Background to the prcdPRA Gene Test
December 2005

This article was written by Julie Vaughan, the Breed Health Co-ordinator at the time, for the Christmas 2005 edition of the Newsletter for members of the Finnish Lapphund Club of Great Britain.

The club is very grateful for all the work done by Julie to get the test developed for the good of the breed. Updates to the original article are given in italics below. For any questions, please contact the current Breed Health Co-ordinator at health@finnishlapphund-club.co.uk. See club website for full contact details.

Last updated December 2009 by Michaela Grabowski, Health Co-ordinator.

NEW PRA GENE TEST

Most of you will be aware of the wonderful news that we now have a gene test for Progressive Retinal Atrophy (PRA) in our breed. This was announced in November 2005 and the test made publicly available by the USA lab Optigen at the beginning of December. The gene identified is the progressive rod cone degeneration (prcd) PRA.

This article aims to answer some questions you may have as owners and/or breeders of Finnish Lapphunds and to give you information on procedure to follow.

What is prcdPRA?

PRA refers to a group of diseases that cause the retina of the eye to degenerate slowly over time. The result is declining vision and eventual blindness. There are several types of PRA identified in dogs, which are all clinically similar, and the prcd type is known to occur in several other breeds in addition to the Finnish Lapphund.

A Little About The History

Our breed was first introduced to the UK in 1991 and through the early and mid part of the decade there was slow but steady increase in numbers through breeding and further imports. The founder committee was prudent in including in our code of ethics, a clause requiring all breeding stock to be health tested including eye examination. No PRA had been found but news of increasing numbers of affected dogs in Finland was slowly revealing that much of the founder UK bloodlines carried high PRA risk. This of course was a major concern to us in the UK.

In 1998, at a canine genetics seminar, I was fortunate to meet and have the opportunity to speak with Dr David Sargan of Cambridge University, who was already working on PRA DNA in other breeds. Dr Sargan was interested in our breed but reluctant to promise a research programme as having no identified PRA affecteds in the UK, we had no dogs of certain PRA genotype to provide research material.

In March 1999 I joined the committee to pursue this on behalf of the club and in September of that year the first UK case of PRA was diagnosed, my own bitch Robyn – Sulyka Lindu of Carlacot (Sulyka Lecibsin Nilla x Lecibsin Loru of Sulyka). This was closely followed by Mossdown Marianna's (Staalon Runne x Sulyka Lecibsin Outi of Mossdown) diagnosis, which gave us sufficient material on which to base the research. Headed by Drs David Sargan and Jesús Aguirre-Hernández, the research commenced in June 2000.

Because of the strict laws surrounding animal research, Cambridge University were not permitted to solicit DNA material for this project and this is why all requests for blood samples were initially through me. These were restricted to the affecteds and their first degree relatives (parents, siblings & offspring) to provide the most useful samples. I then heard of a Finnish eye specialist vet with an interest in our breed,

who had already started collecting samples for the purpose of research. It was a great boost to the project when it was agreed that these deep frozen bloods would be sent over to Cambridge. Further donations of bloods have come from individual owners in Finland and other European countries and one from the USA. In total, 88 samples were used in the research. In addition, we have also had samples from the two related breeds, Lapponian Herders and Swedish Lapphunds, where PRA has also been observed.

After four years of research at Cambridge, the mutation gene was isolated to one end of chromosome 9 and a marker test of 90% accuracy developed. This was obviously not sufficiently accurate to make publicly available and furthermore the researchers suspected that our PRA mutation was the prcd gene, even though this had not been reported from initial research. The prcd gene had already been mapped to this chromosome location and patented by the USA lab Optigen which already had commercial marker tests in several other breeds. So in June 2004, DNA from some of our dogs was sent to the USA researchers to confirm that this was our breed's PRA type.

In June 2005, the USA lab announced that they had developed a direct gene mutation test for the prcd gene. Unlike the marker tests this gives total accuracy so replacing these in all the relevant breeds. In November 2005 it was finally announced by Optigen that the Finnish Lapphund PRA was indeed prcd.

Could there be another PRA type in the breed?

[Update December 2009: Optigen confirmed on 2nd Nov 09 that there is at least one more type of PRA in the Finnish Lapphund breed and only one is detectable with the current Optigen gene test: prcdPRA].

It has been suspected for some time that there could be more than one type of PRA in the Finnish Lapphund and for this reason I have not produced updates of the risk assessment table that was published in the newsletter following the initial diagnoses. Results from two of the prcd tests on the donated bloods have given results that are not consistent with expected genotype from ophthamoscopy and/or pedigree data. A further two results, where prcd status is not known, show a discrepancy between the Cambridge marker test and ophthalmoscopy and/or pedigree data. Possible explanations for the discrepancies are, either a recombinant (mistake in the marker test) has occurred or a second PRA type is becoming evident. This together with results from the marker test, which indicate that the closely related breed, the Lapponian Herder does not share the same PRA gene, provides further evidence of a second PRA type in the Finnish Lapphund.

AHT Blood Banking

[Update December 2009: samples are still very important for further research on conditions in Finnish Lapphunds though nowadays cheek swabs can be used which are far easier to take. Samples are needed from Finnish Lapphunds by the AHT and the University of Helsinki. See the Health section on the web site for details).

This project, run by The Animal Health Trust, continues in its long-term aim of improving animal health through DNA research. The AHT is the only charity specifically dedicated to improving the health and welfare of horses, dogs, and cats by addressing the problems of disease and injury see www.aht.org.uk The club recommends that we all continue to support this project so that the Finnish Lapphund breed may benefit from the research. The release of the Optigen prcdPRA test does not mean we should stop supporting the Blood Bank, since there are other health issues which need to be addressed e.g. hereditary cataracts.

If owners are going to get a blood sample taken for the Optigen prcdPRA gene test, then please consider obtaining a sample for the Animal Health Trust too. This will help with the AHT's future research and hopefully save you some money! Full details are on the club's website http://www.finnishlapphund-club.co.uk/ under Health.

Where do we go from here?

[Update December 2009: The breeding recommendations are now part of the Breed Code of Ethics and have been implemented to prevent any more dogs being bred with the prcdPRA eye condition. All members and breeders of the club have agreed to follow these mandatory rules. See website for more details).

There is a set protocol of breeding recommendation where a new DNA test is developed. The UK Kennel Club's geneticist Dr Jeff Sampson has supplied the following:

All breeding stock should be DNA tested before being used in a mating programme.

Identified carriers should NOT be mated to another carrier.

Carriers can be mated to a DNA tested clear dog. If this is done, the progeny of such a mating should be DNA tested to identify the carrier and clear progeny. Any untested progeny from such a mating should be endorsed 'progeny not eligible for registration'. Such endorsements to be lifted only after the dog has been DNA tested.

Affected dogs can be mated to a DNA tested clear dog; all progeny to be endorsed 'progeny not eligible for registration'. These endorsements to be lifted only if the dog is to be mated to a DNA tested clear dog.

The progeny of two DNA tested clear dogs will be labelled 'hereditarily clear' on the Registration Database. However, it is recommended that all hereditarily clear dogs should be DNA tested before mating, to confirm their status.

These recommendations are set to allow continued breeding from DNA tested carriers and affecteds as well as normal, mutation free dogs, whilst ensuring that PRA affecteds are never again produced. The inclusion of carriers and affecteds is to discourage the overuse of selected PRA free dogs which could drastically reduce the gene pool and unintentionally give rise to increase in other diseases, (either already identified conditions or as yet, unknown in the breed). Also to minimise the loss of possibly important bloodlines, which may be more affected by PRA than others. This is of particular importance in a numerically small breed such as the Finnish Lapphund where the gene pool is already restricted.

The development of this test does not of course eliminate the need for continued eye testing by ophthalmoscopy. Other eye disorders do occur in the breed and there remains the possibility of a second PRA type which could be clinically identical to prcd.

What Should You Do if you Currently Own a Finnish Lapphund?

[Update December 2009: all the results of the prcdPRA gene tests are now available from the KC and published on the club website under Health]

You may or may not decide to find out the prcdPRA status of your dog: normal, carrier or affected. We anticipate that many owners will not take any action and this is perfectly acceptable. It is only really essential to find out, if you are intending to breed from your dog in the future. If you do decide to find out, then the following should give some guidance:

Contact *[the Breed Health Co-ordinator at health@finnishlapphund-club.co.uk],* to get an assessment of the risk of your pet being Normal, a Carrier or an Affected dog.

Contact the breeder of your dog. The breeder will be able to tell you if the sire and dam are going to be tested with the Optigen prcdPRA test. If the results indicate that your dog may be a Carrier or Affected then contact me for further advice.

If you would rather find out directly whether your dog is Normal, a Carrier or Affected, then you will need to arrange a test with Optigen in the USA. The details are described separately in this newsletter. *[See the website for the links on getting a test done].*

The current prcdPRA Results from Optigen

These results are from the UK blood samples originally provided to Cambridge University and which were then passed to the USA lab. Optigen has released these results and the owners have agreed to make the results public:

[Update December 2009: the results are published on the club website]

Name	Sex	Sire	Dam	Prcd status
Elbereth Kaiku	F	Staalon Runne of Sulyka	Sulyka Mischa at Elbereth	carrier
Glenchess Hunaja	F	Sulyka Lecibsin Nilla	Elbereth Kaiku	normal
Glenchess Sable Night	F	Sulyka Lecibsin Nilla	Elbereth Kaiku	carrier
Glenchess Topolino	M	Sulyka Lecibsin Nilla	Elbereth Kaiku	affected
Mossdown Marianna	F	Staalon Runne of Sulyka	Lecibsin Outi of Mossdown	affected

Name	Sex	Sire	Dam	Prcd status
Mossdown Markko	M	Staalon Runne of Sulyka	Lecibsin Outi of Mossdown	normal
Sulyka Reko	M	Sulyka Lecibsin Nilla	Lecibsin Loru of Sulyka	affected
Tsinghuan Poarka at Chelville	M	Masi	Lecibsin Henriikka	normal

Marker Test Results

[Update December 2009: the results are now published on the club website]
In dogs where the prcd status is not available it may be useful to know the Cambridge marker test result, which gives an indication of genotype. It must be understood that this is a prediction only, having an accuracy of 90%, which can give false negatives as well as false positives. The marker test results must not be used as an indication of definite gene status of these dogs or their offspring and so should not be used to avoid the necessity of prcd testing. I have the results of all the dogs involved in the research but of course where prcd status is known, the marker test result becomes redundant. The dogs listed below are those in the UK that participated in the research and for which the prcd status is not available. These samples were either not sent to Optigen or the blood was not of sufficient quality to perform the test. Owners of these who wish to know their result and have not already been informed, should contact me.

Carlacot Adagio at Chelville
Carlacot Alyssum
Carlacot Aurora of Mavanne
Carlacot Azure
Heldalan Fidel
Mossdown Marianna
Sulyka Karri
Sulyka Lindu of Carlacot
Sulyka Mella of Millermead
Sulyka Mischa at Elbereth
Sulyka Rauni at Bekkis
Sulyka Valio at Curdeleon
Staalon Runne
Sulyka Lecibsin Inka
Sulyka Lecibsin Nilla

Finally I would like to thank everyone who has helped in this project, including the owners who contributed samples at their own expense and everyone who gave support and helped with translations and distribution of information. The effort has been worldwide. If I can be of help with any points raised in this or any other health matters, then please don't hesitate to contact me.

Julie Vaughan
Health Co-ordinator