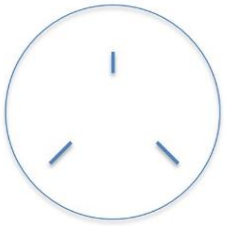
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinal atrophy - *FAM161A*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. In most breeds PRA is inherited as an autosomal recessive trait.

In the Tibetan Spaniel, a mutation in *FAM161A* causes a later onset (4-5 years) of PRA. This form is being called progressive retinal atrophy 3 (PRA3) and appears to be the causative mutation in about 60% of Tibetan Spaniels with PRA. This form is inherited as an autosomal recessive trait. A DNA test for PRA3 is available. This test will not detect PRA caused by other genetic mutations. At least one other form of PRA appears to be present in the Tibetan Spaniel.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Bjerkas E. Progressive retinal atrophy in dogs in Norway. *Norsk Veterinaertidsskrift*. 1991;103:601-610.

3. Downs LM, Mellersh CS. An Intronic SINE insertion in FAM161A that causes exon-skipping is associated with progressive retinal atrophy in Tibetan Spaniels and Tibetan Terriers. *PLoS One*. 2014;9:e93990.

OCULAR DISORDERS REPORT
TIBETAN SPANIEL

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	3,208		367		69	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	2	0.1%	0	0.0%	0	0.0%
EYELIDS							
20.140	ECTOPIC CILIA	4	0.1%	0	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	5	0.2%	0	0.0%	0	0.0%
21.000	ENTROPION, UNSPECIFIED	89	2.8%	3	0.8%	0	0.0%
22.000	ECTROPION, UNSPECIFIED	2	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	278	8.7%	22	6.0%	2	2.9%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	0	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	2	0.1%	1	0.3%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	2	0.1%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	6	0.2%	1	0.3%	0	0.0%
CORNEA							
70.210	PANNUS	8	0.2%	0	0.0%	0	0.0%
70.220	PIGMENTARY KERATITIS	18	0.6%	3	0.8%	1	1.4%
70.700	CORNEAL DYSTROPHY	10	0.3%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.0%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
93.120	IRIS CYST	2	0.1%	1	0.3%	0	0.0%
93.150	IRIS COLOBOMA	4	0.1%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	58	1.8%	11	3.0%	3	4.3%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	4	0.1%	1	0.3%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	4	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	2	0.1%	6	1.6%	1	1.4%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.0%	0	0.0%	0	0.0%
93.810	UVEAL MELANOMA	2	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	9	0.3%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	80	2.5%	8	2.2%	4	5.8%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	4	0.1%	3	0.8%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	4	0.1%	1	0.3%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	2	0.1%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	11	0.3%	4	1.1%	2	2.9%
100.306	PUNCTATE CATARACT, NUCLEUS	1	0.0%	0	0.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	4	0.1%	3	0.8%	1	1.4%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	21	0.7%	0	0.0%	1	1.4%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	12	0.4%	0	0.0%	1	1.4%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	6	0.2%	0	0.0%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	5	0.2%	1	0.3%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	8	0.2%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.1%	0	0.0%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.3%	0	0.0%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	1	0.0%	0	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	7	0.2%	9	2.5%	1	1.4%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.0%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
TIBETAN SPANIEL

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	**3,208**		**367**		**69**	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***102***	***3.2%***	***22***	***6.0%***	***6***	***8.7%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	8	0.2%	1	0.3%	1	1.4%
110.135 PHPV/ PTVL	1	0.0%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	1	0.3%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	12	0.4%	2	0.5%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	9	0.3%	0	0.0%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	0.0%	3	0.8%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	2	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	28	0.9%	1	0.3%	0	0.0%
120.960 RETINOPATHY	1	0.0%	4	1.1%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	2	0.1%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	7	0.2%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	32	1.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	75	2.3%	2	0.5%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	32	1.0%	21	5.7%	1	1.4%
NORMAL						
.000 NORMAL GLOBE	2,612	81.4%	285	77.7%	56	81.2%

TIBETAN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	 Not defined Not defined	 1 1	 Breeder option Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Lens luxation	Autosomal recessive	1, 2-7	NO	Mutation in the *ADAMTS17* gene
F.	Retinal atrophy *FAM161A*	Autosomal recessive	1, 3, 8-11	NO	Mutation in the *FAM161A* gene
G.	Retinal atrophy – *prcd*	Autosomal recessive	12	NO	Mutation in the *prcd* gene
G.	Retinal atrophy - Rod-cone dysplasia (*rcd4*)	Autosomal recessive	14	NO	Mutation in the *C2orf71* gene
H.	Ceroid lipofuscinosis	Not defined	13, 14	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

F. Retinal atrophy - *FAM161A*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky and Samoyed, in most breeds studied to date, PRA is inherited as an autosomal recessive trait.

There are ERG studies to indicate that there is depression of the B wave at 10-12 weeks of age in the second variety and slower depression in the first variety. Some may have no obvious signs at 5-6 years of age, only to develop clinical signs at 6-7 years of age. It is logical that any animal found with signs of bilateral atrophy should not be bred. Members of the family of the affected animal should be carefully screened. Perhaps, ERG in animals less than 4 years of age is logical, especially if the animal is intended for breed foundation.

In the Tibetan Terrier a mutation in *FAM161A* causes a later onset (4-5 years) of PRA. This form is being called progressive retinal atrophy 3 (PRA3). This form is inherited as an autosomal recessive trait. A DNA test for PRA3 is available. This test will not detect PRA caused by other genetic mutations. At least one other form of PRA appears to be present in

the Tibetan Terrier.

G. Rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA initially identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A mutation-based gene test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and is of no value in identifying other forms of PRA.

H. Ceroid Lipofuscinosis

An inherited disease of man and animal characterized by the accumulation of lipopigment in various tissues of the body including the eye. It results in progressive neurologic disease. In the Tibetan Terrier, moderate visual impairment can occur in low-light conditions.

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OCULAR DISORDERS REPORT
TIBETAN TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	8,300		1,108		185	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	4	0.0%	0	0.0%	0	0.0%
10.000	GLAUCOMA	3	0.0%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	120	1.4%	6	0.5%	2	1.1%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	4	0.4%	1	0.5%
40.910	KERATOCONJUNCTIVITIS SICCA	0	0.0%	0	0.0%	1	0.5%
NICTITANS							
52.110	PROLAPSED GLAND OF THE THIRD EYELID	4	0.0%	0	0.0%	0	0.0%
CORNEA							
70.220	PIGMENTARY KERATITIS	3	0.0%	1	0.1%	0	0.0%
70.700	CORNEAL DYSTROPHY	88	1.1%	8	0.7%	2	1.1%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.0%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	487	5.9%	66	6.0%	23	12.4%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	21	0.3%	1	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	40	0.5%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	10	0.1%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	34	0.4%	37	3.3%	9	4.9%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	11	0.1%	4	0.4%	1	0.5%
93.810	UVEAL MELANOMA	0	0.0%	1	0.1%	0	0.0%
95.120	CILIARY BODY CYST	0	0.0%	1	0.1%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%	0	0.0%
97.120	COLOBOMA	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	34	0.4%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	380	4.6%	69	6.2%	15	8.1%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	102	1.2%	48	4.3%	9	4.9%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	43	0.5%	4	0.4%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	15	0.2%	7	0.6%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	15	0.2%	10	0.9%	3	1.6%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	7	0.1%	5	0.5%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	12	0.1%	10	0.9%	3	1.6%
100.307	PUNCTATE CATARACT, CAPSULAR	21	0.3%	11	1.0%	4	2.2%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	65	0.8%	10	0.9%	2	1.1%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	68	0.8%	8	0.7%	1	0.5%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	37	0.4%	3	0.3%	1	0.5%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	12	0.1%	1	0.1%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	13	0.2%	1	0.1%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	9	0.1%	2	0.2%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	5	0.1%	4	0.4%	2	1.1%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	5	0.1%	6	0.5%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	3	0.0%	3	0.3%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	2	0.0%	3	0.3%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.1%	1	0.5%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	0	0.0%	2	1.1%

OCULAR DISORDERS REPORT
TIBETAN TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	8,300		1,108		185	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
LENS Continued						
100.328 Y-SUTURE TIP OPACITIES	1	0.0%	2	0.2%	1	0.5%
100.330 GENERALIZED/ COMPLETE CATARACT	38	0.5%	4	0.4%	0	0.0%
100.340 RESORBING/ HYPERMATURE CATARACT	1	0.0%	1	0.1%	1	0.5%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	17	0.2%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***508***	***6.1%***	***144***	***13.0%***	***30***	***16.2%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	4	0.0%	2	0.2%	1	0.5%
110.135 PHPV/ PTVL	2	0.0%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	7	0.1%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	32	0.4%	2	0.2%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	10	0.1%	2	0.2%	1	0.5%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	4	0.0%	1	0.1%	0	0.0%
120.190 RETINAL DYSPLASIA, DETACHED	4	0.0%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	124	1.5%	0	0.0%	2	1.1%
120.400 RETINAL HEMORRHAGE	3	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.1%	0	0.0%
120.960 RETINOPATHY	3	0.0%	7	0.6%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	2	0.0%	0	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	4	0.0%	1	0.1%	1	0.5%
OTHER						
900.000 OTHER, UNSPECIFIED	82	1.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	147	1.8%	2	0.2%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	61	0.7%	44	4.0%	14	7.6%
NORMAL						
.000 NORMAL GLOBE	7,078	85.3%	869	78.4%	129	69.7%

TOY AUSTRALIAN SHEPHERD

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Microphthalmia with multiple ocular defects	Presumed autosomal recessive with incomplete penetrance	1-6	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Iris coloboma	Not defined	1	NO	
D.	Iris hypoplasia	Not defined	1	Breeder option	
E.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
F.	Cataract	Autosomal co-dominant	1, 7, 8	NO	Mutation in the *HSF4-2* gene
G.	Retinal atrophy (*prcd*)	Autosomal recessive	1, 9	NO	Mutation in the *prcd* gene
H.	Cone degeneration - day blindness	Autosomal recessive	10	NO	Mutation in the *CNGB3* gene
I.	Multifocal retinopathy - *cmr1*	Autosomal recessive	11	Breeder option	Mutation in the *BEST1* gene
J.	Choroidal hypoplasia (Collie Eye Anomaly) - Optic nerve coloboma - Retinal detachment - Retinal hemorrhage - Staphyloma/coloboma	Autosomal recessive	1, 12	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Microphthalmia with multiple ocular defects

Microphthalmia is a congenital defect characterized by a small eye with associated defects of the cornea, iris (coloboma), anterior chamber, lens (cataract) and/or retina (dysplasia). In the Australian Shepherd, microphthalmia has long been suspected to be associated with merled coat coloration but a definitive genetic relationship has not been established. The eyes of affected homozygous merle (usually white) dogs have extreme forms of this entity and are usually blind at birth. Affected heterozygous merle-coated dogs demonstrate less severe manifestations.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Iris coloboma

A congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue, commonly (though not exclusively) located at the 6 o'clock position associated with failure of closure of the optic fissure. A partial-thickness defect in iris tissue should be recorded as iris hypoplasia on the OFA form.

D. Iris hypoplasia

A congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as a partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the OFA form.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Australian Shepherd, a mutation in *HSF4* (heat shock transcription factor 4), the *HSF4-2* mutation, has been shown to increase the likelihood of cataract formation. The mutation is inherited in a co-dominant manner. Dogs with one copy of the mutation develop bilateral posterior cataracts and homozygotes develop a nuclear cataract that typically progresses to a mature cataract. A DNA test is available for this mutation. Other genetic factors can contribute to cataract formation in this breed and will not be detected by this test.

G. Retinal atrophy - *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Toy Australian Shepherd is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

H. Cone degeneration - day blindness or hemeralopia

Autosomal recessively inherited early degeneration of the cone photoreceptors (achromatopsia). Affected puppies develop day-blindness, colorblindness, and photophobia between 8 and 12 weeks of age. Affected dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. Genetically, the condition results from a mutation in the *CNGB3* gene. A DNA test is available.

I. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (cmr1) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, and Mastiff.

J. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

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OCULAR DISORDERS REPORT
TOY AUSTRALIAN SHEPHERD

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	922		170		88	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	4	0.4%	0	0.0%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	41	4.4%	12	7.1%	3	3.4%
CORNEA							
70.700	CORNEAL DYSTROPHY	1	0.1%	3	1.8%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	15	1.6%	9	5.3%	2	2.3%
93.150	IRIS COLOBOMA	18	2.0%	1	0.6%	3	3.4%
93.180	IIRIS SPHINCTER DYSPLASIA	3	0.3%	0	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	103	11.2%	14	8.2%	10	11.4%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	7	0.8%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	2	0.2%	2	1.2%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	0	0.0%	1	0.6%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.1%	0	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	0	0.0%	1	0.6%	0	0.0%
FUNDUS							
97.110	CHOROIDAL HYPOPLASIA	0	0.0%	0	0.0%	1	1.1%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	12	1.3%	3	1.8%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	0.1%	1	0.6%	0	0.0%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.1%	0	0.0%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.2%	2	1.2%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	0	0.0%	2	1.2%	2	2.3%
100.307	PUNCTATE CATARACT, CAPSULAR	1	0.1%	0	0.0%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	4	0.4%	0	0.0%	1	1.1%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.1%	0	0.0%	1	1.1%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.2%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.2%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***16***	***1.7%***	***5***	***2.9%***	***4***	***4.5%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	5	0.5%	0	0.0%	0	0.0%
110.135	PHPV/ PTVL	2	0.2%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	2	0.2%	1	0.6%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	3	0.3%	0	0.0%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.1%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	1	0.1%	0	0.0%	0	0.0%
OPTIC NERVE							
130.110	MICROPAPILLA	10	1.1%	1	0.6%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	2	0.2%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	6	0.7%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	8	0.9%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	6	0.7%	5	2.9%	4	4.5%

OCULAR DISORDERS REPORT
TOY AUSTRALIAN SHEPHERD

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	922		170		88	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	785	85.1%	122	71.8%	63	71.6%

TOY FOX TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Lens luxation	Autosomal recessive	2	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011 Nov;14:378-384.

OCULAR DISORDERS REPORT
TOY FOX TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 193 #	 %	2016-2020 32 #	 %	2021 7 #	 %
EYELIDS						
25.110 DISTICHIASIS	2	1.0%	0	0.0%	0	0.0%
NASOLACRIMAL						
32.110 IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	1	3.1%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	0	0.0%	1	3.1%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	1	0.5%	0	0.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	19	9.8%	1	3.1%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	1.0%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.5%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	1.6%	1	3.1%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	3.1%	0	0.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	5	2.6%	1	3.1%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.5%	1	3.1%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	0	0.0%	1	3.1%	0	0.0%
100.316 INCIPIENT CATARACT, NUCLEUS	0	0.0%	1	3.1%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	3.1%	1	14.3%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	0	0.0%	1	14.3%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.5%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***6***	***3.1%***	***6***	***18.8%***	***2***	***28.6%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	1	0.5%	0	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.5%	0	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION SYNERESIS	2	1.0%	1	3.1%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	7	3.6%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	2	1.0%	0	0.0%	0	0.0%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	2	1.0%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	2	1.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	3	1.6%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	4	2.1%	3	9.4%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	155	80.3%	25	78.1%	6	85.7%

TREEING WALKER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the TREEING WALKER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
TREEING WALKER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 4 #	 %	2016-2020 9 #	 %	2021 0 #	 %
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	22.2%	0	
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	11.1%	0	
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	1	11.1%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***2***	***22.2%***	***0***	
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	2	22.2%	0	
NORMAL						
.000 NORMAL GLOBE	4	100.0%	6	66.7%	0	

VIZSLA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Not defined	1, 2	NO
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
C.	Persistent pupillary membranes - iris to iris - lens pigment foci/no strands	Not defined Not defined	1 1	Breeder option Passes with no notation
D.	Cataract	Not defined	1	NO

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine screening exam for certification.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation,

specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Strom AR, Hassig M, Iburg TM, et al. Epidemiology of canine glaucoma presented to University of Zurich from 1995 to 2009. Part 1: Congenital and primary glaucoma (4 and 123 cases). *Vet Ophthalmol*. 2011 Mar;14:121-126.

OCULAR DISORDERS REPORT
VIZSLA

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	2,892		1,298		358	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
10.000	GLAUCOMA	0	0.0%	0	0.0%	1	0.3%
EYELIDS							
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%	1	0.3%
21.000	ENTROPION, UNSPECIFIED	3	0.1%	0	0.0%	1	0.3%
22.000	ECTROPION, UNSPECIFIED	3	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	25	0.9%	11	0.8%	3	0.8%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	1	0.1%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	1	0.0%	1	0.1%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	4	0.1%	0	0.0%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	7	0.2%	0	0.0%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	38	1.3%	17	1.3%	2	0.6%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.1%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	1	0.0%	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	58	2.0%	28	2.2%	12	3.4%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	12	0.4%	2	0.2%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	90	3.1%	102	7.9%	27	7.5%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	1	0.0%	2	0.2%	0	0.0%
95.120	CILIARY BODY CYST	1	0.0%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	4	0.1%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	106	3.7%	36	2.8%	8	2.2%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	19	0.7%	10	0.8%	2	0.6%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	16	0.6%	9	0.7%	1	0.3%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	4	0.1%	4	0.3%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	5	0.2%	2	0.2%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	3	0.1%	7	0.5%	1	0.3%
100.307	PUNCTATE CATARACT, CAPSULAR	22	0.8%	15	1.2%	4	1.1%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	16	0.6%	7	0.5%	2	0.6%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	19	0.7%	16	1.2%	4	1.1%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	20	0.7%	3	0.2%	3	0.8%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.0%	1	0.1%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	4	0.1%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	2	0.1%	2	0.2%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	6	0.2%	4	0.3%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	3	0.1%	1	0.1%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	2	0.1%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	2	0.1%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***146***	***5.0%***	***82***	***6.3%***	***17***	***4.7%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	3	0.1%	2	0.2%	1	0.3%
110.135	PHPV/ PTVL	1	0.0%	0	0.0%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.1%	6	0.5%	2	0.6%

OCULAR DISORDERS REPORT
VIZSLA

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,892 #	 %	Year Examined: 2016-2020 Total # Dogs: 1,298 #	 %	Year Examined: 2021 Total # Dogs: 358 #	 %
VITREOUS Continued						
110.320 VITREOUS DEGENERATION SYNERESIS	10	0.3%	5	0.4%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	3	0.1%	2	0.2%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	5	0.2%	0	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.1%	4	0.3%	1	0.3%
OPTIC NERVE						
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	1	0.1%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	51	1.8%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	73	2.5%	1	0.1%	1	0.3%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	50	1.7%	59	4.5%	21	5.9%
NORMAL						
.000 NORMAL GLOBE	2,520	87.1%	1,028	79.2%	282	78.8%

VOLPINO ITALIANO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Lens luxation	Autosomal recessive	1	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Volpino Italiano. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011; 14: 378-384.

OCULAR DISORDERS REPORT
VOLPINO ITALIANO

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	1	100.0%	0		0	

WACHTELHUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WACHTELHUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
WACHTELHUND

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	2	100.0%	0		0	

WEIMARANER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy - generalized	X-linked	1, 2	NO	Mutation in the *RPGR* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

In the Weimaraner, because there is significant clinical disease associated with the abnormal hairs, breeding should be discouraged.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA is inherited as an autosomal recessive trait in most breeds.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Kropatsch R, Akkad D, Frank M, et al. A large deletion in RPGR causes XLPRA in Weimarener dogs. Canine Genetics and Epidemiol. 2016; 3:7.

OCULAR DISORDERS REPORT
WEIMARANER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,657		511		121	
	Diagnostic Name	#	%	#	%	#	%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	3	0.2%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	492	29.7%	131	25.6%	28	23.1%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	2	0.4%	0	0.0%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	13	0.8%	4	0.8%	1	0.8%
CORNEA							
70.700	CORNEAL DYSTROPHY	29	1.8%	7	1.4%	1	0.8%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	5	0.3%	1	0.2%	0	0.0%
UVEA							
93.120	IRIS CYST	4	0.2%	2	0.4%	1	0.8%
93.150	IRIS COLOBOMA	2	0.1%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	1	0.1%	1	0.2%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	15	0.9%	3	0.6%	2	1.7%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	3	0.2%	0	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.3%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	9	1.8%	1	0.8%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.1%	0	0.0%	0	0.0%
93.810	UVEAL MELANOMA	1	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	2	0.1%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	92	5.6%	41	8.0%	12	9.9%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	13	0.8%	21	4.1%	7	5.8%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	5	0.3%	3	0.6%	2	1.7%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	8	0.5%	7	1.4%	1	0.8%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	0	0.0%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	1	0.1%	3	0.6%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	9	0.5%	5	1.0%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	4	0.2%	9	1.8%	2	1.7%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	43	2.6%	12	2.3%	4	3.3%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	11	0.7%	6	1.2%	1	0.8%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	15	0.9%	13	2.5%	2	1.7%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	1	0.2%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	5	0.3%	4	0.8%	2	1.7%
100.317	INCIPIENT CATARACT, CAPSULAR	1	0.1%	9	1.8%	1	0.8%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	3	0.6%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	2	0.4%	0	0.0%
100.323	INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	2	0.4%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.2%	1	0.8%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	0.4%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	5	0.3%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	1	0.2%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***128***	***7.7%***	***103***	***20.2%***	***23***	***19.0%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	4	0.2%	1	0.2%	1	0.8%
110.135	PHPV/ PTVL	0	0.0%	2	0.4%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	2	0.4%	1	0.8%

OCULAR DISORDERS REPORT
WEIMARANER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,657 #	 %	2016-2020 511 #	 %	2021 121 #	 %
VITREOUS Continued						
110.320 VITREOUS DEGENERATION SYNERESIS	1	0.1%	1	0.2%	1	0.8%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	2	0.1%	0	0.0%	0	0.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	4	0.2%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	6	0.4%	0	0.0%	0	0.0%
120.400 RETINAL HEMORRHAGE	1	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	12	0.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	50	3.0%	4	0.8%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	17	1.0%	26	5.1%	8	6.6%
NORMAL						
.000 NORMAL GLOBE	1,068	64.5%	292	57.1%	67	55.4%

WELSH SHEEPDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WELSH SHEEPDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
WELSH SHEEPDOG

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		0		0	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	1	100.0%	0		0	

WELSH SPRINGER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Glaucoma	Presumed autosomal dominant	1-4	NO
B.	Entropion	Not defined	1	Breeder option
C.	Distichiasis	Not defined	1	Breeder option
D.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option
E.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
F.	Cataract	Presumed autosomal recessive	1, 5, 6	NO
G.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam. Due to the increased incidence of PLD in the breed and the increased progression observed with age, it may be prudent to perform repeated gonioscopy examinations over time.

Primary angle closure glaucoma has been reported in the Welsh Springer Spaniel. Females are affected more than males. Onset ranges from 10 weeks to 10 years. At the iridocorneal angle, the pectinate ligaments appear sparse and wispy in contrast to the sturdy fibers seen in other breeds. A dominant mode of inheritance is reported.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic),

defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Welsh Springer Spaniel, lesions may be seen as early as 8-12 weeks of age and progress rapidly to complete cataract, impairing vision. A recessive mode of inheritance is reported.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Cottrell B, Barnett K. Primary glaucoma in the Welsh Springer Spaniel. *J Small Anim Pract*. 1988;29:185-199.

3. Gelatt KN, MacKay EO. Prevalence of the breed-related glaucomas in pure-bred dogs in North America. *Vet Ophthalmol*. 2004;7:97-111. Epub 2004/02/26.

4. Oliver JA, Ekiri A, Mellersh. Prevalence and Progression of Pectinate Ligament Dysplasia in the Welsh Springer Spaniel. J Sm Anim Pract. 2016;57: 416-421.

5. Barnett KC. Hereditary cataract in the Welsh Springer Spaniel. *J Small Anim Pract*. 1980;21:621-625. Epub 1980/11/01.

6. Barnett KC. The diagnosis and differential diagnosis of cataract in the dog. *J Small Anim Pract*. 1985;26:305.

OCULAR DISORDERS REPORT
WELSH SPRINGER SPANIEL

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	2,578		651		151	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
10.000	GLAUCOMA	1	0.0%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	39	1.5%	16	2.5%	2	1.3%
22.000	ECTROPION, UNSPECIFIED	3	0.1%	0	0.0%	0	0.0%
25.110	DISTICHIASIS	299	11.6%	109	16.7%	21	13.9%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	1	0.0%	2	0.3%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	43	1.7%	19	2.9%	3	2.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	2	0.1%	0	0.0%	0	0.0%
UVEA							
93.120	IRIS CYST	1	0.0%	1	0.2%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%	0	0.0%
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	0.2%	1	0.7%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	579	22.5%	172	26.4%	50	33.1%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.1%	2	0.3%	3	2.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	1	0.0%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.0%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	4	0.2%	6	0.9%	1	0.7%
95.120	CILIARY BODY CYST	1	0.0%	0	0.0%	0	0.0%
97.150	CHORIORETINAL COLOBOMA, CONGENITAL	0	0.0%	1	0.2%	0	0.0%
FUNDUS							
97.120	COLOBOMA	2	0.1%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	6	0.2%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	130	5.0%	29	4.5%	7	4.6%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	13	0.5%	19	2.9%	2	1.3%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	5	0.2%	4	0.6%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.0%	3	0.5%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	3	0.1%	2	0.3%	3	2.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.1%	1	0.2%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	4	0.2%	7	1.1%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	3	0.1%	9	1.4%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	5	0.2%	1	0.2%	1	0.7%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	2	0.1%	3	0.5%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.1%	3	0.5%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	2	0.1%	0	0.0%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	2	0.1%	0	0.0%	1	0.7%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	1	0.2%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	0.0%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	1	0.0%	0	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***52***	***2.0%***	***53***	***8.1%***	***7***	***4.6%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	10	0.4%	1	0.2%	0	0.0%
110.135	PHPV/ PTVL	1	0.0%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	5	0.2%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
WELSH SPRINGER SPANIEL

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 2,578 #	 %	2016-2020 651 #	 %	2021 151 #	 %
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	29	1.1%	5	0.8%	1	0.7%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	4	0.2%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	8	0.3%	1	0.2%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	3	0.1%	0	0.0%	2	1.3%
130.120 OPTIC NERVE HYPOPLASIA	6	0.2%	1	0.2%	0	0.0%
130.150 OPTIC DISC COLOBOMA	4	0.2%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	19	0.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	50	1.9%	4	0.6%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	20	0.8%	26	4.0%	5	3.3%
NORMAL						
.000 NORMAL GLOBE	1,720	66.7%	336	51.6%	77	51.0%

WELSH TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Lens luxation	Autosomal recessive	1, 2	NO	Mutation in the *ADAMTS17* gene

Description and Comment

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

B. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011 Nov;14:378-384.

OCULAR DISORDERS REPORT
WELSH TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	359		41		25	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
10.000 GLAUCOMA	1	0.3%	0	0.0%	0	0.0%
EYELIDS						
20.140 ECTOPIC CILIA	1	0.3%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	12	3.3%	1	2.4%	0	0.0%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	1	0.3%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	4	1.1%	0	0.0%	0	0.0%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	3	0.8%	1	2.4%	0	0.0%
UVEA						
93.170 ANTERIOR CHAMBER CYST	0	0.0%	0	0.0%	1	4.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	30	8.4%	1	2.4%	5	20.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	2	0.6%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	3	0.8%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	4	1.1%	8	19.5%	3	12.0%
LENS						
100.200 CATARACT, UNSPECIFIED	1	0.3%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	22	6.1%	0	0.0%	4	16.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	2	0.6%	0	0.0%	1	4.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	2	0.6%	0	0.0%	0	0.0%
100.307 PUNCTATE CATARACT, CAPSULAR	1	0.3%	0	0.0%	1	4.0%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	3	0.8%	0	0.0%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	2	0.6%	0	0.0%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.3%	0	0.0%	1	4.0%
100.317 INCIPIENT CATARACT, CAPSULAR	2	0.6%	0	0.0%	1	4.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	3	7.3%	2	8.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	3	0.8%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***14***	***3.9%***	***3***	***7.3%***	***6***	***24.0%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	0	0.0%	1	4.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	1	0.3%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	6	1.7%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	13	3.6%	0	0.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.3%	4	9.8%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	291	81.1%	28	68.3%	16	64.0%

WEST HIGHLAND WHITE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Keratoconjunctivitis sicca	Not defined	1-4	NO
B.	Persistent pupillary membranes			
	- iris to iris	Not defined	1, 5	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
C.	Cataract	Presumed autosomal recessive	1, 5	NO
D.	Y-suture tip opacity	Not defined	1	Breeder option
E.	Retinal dysplasia - folds	Not defined	1	Breeder option

Description and Comments

A. Keratoconjunctivitis sicca

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

In the West Highland White Terrier, this disease has been reported more commonly in females than males.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the West Highland White Terrier, these membranes, when present, often bridge from the iris to the lens and may result in cataract with vision impairment.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

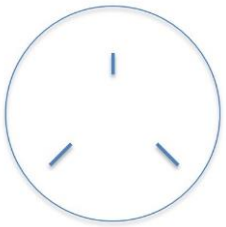
C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The cataract described in the West Highland White Terrier initially involves the posterior Y sutures and may infrequently progress, resulting in vision impairment. The age of onset is less than 6 months of age. A recessive mode of inheritance is suggested by the pedigrees which have been studied.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Sansom J, Barnett KC, Neumann W, et al. Treatment of keratoconjunctivitis sicca in dogs with cyclosporine ophthalmic ointment: a European clinical field trial. *Vet Rec*. 1995; 137: 504-507.

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OCULAR DISORDERS REPORT
WEST HIGHLAND WHITE TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	1,379		394		133	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	5	0.4%	0	0.0%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	2	0.1%	1	0.3%	3	2.3%
NASOLACRIMAL							
32.110	IMPERFORATE LOWER NASOLACRIMAL PUNCTUM	0	0.0%	2	0.5%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA	3	0.2%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	1	0.1%	0	0.0%	0	0.0%
70.700	CORNEAL DYSTROPHY	1	0.1%	0	0.0%	1	0.8%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	3	0.2%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	117	8.5%	29	7.4%	7	5.3%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	21	1.5%	3	0.8%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	0.4%	1	0.3%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	16	1.2%	7	1.8%	3	2.3%
93.760	PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.3%	0	0.0%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	21	1.5%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	112	8.1%	34	8.6%	6	4.5%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	21	1.5%	10	2.5%	2	1.5%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	11	0.8%	6	1.5%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	3	0.2%	4	1.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.1%	1	0.3%	0	0.0%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	26	1.9%	15	3.8%	1	0.8%
100.306	PUNCTATE CATARACT, NUCLEUS	10	0.7%	3	0.8%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	16	1.2%	17	4.3%	4	3.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	36	2.6%	2	0.5%	2	1.5%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	22	1.6%	5	1.3%	2	1.5%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	5	0.4%	0	0.0%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	0	0.0%	0	0.0%
100.315	INCIPIENT CATARACT, POSTERIOR SUTURES	5	0.4%	2	0.5%	2	1.5%
100.316	INCIPIENT CATARACT, NUCLEUS	14	1.0%	1	0.3%	4	3.0%
100.317	INCIPIENT CATARACT, CAPSULAR	10	0.7%	8	2.0%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.1%	2	0.5%	1	0.8%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	2	0.1%	1	0.3%	1	0.8%
100.325	INCOMPLETE CATARACT, POSTERIOR SUTURES	4	0.3%	0	0.0%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	0	0.0%	1	0.3%	0	0.0%
100.327	INCOMPLETE CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	0.8%
100.328	Y-SUTURE TIP OPACITIES	16	1.2%	12	3.0%	8	6.0%
100.330	GENERALIZED/ COMPLETE CATARACT	30	2.2%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***256***	***18.6%***	***90***	***22.8%***	***28***	***21.1%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	2	0.1%	0	0.0%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.2%	1	0.3%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	8	0.6%	1	0.3%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	46	3.3%	11	2.8%	4	3.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	3	0.2%	0	0.0%	0	0.0%

OCULAR DISORDERS REPORT
WEST HIGHLAND WHITE TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,379 #	 %	Year Examined: 2016-2020 Total # Dogs: 394 #	 %	Year Examined: 2021 Total # Dogs: 133 #	 %
RETINA Continued						
120.190 RETINAL DYSPLASIA, DETACHED	1	0.1%	0	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	14	1.0%	2	0.5%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	2	0.1%	0	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.1%	0	0.0%	1	0.8%
OPTIC NERVE						
130.150 OPTIC DISC COLOBOMA	2	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	33	2.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	17	1.2%	1	0.3%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	31	2.2%	17	4.3%	3	2.3%
NORMAL						
.000 NORMAL GLOBE	1,001	72.6%	276	70.1%	92	69.2%

WHIPPET

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Vitreous degeneration - syneresis	Not defined	1, 2	Breeder option	
D.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	3	NO	Mutation in the *NHEJ1* gene
E.	Retinal atrophy – generalized	Not defined	4	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment. This is a significant problem in the Whippet.

D. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly" and has been identified in the longhaired Whippet. The choroidal hypoplasia component is caused by a 7799 base pairs deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

E. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

References

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4. Somma A, Moreno J, Sato M, et al. Characterization of a novel form of Progressive Retinal Atrophy in Whippet dogs: a clinical, electroretinographic, and breeding study. Vet Ophth. 2016: 1-10.

OCULAR DISORDERS REPORT
WHIPPET

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	10,893		2,942		668	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE						
.110 MICROPHTHALMIA	1	0.0%	0	0.0%	0	0.0%
EYELIDS						
20.140 ECTOPIC CILIA	2	0.0%	0	0.0%	0	0.0%
22.000 ECTROPION, UNSPECIFIED	1	0.0%	0	0.0%	0	0.0%
25.110 DISTICHIASIS	7	0.1%	6	0.2%	0	0.0%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	0	0.0%	0	0.0%	1	0.1%
NICTITANS						
50.210 PLASMOMA/ ATYPICAL PANNUS	1	0.0%	0	0.0%	0	0.0%
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.0%	0	0.0%	0	0.0%
CORNEA						
70.210 PANNUS	5	0.0%	0	0.0%	1	0.1%
70.700 CORNEAL DYSTROPHY	37	0.3%	10	0.3%	1	0.1%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	5	0.0%	1	0.0%	0	0.0%
UVEA						
93.110 IRIS HYPOPLASIA	0	0.0%	2	0.1%	0	0.0%
93.120 IRIS CYST	15	0.1%	5	0.2%	1	0.1%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%	0	0.0%
93.170 ANTERIOR CHAMBER CYST	2	0.0%	1	0.0%	2	0.3%
93.180 IIRIS SPHINCTER DYSPLASIA	2	0.0%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	100	0.9%	44	1.5%	13	1.9%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	10	0.1%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	11	0.1%	0	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	16	0.1%	0	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	9	0.1%	5	0.2%	1	0.1%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	4	0.0%	4	0.1%	0	0.0%
93.810 UVEAL MELANOMA	0	0.0%	1	0.0%	0	0.0%
95.120 CILIARY BODY CYST	1	0.0%	2	0.1%	2	0.3%
FUNDUS						
97.110 CHOROIDAL HYPOPLASIA	19	0.2%	0	0.0%	0	0.0%
97.120 COLOBOMA	4	0.0%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	11	0.1%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	410	3.8%	109	3.7%	27	4.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	64	0.6%	48	1.6%	7	1.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	24	0.2%	7	0.2%	4	0.6%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	38	0.3%	20	0.7%	2	0.3%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	9	0.1%	3	0.1%	3	0.4%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	11	0.1%	20	0.7%	3	0.4%
100.306 PUNCTATE CATARACT, NUCLEUS	23	0.2%	15	0.5%	4	0.6%
100.307 PUNCTATE CATARACT, CAPSULAR	15	0.1%	15	0.5%	4	0.6%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	56	0.5%	29	1.0%	2	0.3%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	39	0.4%	5	0.2%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	55	0.5%	17	0.6%	2	0.3%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.0%	2	0.1%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	10	0.1%	2	0.1%	1	0.1%
100.316 INCIPIENT CATARACT, NUCLEUS	14	0.1%	6	0.2%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	19	0.2%	3	0.1%	0	0.0%

OCULAR DISORDERS REPORT
WHIPPET

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 10,893 #	 %	2016-2020 2,942 #	 %	2021 668 #	 %
LENS Continued						
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	8	0.3%	0	0.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.0%	5	0.2%	0	0.0%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	3	0.1%	1	0.1%
100.326 INCOMPLETE CATARACT, NUCLEUS	0	0.0%	2	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	5	0.0%	22	0.7%	8	1.2%
100.330 GENERALIZED/ COMPLETE CATARACT	16	0.1%	2	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	33	0.3%	2	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***412***	***3.8%***	***234***	***8.0%***	***41***	***6.1%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	16	0.1%	16	0.5%	4	0.6%
110.135 PHPV/ PTVL	11	0.1%	1	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	104	1.0%	45	1.5%	8	1.2%
110.320 VITREOUS DEGENERATION SYNERESIS	514	4.7%	72	2.4%	9	1.3%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	31	0.3%	9	0.3%	1	0.1%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	4	0.0%	5	0.2%	1	0.1%
120.190 RETINAL DYSPLASIA, DETACHED	4	0.0%	1	0.0%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	40	0.4%	10	0.3%	1	0.1%
120.400 RETINAL HEMORRHAGE	1	0.0%	0	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	4	0.0%	0	0.0%	0	0.0%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	1	0.0%	0	0.0%
120.960 RETINOPATHY	6	0.1%	5	0.2%	1	0.1%
OPTIC NERVE						
130.110 MICROPAPILLA	3	0.0%	1	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	3	0.0%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	14	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	114	1.0%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	233	2.1%	2	0.1%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	117	1.1%	129	4.4%	36	5.4%
NORMAL						
.000 NORMAL GLOBE	9,625	88.4%	2,479	84.3%	568	85.0%

WHITE SHEPHERD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Corneal dystrophy - epithelial/stromal	Not defined	1	Breeder option	

Description and Comments

A. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral. In the Mi-Ki, lesions are circular or semicircular central crystalline deposits in the anterior corneal stroma that appear between 2 and 5 years of age. It may be associated with exophthalmos and lagophthalmos common in these dogs.

References

There are no references providing detailed descriptions of hereditary ocular conditions of the White Shepherd breed. The conditions listed above are generally recognized to exist in this breed, as evidenced by identification on breed eye screening examinations and/or clinical experience of veterinary ophthalmologists.

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
WHITE SHEPHERD

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 17 #	 %	Year Examined: 2016-2020 Total # Dogs: 48 #	 %	Year Examined: 2021 Total # Dogs: 5 #	 %
CORNEA						
70.210 PANNUS	0	0.0%	2	4.2%	0	0.0%
70.700 CORNEAL DYSTROPHY	2	11.8%	4	8.3%	0	0.0%
UVEA						
93.170 ANTERIOR CHAMBER CYST	0	0.0%	0	0.0%	1	20.0%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	1	5.9%	0	0.0%	0	0.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	5.9%	3	6.3%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	2.1%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	1	2.1%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	1	5.9%	1	2.1%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	1	5.9%	0	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	2.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2***	***11.8%***	***4***	***8.3%***	***0***	***0.0%***
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	1	5.9%	0	0.0%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	1	5.9%	1	2.1%	1	20.0%
130.120 OPTIC NERVE HYPOPLASIA	1	5.9%	0	0.0%	0	0.0%
OTHER						
900.100 OTHER, NOT INHERITED	0	0.0%	1	2.1%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	5	10.4%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	10	58.8%	33	68.8%	4	80.0%

WHITE SWISS SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WHITE SWISS SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
WHITE SWISS SHEPHERD

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	2		21		14	
	Diagnostic Name	#	%	#	%	#	%
CORNEA							
70.700	CORNEAL DYSTROPHY	0	0.0%	1	4.8%	3	21.4%
UVEA							
93.170	ANTERIOR CHAMBER CYST	0	0.0%	1	4.8%	0	0.0%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	50.0%	1	4.8%	2	14.3%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	1	50.0%	0	0.0%	2	14.3%
100.307	PUNCTATE CATARACT, CAPSULAR	1	50.0%	0	0.0%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	0	0.0%	1	4.8%	0	0.0%
100.316	INCIPIENT CATARACT, NUCLEUS	0	0.0%	1	4.8%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***2***	***100.0%***	***2***	***9.5%***	***2***	***14.3%***
NORMAL							
.000	NORMAL GLOBE	1	50.0%	17	81.0%	9	64.3%

WINDSPRITE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WINDSPRITE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
WINDSPRITE

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1		39		27	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
VITREOUS						
110.320 VITREOUS DEGENERATION SYNERESIS	0	0.0%	0	0.0%	1	3.7%
NORMAL						
.000 NORMAL GLOBE	1	100.0%	39	100.0%	26	96.3%

WIRE FOX TERRIER*

*The Wire Fox Terrier and the Smooth Fox Terrier were originally considered two varieties of the same breed. They became separate breeds in 1985. It is likely that the same genetic diseases exist in both breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Glaucoma	Not defined	1, 2	NO	
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	3	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. The cataracts observed in Wire Fox Terrier begin in the posterior subcapsular region and are progressive.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Martin CL, Wyman M. Primary glaucoma in the dog. *Vet Clin North Am*. 1978;8:257-286.

3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384.

OCULAR DISORDERS REPORT
WIRE FOX TERRIER

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	297		41		6	
	Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
GLOBE							
.110	MICROPHTHALMIA	1	0.3%	0	0.0%	0	0.0%
EYELIDS							
25.110	DISTICHIASIS	8	2.7%	1	2.4%	0	0.0%
CORNEA							
70.700	CORNEAL DYSTROPHY	3	1.0%	0	0.0%	0	0.0%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	1	0.3%	0	0.0%	0	0.0%
UVEA							
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	92	31.0%	26	63.4%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	3	1.0%	2	4.9%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	5	1.7%	0	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES, IRIS SHEETS	1	0.3%	0	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	1	2.4%	0	0.0%
LENS							
100.200	CATARACT, UNSPECIFIED	4	1.3%	0	0.0%	0	0.0%
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	2	0.7%	0	0.0%	0	0.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	3	1.0%	0	0.0%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.3%	0	0.0%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	5	1.7%	0	0.0%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	5	1.7%	0	0.0%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	2	0.7%	0	0.0%	0	0.0%
100.314	INCIPIENT CATARACT, ANTERIOR SUTURES	1	0.3%	0	0.0%	0	0.0%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	1	0.3%	0	0.0%	0	0.0%
100.322	INCOMPLETE CATARACT, POSTERIOR CORTEX	1	0.3%	0	0.0%	0	0.0%
100.326	INCOMPLETE CATARACT, NUCLEUS	1	0.3%	0	0.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE CATARACT	8	2.7%	0	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***32***	***10.8%***	***0***	***0.0%***	***0***	***0.0%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	1	0.3%	0	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION SYNERESIS	1	0.3%	0	0.0%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	1	0.3%	0	0.0%	0	0.0%
120.310	GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	4	1.3%	0	0.0%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	3	1.0%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	12	4.0%	0	0.0%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	1	0.3%	0	0.0%	0	0.0%
NORMAL							
.000	NORMAL GLOBE	179	60.3%	14	34.1%	6	100.0%

WIREHAIRED POINTING GRIFFON

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Distichiasis	Not defined	1	Breeder option
B.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option
C.	Cataract	Not defined	1	NO
D.	Y-suture tip opacity	Not defined	1	Breeder option

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

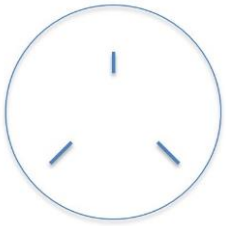
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
WIREHAIRED POINTING GRIFFON

	Year Examined:	1991-2016		2016-2020		2021	
	Total # Dogs:	472		364		120	
	Diagnostic Name	#	%	#	%	#	%
GLOBE							
.110	MICROPHTHALMIA	1	0.2%	0	0.0%	0	0.0%
EYELIDS							
21.000	ENTROPION, UNSPECIFIED	3	0.6%	2	0.5%	0	0.0%
25.110	DISTICHIASIS	3	0.6%	6	1.6%	2	1.7%
NICTITANS							
51.100	THIRD EYELID CARTILAGE ANOMALY	0	0.0%	1	0.3%	0	0.0%
52.110	PROLAPSED GLAND OF THE THIRD EYELID	1	0.2%	0	0.0%	0	0.0%
CORNEA							
70.210	PANNUS	0	0.0%	1	0.3%	0	0.0%
70.700	CORNEAL DYSTROPHY	1	0.2%	0	0.0%	1	0.8%
70.730	CORNEAL ENDOTHELIAL DEGENERATION	3	0.6%	0	0.0%	0	0.0%
UVEA							
93.110	IRIS HYPOPLASIA	0	0.0%	2	0.5%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	7	1.5%	7	1.9%	1	0.8%
93.750	PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	1	0.2%	2	0.5%	3	2.5%
LENS							
100.210	CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	34	7.2%	29	8.0%	6	5.0%
100.301	PUNCTATE CATARACT, ANTERIOR CORTEX	10	2.1%	8	2.2%	3	2.5%
100.302	PUNCTATE CATARACT, POSTERIOR CORTEX	3	0.6%	2	0.5%	0	0.0%
100.303	PUNCTATE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.3%	0	0.0%
100.304	PUNCTATE CATARACT, ANTERIOR SUTURES	1	0.2%	0	0.0%	1	0.8%
100.305	PUNCTATE CATARACT, POSTERIOR SUTURES	2	0.4%	4	1.1%	0	0.0%
100.306	PUNCTATE CATARACT, NUCLEUS	7	1.5%	8	2.2%	0	0.0%
100.307	PUNCTATE CATARACT, CAPSULAR	2	0.4%	4	1.1%	0	0.0%
100.311	INCIPIENT CATARACT, ANTERIOR CORTEX	3	0.6%	1	0.3%	0	0.0%
100.312	INCIPIENT CATARACT, POSTERIOR CORTEX	1	0.2%	4	1.1%	0	0.0%
100.313	INCIPIENT CATARACT, EQUATORIAL CORTEX	1	0.2%	1	0.3%	1	0.8%
100.316	INCIPIENT CATARACT, NUCLEUS	4	0.8%	4	1.1%	0	0.0%
100.317	INCIPIENT CATARACT, CAPSULAR	0	0.0%	0	0.0%	1	0.8%
100.321	INCOMPLETE CATARACT, ANTERIOR CORTEX	0	0.0%	0	0.0%	1	0.8%
100.328	Y-SUTURE TIP OPACITIES	2	0.4%	6	1.6%	2	1.7%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***36***	***7.6%***	***43***	***11.8%***	***9***	***7.5%***
VITREOUS							
110.120	PERSISTENT HYALOID ARTERY/ REMNANT	0	0.0%	2	0.5%	5	4.2%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.4%	1	0.3%	1	0.8%
110.320	VITREOUS DEGENERATION SYNERESIS	5	1.1%	1	0.3%	0	0.0%
RETINA							
120.170	RETINAL DYSPLASIA, FOLDS	4	0.8%	1	0.3%	0	0.0%
120.180	RETINAL DYSPLASIA, GEOGRAPHIC	1	0.2%	0	0.0%	0	0.0%
120.400	RETINAL HEMORRHAGE	1	0.2%	0	0.0%	0	0.0%
120.960	RETINOPATHY	0	0.0%	1	0.3%	0	0.0%
OTHER							
900.000	OTHER, UNSPECIFIED	6	1.3%	0	0.0%	0	0.0%
900.100	OTHER, NOT INHERITED	2	0.4%	1	0.3%	0	0.0%
900.110	OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	8	1.7%	12	3.3%	7	5.8%
NORMAL							
.000	NORMAL GLOBE	411	87.1%	298	81.9%	94	78.3%

WIREHAIRED VIZSLA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
WIREHAIRED VIZSLA

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	119		105		30	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
EYELIDS						
25.110 DISTICHIASIS	0	0.0%	1	1.0%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	3	2.5%	0	0.0%	0	0.0%
CORNEA						
70.700 CORNEAL DYSTROPHY	0	0.0%	1	1.0%	0	0.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	10	8.4%	4	3.8%	1	3.3%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	11	9.2%	5	4.8%	2	6.7%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	18	15.1%	7	6.7%	3	10.0%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	6	5.0%	0	0.0%	0	0.0%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	1	0.8%	0	0.0%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	1	0.8%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	2	1.7%	0	0.0%	0	0.0%
100.306 PUNCTATE CATARACT, NUCLEUS	1	0.8%	2	1.9%	1	3.3%
100.307 PUNCTATE CATARACT, CAPSULAR	6	5.0%	2	1.9%	1	3.3%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	0	0.0%	2	1.9%	0	0.0%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	0	0.0%	0	0.0%	1	3.3%
100.316 INCIPIENT CATARACT, NUCLEUS	1	0.8%	0	0.0%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	0	0.0%	0	0.0%	2	6.7%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	1	1.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.8%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***19***	***16.0%***	***7***	***6.7%***	***5***	***16.7%***
VITREOUS						
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.8%	0	0.0%	1	3.3%
110.320 VITREOUS DEGENERATION SYNERESIS	1	0.8%	0	0.0%	0	0.0%
RETINA						
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.8%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	4	3.4%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	0	0.0%	1	1.0%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	3	2.5%	6	5.7%	2	6.7%
NORMAL						
.000 NORMAL GLOBE	90	75.6%	82	78.1%	21	70.0%

WORKING KELPIE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WORKING KELPIE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
WORKING KELPIE

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	0		1		1	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
NORMAL						
.000 NORMAL GLOBE	0		1	100.0%	1	100.0%

XOLOITZCUINTLI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TEST(S) AVAILABLE
A.	Cataract	Not defined	1	NO	
B.	Retinal atrophy (*prcd)*	Autosomal recessive	2, 3	NO	Mutation in the *prcd* gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

3. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. PLoS Genet. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
XOLOITZCUINTLI

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 53 #	 %	2016-2020 108 #	 %	2021 51 #	 %
EYELIDS						
25.110 DISTICHIASIS	1	1.9%	0	0.0%	1	2.0%
UVEA						
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	1.9%	3	2.8%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	0	0.0%	3	2.8%	1	2.0%
LENS						
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	3	2.8%	4	7.8%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	0	0.0%	0	0.0%	3	5.9%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	0	0.0%	1	0.9%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.9%	3	5.9%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	2	3.8%	1	0.9%	0	0.0%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	5	9.4%	3	2.8%	0	0.0%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	2	3.8%	1	0.9%	0	0.0%
100.317 INCIPIENT CATARACT, CAPSULAR	2	3.8%	1	0.9%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	0.9%	1	2.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***11***	***20.8%***	***9***	***8.3%***	***7***	***13.7%***
VITREOUS						
110.320 VITREOUS DEGENERATION SYNERESIS	0	0.0%	1	0.9%	1	2.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	0	0.0%	0	0.0%	1	2.0%
120.180 RETINAL DYSPLASIA, GEOGRAPHIC	1	1.9%	0	0.0%	0	0.0%
OTHER						
900.100 OTHER, NOT INHERITED	0	0.0%	1	0.9%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	4	3.7%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	46	86.8%	91	84.3%	42	82.4%

YAKUTIAN LAIKA

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the YAKUTIAN LAIKA breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
YAKUTIAN LAIKA

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	2		16		8	
Diagnostic Name	**#**	**%**	**#**	**%**	**#**	**%**
UVEA						
93.120 IRIS CYST	1	50.0%	0	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	1	50.0%	0	0.0%	0	0.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	1	50.0%	0	0.0%	0	0.0%
OTHER						
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	0	0.0%	1	6.3%	0	0.0%
NORMAL						
.000 NORMAL GLOBE	1	50.0%	15	93.8%	8	100.0%

YORKSHIRE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Keratoconjunctivitis sicca	Not defined	1, 2	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Lens luxation	Autosomal recessive	3-5	NO	Mutation in the *ADAMTS17* gene
F.	Vitreous degeneration	Not defined	1	Breeder option	
G.	Retinal atrophy - generalized	Not defined	1	NO	

Description and Comment

A. Keratoconjunctivitis sicca

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment. There is evidence that Yorkshire Terriers sometimes present with severe, congenital, unilateral keratoconjunctivitis sicca (KCS) and it is suspected this is due to hypoplasia or aplasia of the gland.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

F. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

G. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA is inherited as an autosomal recessive trait in most breeds.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Herrera HD, Weichsler N, Gomez JR, et al. Severe, unilateral, unresponsive keratoconjunctivitis sicca in 16 juvenile Yorkshire Terriers. *Vet Ophthalmol.* 2007;10:285-288.

3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011;14:378-384.

4. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci*. 2010;51:4716-4721.

5. Walde I. Retinal and corneal dysplasias in the Yorkshire Terrier and other breeds in Austria. *Tiereztliche Praxix.* 1997;25:62.

OCULAR DISORDERS REPORT
YORKSHIRE TERRIER

Year Examined:	1991-2016		2016-2020		2021	
Total # Dogs:	1,573		641		290	
Diagnostic Name	#	%	#	%	#	%
GLOBE						
.110 MICROPHTHALMIA	3	0.2%	3	0.5%	0	0.0%
10.000 GLAUCOMA	1	0.1%	0	0.0%	0	0.0%
EYELIDS						
21.000 ENTROPION, UNSPECIFIED	0	0.0%	1	0.2%	0	0.0%
25.110 DISTICHIASIS	33	2.1%	7	1.1%	0	0.0%
NASOLACRIMAL						
40.910 KERATOCONJUNCTIVITIS SICCA	5	0.3%	2	0.3%	0	0.0%
NICTITANS						
52.110 PROLAPSED GLAND OF THE THIRD EYELID	1	0.1%	0	0.0%	0	0.0%
CORNEA						
70.210 PANNUS	4	0.3%	0	0.0%	0	0.0%
70.220 PIGMENTARY KERATITIS	4	0.3%	0	0.0%	0	0.0%
70.700 CORNEAL DYSTROPHY	12	0.8%	4	0.6%	1	0.3%
70.730 CORNEAL ENDOTHELIAL DEGENERATION	1	0.1%	0	0.0%	0	0.0%
UVEA						
93.110 IRIS HYPOPLASIA	1	0.1%	0	0.0%	1	0.3%
93.710 PERSISTENT PUPILLARY MEMBRANES, IRIS TO IRIS	154	9.8%	49	7.6%	15	5.2%
93.720 PERSISTENT PUPILLARY MEMBRANES, IRIS TO LENS	4	0.3%	0	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES, IRIS TO CORNEA	4	0.3%	2	0.3%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES, LENS PIGMENT FOCI/ NO STRANDS	12	0.8%	14	2.2%	5	1.7%
93.760 PERSISTENT PUPILLARY MEMBRANES, ENDOTHELIAL OPACITY/ NO STRANDS	2	0.1%	0	0.0%	0	0.0%
LENS						
100.200 CATARACT, UNSPECIFIED	23	1.5%	0	0.0%	0	0.0%
100.210 CATARACT. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	51	3.2%	10	1.6%	4	1.4%
100.301 PUNCTATE CATARACT, ANTERIOR CORTEX	33	2.1%	16	2.5%	1	0.3%
100.302 PUNCTATE CATARACT, POSTERIOR CORTEX	12	0.8%	2	0.3%	0	0.0%
100.303 PUNCTATE CATARACT, EQUATORIAL CORTEX	6	0.4%	0	0.0%	1	0.3%
100.304 PUNCTATE CATARACT, ANTERIOR SUTURES	5	0.3%	0	0.0%	0	0.0%
100.305 PUNCTATE CATARACT, POSTERIOR SUTURES	5	0.3%	3	0.5%	1	0.3%
100.306 PUNCTATE CATARACT, NUCLEUS	1	0.1%	3	0.5%	1	0.3%
100.307 PUNCTATE CATARACT, CAPSULAR	1	0.1%	4	0.6%	1	0.3%
100.311 INCIPIENT CATARACT, ANTERIOR CORTEX	24	1.5%	12	1.9%	12	4.1%
100.312 INCIPIENT CATARACT, POSTERIOR CORTEX	16	1.0%	7	1.1%	11	3.8%
100.313 INCIPIENT CATARACT, EQUATORIAL CORTEX	15	1.0%	4	0.6%	1	0.3%
100.314 INCIPIENT CATARACT, ANTERIOR SUTURES	2	0.1%	1	0.2%	19	6.6%
100.315 INCIPIENT CATARACT, POSTERIOR SUTURES	3	0.2%	1	0.2%	20	6.9%
100.316 INCIPIENT CATARACT, NUCLEUS	3	0.2%	0	0.0%	12	4.1%
100.317 INCIPIENT CATARACT, CAPSULAR	1	0.1%	1	0.2%	0	0.0%
100.321 INCOMPLETE CATARACT, ANTERIOR CORTEX	2	0.1%	5	0.8%	3	1.0%
100.322 INCOMPLETE CATARACT, POSTERIOR CORTEX	0	0.0%	3	0.5%	2	0.7%
100.323 INCOMPLETE CATARACT, EQUATORIAL CORTEX	0	0.0%	1	0.2%	0	0.0%
100.324 INCOMPLETE CATARACT, ANTERIOR SUTURES	0	0.0%	1	0.2%	0	0.0%
100.325 INCOMPLETE CATARACT, POSTERIOR SUTURES	0	0.0%	1	0.2%	0	0.0%
100.326 INCOMPLETE CATARACT, NUCLEUS	1	0.1%	1	0.2%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.1%	2	0.3%	0	0.0%
100.330 GENERALIZED/ COMPLETE CATARACT	28	1.8%	1	0.2%	0	0.0%
100.375 SUBLUXATION/ LUXATION, UNSPECIFIED	1	0.1%	0	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***182***	***11.6%***	***69***	***10.8%***	***85***	***29.3%***
VITREOUS						
110.120 PERSISTENT HYALOID ARTERY/ REMNANT	2	0.1%	3	0.5%	0	0.0%

OCULAR DISORDERS REPORT
YORKSHIRE TERRIER

Diagnostic Name	Year Examined: 1991-2016 Total # Dogs: 1,573 #	 %	2016-2020 641 #	 %	2021 290 #	 %
VITREOUS Continued						
110.135 PHPV/ PTVL	4	0.3%	1	0.2%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	6	0.4%	5	0.8%	2	0.7%
110.320 VITREOUS DEGENERATION SYNERESIS	14	0.9%	7	1.1%	3	1.0%
RETINA						
120.170 RETINAL DYSPLASIA, FOLDS	7	0.4%	1	0.2%	0	0.0%
120.310 GENERALIZED PROGRESSIVE RETINAL ATROPHY (PRA)	53	3.4%	4	0.6%	1	0.3%
120.920 RETINAL DETACHMENT WITH DIALYSIS	0	0.0%	2	0.3%	1	0.3%
120.960 RETINOPATHY	4	0.3%	1	0.2%	0	0.0%
OPTIC NERVE						
130.110 MICROPAPILLA	0	0.0%	1	0.2%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	3	0.2%	0	0.0%	0	0.0%
130.150 OPTIC DISC COLOBOMA	1	0.1%	0	0.0%	0	0.0%
OTHER						
900.000 OTHER, UNSPECIFIED	19	1.2%	0	0.0%	0	0.0%
900.100 OTHER, NOT INHERITED	26	1.7%	2	0.3%	0	0.0%
900.110 OTHER. SUSPECT NOT INHERITED/ SIGNIFICANCE UNKNOWN	22	1.4%	24	3.7%	10	3.4%
NORMAL						
.000 NORMAL GLOBE	1,195	76.0%	477	74.4%	221	76.2%