Bodo Bäckmo
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<u>**Eye health, status as per end of 2010**</u>

Up to, and including 2010, the ophtalmologic protocols in Sweden have not been fully coherent with the ECVO standards, making direct international comparisons diffuse. However, from 2011-01-01 and onwards, the ECVO procedure is implemented.

Since it is of interest to see what effects the change may have for the interpretation of the eye health of our domestic population, this survey has the double purpose of beeing a benchmark of past achievements for future comparisons, as well as beeing a compass for breeding purposes to come.

Sources
A) The official database from SKK, showing number of eye controls based on <u>yearly groups of litters.</u> This means that in the end of each calendar year, the individuals controlled that year are distributed to the respective year of birth, adding to the previously accumulated volume. This source uses the latest diagnose for each individual as input to the overall result. When a list of diagnoses is extracted however, the total number of diagnoses are displayed, which may seem confusing.
B) A detailed mapping of individual health status, compiled by Ms Anna Borg, Board member of the Pinschersection. This shows all individual data, including health and mental status, based on calendar year events. Thus, it is not directly comparative with the SKK data, but it has allowed an analysis showing the debut of defects versus dog age, which had not been feasible otherwise.
C) Official data from the Finnish breeding committee, supplied by Ms Karoliina Suomalainen of the Finnish breeding committee.
D) Personal info from the Norwegian horizon, made available by Ms Irene Kuisma of the Norwegian breeding committee.
E) Data covering conditions in Germany, compiled and supplied by Mr Dieter Kuschinsky; officially responsive for breeding matters in the PSKD.

Note
Since the sources are collected and scrutinized over differing periods of time, there will be minor variations in overall results, when compared. Those variations are random in character and do not change the overall picture.

Results, overall
The overall view for Sweden is first presented as the total number of examined individuals, based on year of birth. Where multiple controls have been performed on an individual, there is still only one notation for that specific individual. A major concern has been hereditary defects; primarily cataracts. For the international comparison, the Swedish information here has been rearranged to include all cataracts; other defects are excluded. A listing of all defects is found in appendix I.

In 2002, the club introduced a recommendation that all dogs used for breeding should be examined; those who were not would be marked with a colour code in the whelping list et c.. The reason for this measure was observations that indicated an increasing rate of various cataracts, the majority inherited. These observations seemed to be confirmed by the statistics from the years around the millennium shift, where roughly 77 % of the controlled individuals were unaffected. Here it must be noted, that the number of controls are too few to validate the conclusion.
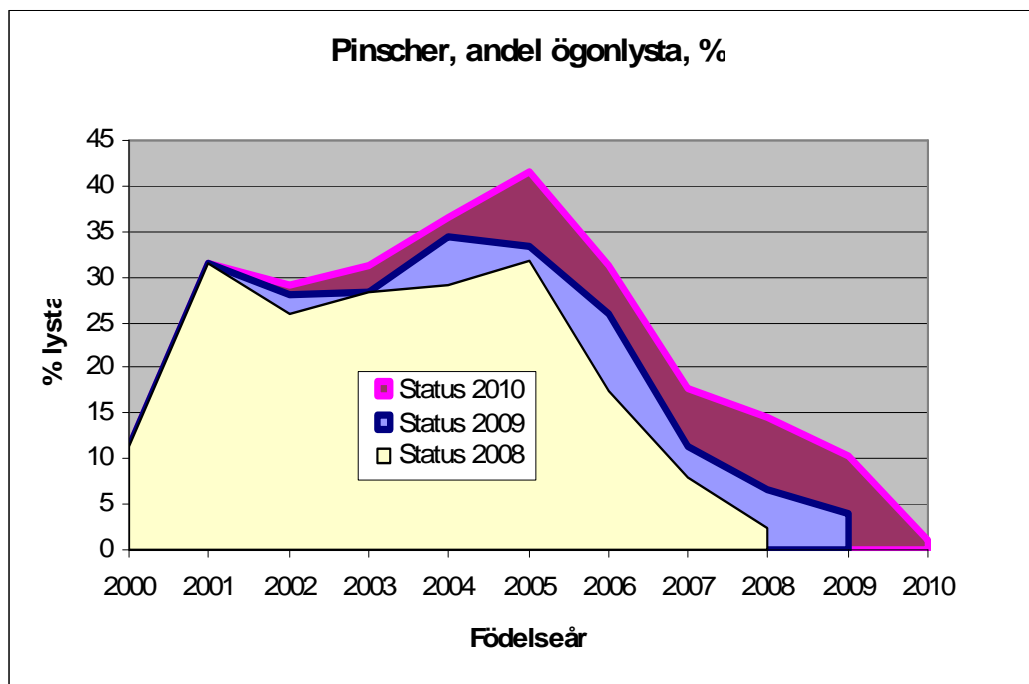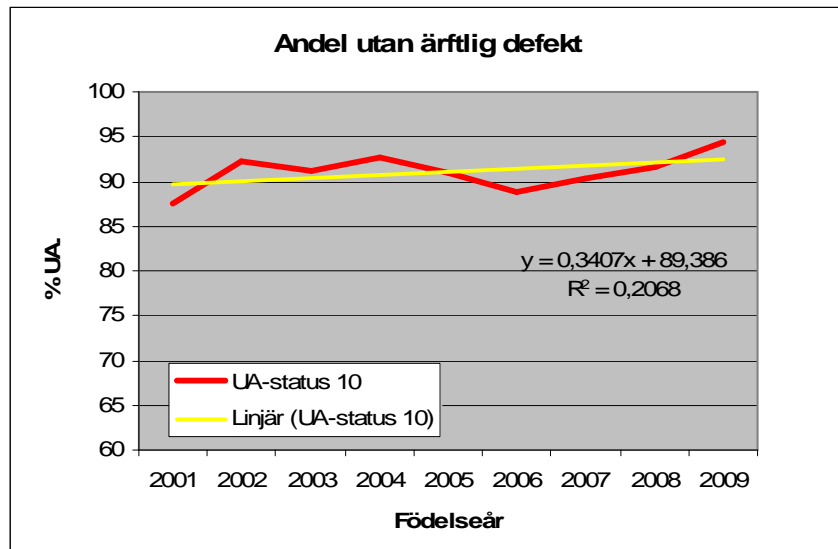

Proportion of controlled dogs in relation to the number born domestically.
Key: "Födelseår"; year of birth, "andel ögonlysta, %"; percentage controlled.

Based on the situation 2008, it is seen that the percentage controlled has steadily increased from ~26 %. As an example, we see from the 2010 status that there has been one dog from 2002 controlled in 2010 at the age of 8. The 2005 litters are now controlled to 42 percent, a very high number. At the end of 2010, a total of 331 dogs were checked at ~490 occations. In the year 2010, a total of 70 dogs were tested.

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Status 2010-12-30, accumulated 2000-2010
Y of birth   Number   Proportion   Her. diagn   % her. d.   Prop UA
2000         9        11 %         0            0,0         100
2001         24       32           3            12,5        88
2002         26       29           2            7,7         92
2003         34       31           3            8,8         91
2004         54       36           4            7,4         93
2005         55       42           5            9,1         91
2006         54       31           6            11,1        89
2007         31       18           3            9,7         90
2008         24       15           2            8,3         92
2009         18       10           1            5,6         94
2010         2        1            0            0           100
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The tabulation above shows that the control rate became high right from the start; the breeders adopted to the recommendation very quickly. In the other end, we see from the percentage controlled from the 2007 litters and onwards, that these litters are not yet "fully controlled", due to their low age. In the years to come, there will be additional individuals controlled from these litters, adding to the accumulated data.

Using data from the litters 2002-2007 as representative, we find a mean value of 91 percent of the domestic population unaffected by hereditary eye defects. In a wild population, mutations and random incidents are estimated to be some 5-6 % (P E Sundgren), which tells us we can still achieve a slight improvement by changing breeding strategy, see below.


Andel utan ärftlig defekt

$y = 0,3407x + 89,386$
$R^2 = 0,2068$

Key:
— UA-status 10
— Linjär (UA-status 10)

Y-axis: % UA
X-axis: Födelseår

Percentage, non-affected per year, referring to year of birth.
Key: Red shows annual variation, Yellow shows linear trend. Note that values for 2009 are not fully relevant!

Results, age at debuting defect
In the past, various opinions have been waved concerning the age of our dogs, when defects are showing. This issue has a major impact on breeding strategy and is subject to a separate analysis here. It includes one additional defect, discovered in January 2011, making for a total of 30.

From the diagram below, it is seen that for the pinscher population in Sweden, and with the present praxis of testing, <u>the majority of defects (~80 %) are discovered before the age of 6 years.</u> Although there is a lack of control evidence from older dogs, we find that the bulk of defects show up in the fertile group (1-6 years), mostly used in breeding.

(Please note that the raw data for this analysis covers a different period of time than the rest of the work. Its validity is equal though, since the volume of data is relevant.)
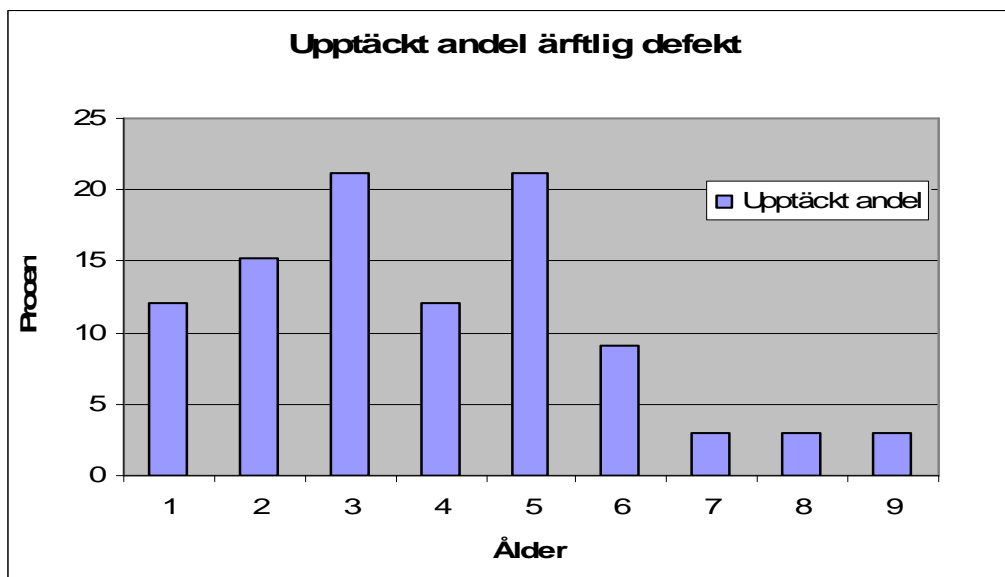
Percentage of discovered defects per dog age, as function of total of defects. Key: "Ålder"; age.

This means that we have a slight possibility for further improvements through postponing the breeding debut for our dogs. With a late debut of defects, that would be extremely difficult, since most dogs were then already used in breeding, before any defects could be detected.

Example: With a mean fertile age of 6 years, and a fresh control protocol directly from the ophtalmolog, we have the following situation ("Avelsdebut"; breeding debut):

Med fertil ålder tom 6 år:

Avelsdebut 2 år	år 1+2	9 st	30%
	år 3+4+5+6	21 st	70%
Avelsdebut 3 år	år 1+2+3	16 st	54%
	4+5+6	14 st	46%

The matrix shows that with a breedng debut at the age of two years, there will be 9 defects discovered out of a total of 30 before the first mating. If the breeding debut could be postponed for just one year in general, there would be another 7 defects coming to the surface and thus possible to avoid.


NOTE
In the worst scenario, a two year stud dog and an 18 month bitch could be used, both having a one year old protocol. This mating would abide to the rules, but there would only be a possibility to discover 4 defects, or 13 %, leaving a remaining risk of 87 % for later development of defects!

International comparison

Germany

The data recieved from Mr Kuschinsky (source E) has been replotted below, showing annual variation in percent unaffected in Germany (blue), compared to Sweden (red). The "Tot" line shows total number of controlled dogs per annum in Germany. "Defect" shows total number of defects.

It should be observed that, like the Swedish figures, the German include not only hereditary cataracts, but other hereditary defects as well. These, other defects are regarded insignificant by Mr Kuschinsky, who says the main concern in Germany is cataracts. This finding is in line with the Swedish results.
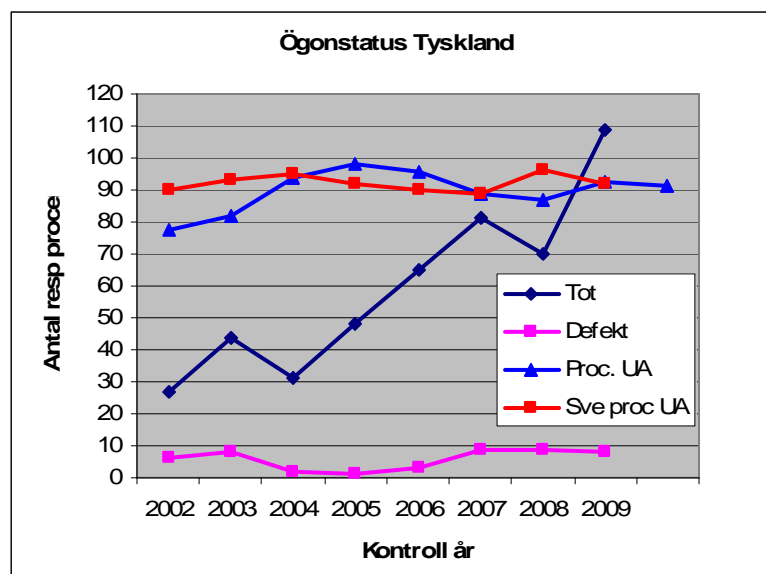
Regarding age of debut of defects, Mr Kuschinsky refers to information from a number of German veterinary clinics, dating back to 2006. Out of a total of 8 diagnosed cataracts, 5 were operated at the age of 2.5 – 3 years, 2 at 5 – 6.5 years and one at the age of 9. Although this information is not statistically significant, it supports the findings in the Swedish population.

Finland
The information from Finland is explicitly adressing hereditary cataracts, and is presented in three groups, based on the age of the examined dogs. Up to 2009, a total of 371 individuals have been examined. Of those, 17 % have been diagnosed with a hereditary cataract. Other defects are not mentioned. In the following diagram the Finnish results are plotted together with Swedish data for comparison. In the diagram below, the Swedish data shows all detected cataracts, non-hereditary included; other diagnoses are excluded.
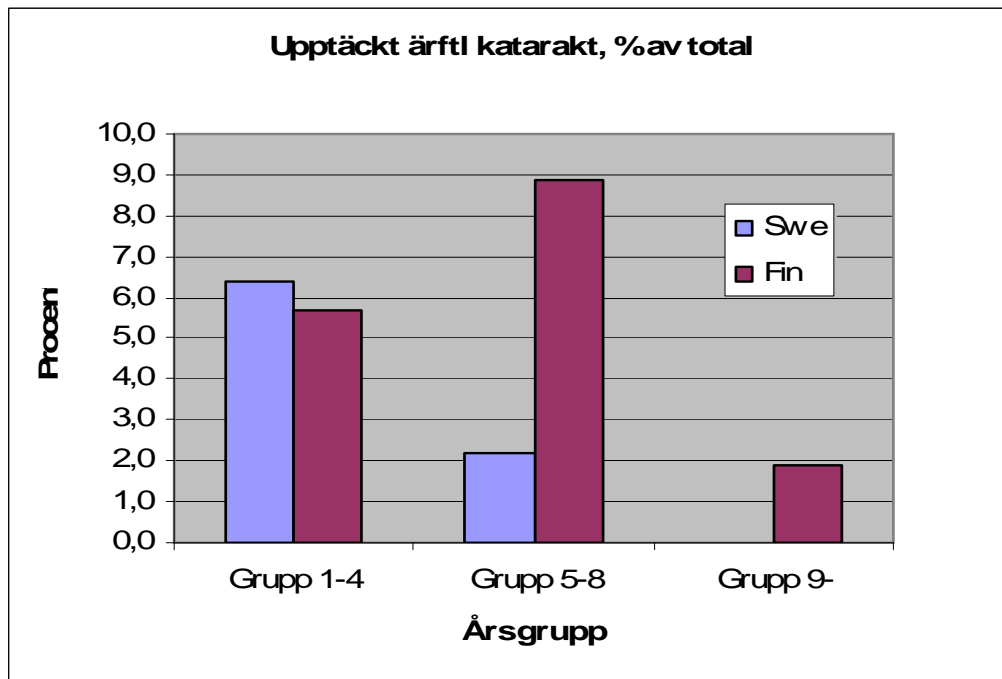

*Discovered percentage of HC in Finland and Sweden in groups of age, referred to total no:s of cataracts.*

The original statistics from Finland (2009), is presented in three groups of age: 1-4, 5-8, 9- . In those groups were examined: 188, 149 and 34 respectively, with 21, 33 and 7 HC- diagnoses detected in each group. A better distribution of data would be achieved with a tree-year interval instead, and provide a better basis for comparison. The original data for Finland can be rearranged to give a preliminary insight into the effects as follows:

If a linear distribution within each group is assumed, we can use the respective annual mean values. The group 1-3 years will then contain 188/4*3=141. The second will consist of (188/4+149/2)=122, the third of (149/2+34/4)=83 and the last group 34/4*3=25. The defects are redistributed similarly. This is, of course a rough estimation, but within a tolerance of +/- 7 dogs, the fault is less than ~2 %.

With the data rearranged to three-year groups, we get:
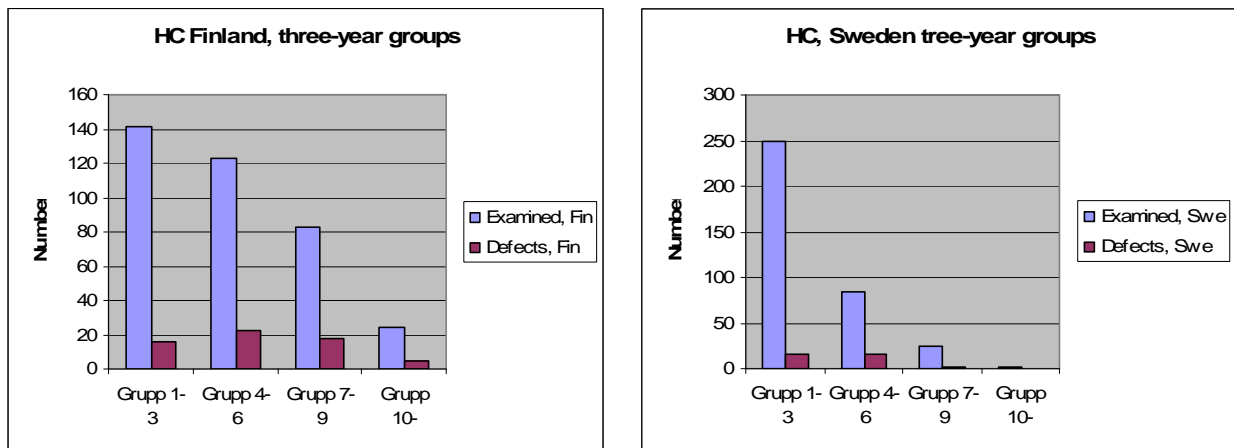
The Finnish data has a better coverage over the examined ages than the Swedish, which reflects the effect of the requirement for eye examination before mating. This has lead to a peaky distribution, that can be shown in a 3D topographic diagram:
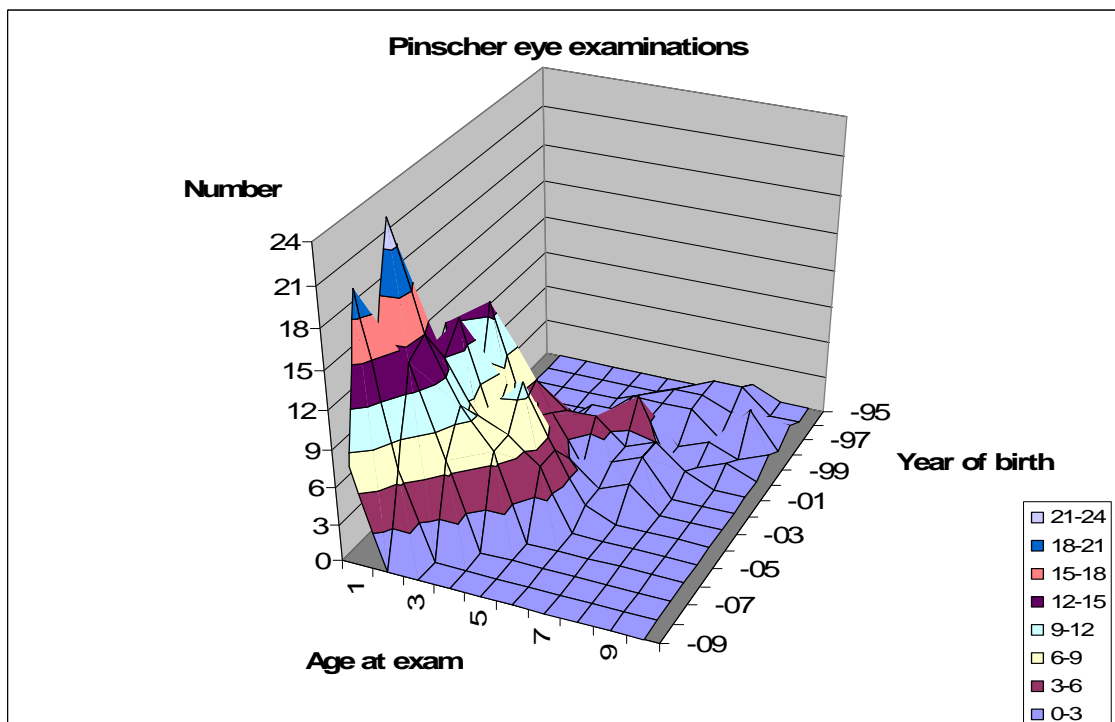
It is easily seen that great care has to be applied when trying to find any sign of a major trend in this material. If the age groups are selected too wide or too narrow, it will be impossible to extract any relevant tendencies. From the information later recieved from Ms Karoliina Suomalainen, the Finnish data will probably have a slightly smoother appearance, but in order to draw any conclusions, it should be arranged in a matrix format like the Swedish here.

From the above, it seems that the three-year age grouping would be a reasonable compromise. Making the group values non-dimensional with respect to the examined number in each group, we may get an idea on the differences in occurrence of HC in the Finnish and Swedish Pinscher populations:
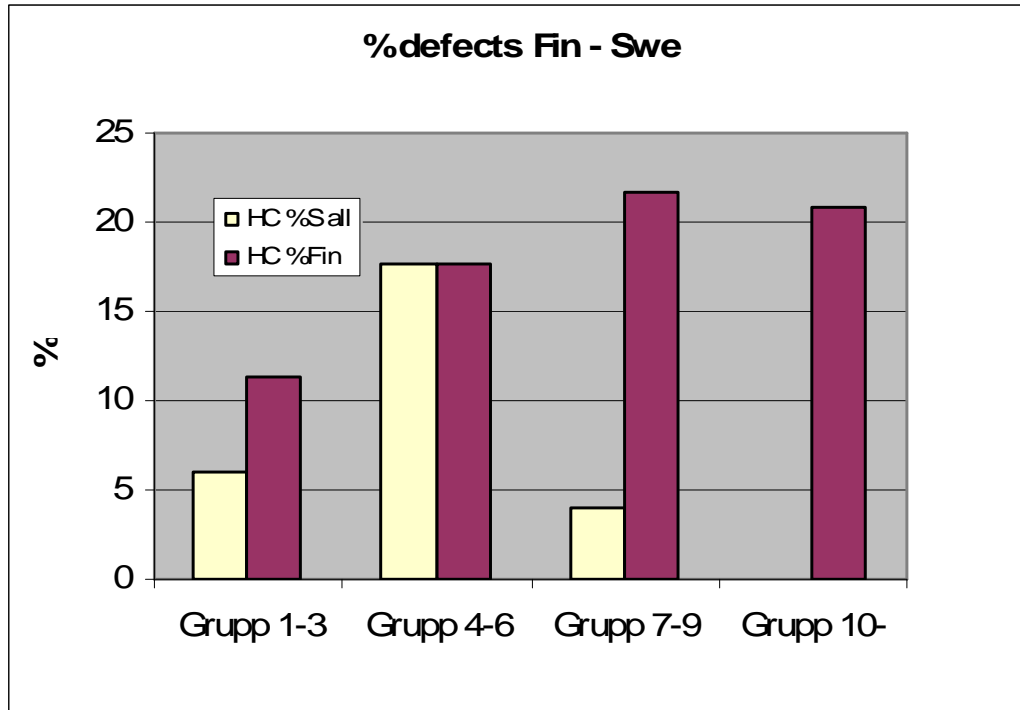
Considering the approximations made in rearranging the Finnish data, we observe a marked age-dependant increase of HC in the Finnish dogs, that is not present in the Swedish population. The reason for this is as yet unknown.

Norway
Related to the other populations studied here, the Norwegian number of domestically produced pinschers is small. In 2010 a total of 32 dogs were registered, 14 of these were imports.

In 2008, 14 dogs out of 18 tested, were found to be unaffected. For 2009 the corresponding figures were 16 out of 20. This indicates a mean percentage of unaffected dogs of about 79 %. In total there were 3 PTHLV/PHPV, 3 cataracts and 2 distichyosis.

Before going further here, the proportions of imports/domestics should be clear; for instance are there any imports from Finland or elsewhere incorporated in the controlled group of dogs, and how many from Sweden? Unfortunately, at this stage the Norwegian information is inconclusive.

Conclusion
The German and Swedish results are very similar. When the ECVO-procedure has made its full impact in Sweden, the situation will probably be close to identical in the two regions. Roughly speaking, those two populations are about 3 to 4 percent from the maximum limit of unaffected dogs regarding eye health. For Sweden, this boils down to a reduction of 5 à 6 affected individuals from the total annually. <u>There is no evidence for the view that cataracts in general show up late in the German Pinscher, even if this is the case in Finland</u>

A small increase in the number of unaffected dogs may be gained by postponing the breeding debut for both sexes. There is no reason why males should be used as soon as they reach the limiting age of two; a healthy male is fertile for a long period of time. The situation may be slightly different for females, but even here there is room for a different approach.

In Finland however, a radically different picture is found. The overall amount of defects are more than double the proportion found in Germany and Sweden. On top of that, the main bulk of defects are not detected until the dogs have passed their "breeding period". It seems that the Finnish population is developing a specific variant of aging-dependent cataract, to which there is no equal in the other populations. One measure to detect the affected individuals, used in Finland is a short "lifetime" of 8 months before mating for the eye protocols.

Since we all share a small genetic pool in the sphere of European pinschers, the situation in Finland is a concern for all of us. As far as we know now, young imports from Finland carry the risk of spreading the problem. When it comes to exports to Finland, we must all take every precaution that the dogs exported are free, based on freshest possible eye tests, so that we are not adding to the problem our Finnish collegues are facing.
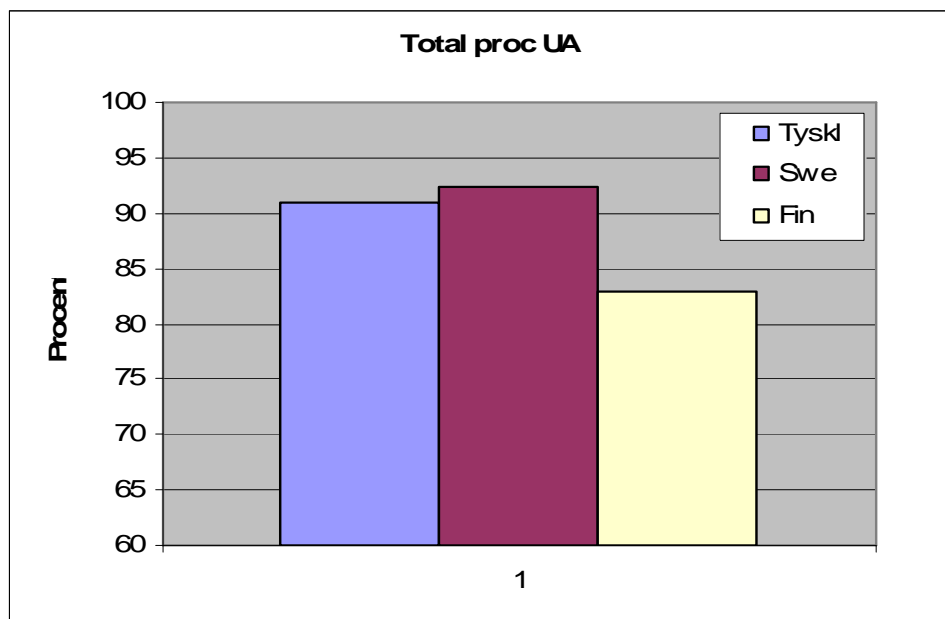
Total percentage of unaffected in Germany, Sweden and Finland.
(G and S shows all defects, F shows only cataracts)

APPENDIX I

The information here includes <u>all cataracts</u> diagnosed from 1995 to 2010. For non-affected dogs, the last examination is used, while the first affected diagnose is used for the affected dogs. The matrix shows a wide variation in examinations, both in terms of age when examined, and regarding year of birth.

Swedish born 1995-2010, Status 2010-08-20
Age at examination

Year of birth	1	2	3	4	5	6	7	8	9	10	Born #
1995								1			
Def											
1996						1	2	2			
Def											
1997					1	2	2	1	1	1	
Def											
1998					2	2	2		3		
Def					1						
1999				2	2	2		1		1	
Def								1			
2000		3	2	2	1	5			1		79
Def					1	1					
2001	3	4	6	4	4	2	3	1			76
Def		a1		3	2	a1					
2002	4	13	5	5	1	2	3				89
Def		2 a1	a								
2003	12	6	8	6	3	1	2				109
Def	1		2		2						
2004	9	14	6	10	5	1					148
Def				3	1						
2005	11	12	8	7	5						132
Def		2	1	1	1						
2006	23	15	10	7							173
Def	aa1	2		1							
2007	15	14	7								175
Def	1 a										
2008	20	7									163
Def		1									
2009	8										124
Def	1										
2010	2										164
Def	0										
Sum 95-02	7	20	13	13	11	16	12	6	5	2	105
Def	0	2	1	3	3	1	1	1	0	0	
% Def p.age	0	10	8	23	27	6	8	17	0	0	
Sum 03-10	100	68	41	30	13	2	2	0	0	0	
Def 03-10	4	5	3	5	4	0	0	0	0	0	
Sum 95-10	107	88	54	43	24	18	14	6	5	2	361
Def 95-10	4	7	4	8	7	0	1	0	0	0	31
% Def p age	4	8	7	19	29	0	7	0	0	0	

					Tot exam
Three yr grp	249	85	25	363	361
Def	15	15	2	0	31
% def p grp	6,0	17,6	8,0	0	8,6

An "a" in the defect line marks a defect that is not a cataract.

Pinsher eyes 2002-2010, Diagnoses, Sweden
(Note: ~150 dogs have seen two or more examinations. Some of these show multiple defects, which reduces the "Percenage NA" value here!)

Kontroll år	2002	2003	2004	2005	2006	2007	2008	2009	2010	Sum	Exam., year
Födda	89	109	142	122	167	170	151	189	164	1303	Born
Lysta	9	28	39	59	81	68	80	73	69	497	Exam., number
Andel lysta	10	26	27	48	49	40	53	39	42	38	Percentage examined
u.a.	8	27	36	52	72	63	63	65	62	440	Non-affected, number
andel u.a.	0,89	96	92	88	89	93	79	89	90	90	Percentage NA
katarakt ÖP lindrig utbredning							3	1		4	Cataract polar, minor
katarakt ÖP måttlig utbredning		1					1		2	4	Cataract polar, mild
katarakt ÖP	1		1			2	4	1	1	10	Cataract polar
katarakt BP				2	1		1	2	1	7	Cataract post polar
katarakt BP kraftig utbredning					1					1	Cataract post polar, severe
katarakt BP lindrig utbredning							2	2		4	Cataract post polar, minor
främre y-sömskatarakt								1	1	2	Cataract Y-seam, ant
katarakt total						1		1	1	3	Cataract total
Icke ärftlig katarakt				1	2	1	3	1	3	11	Cataract non-hereditary
PHTVL/PHPV grad 1			1	1	2					4	PHTVL/PHPV grade 1
PHTVL/PHPV grad 2				1						1	PHTVL/PHPV grade 2
PHTVL/PHPV grad 3							1			1	PHTVL/PHPV grade 3
retinopati, sannolikt ej ärftlig			1	2		1	1			5	Retinopathy, non-hereditary
mikropapill/hypoplasi					1					1	Mikropapill/hypoplasia
corneadystrofi						1				1	Corneadystrophia
persisterande hyaloidkärl								1		1	Persisting hyaloidvessels
Total										**60**	**Total**

	#	% of defects	% of exam.		
Totalt katarakter, ärftliga	35	58	7,0		Total cataracts, hereditary
Totalt övriga ärftliga defekter	9	15	1,8		Total, hereditary defects, remain
Totalt ej ärftliga defekter	16	27	3,2		Total, non-hereditary defects

	#	% of defects	% of exam.		
All cataracts	46	77	9,3		
Total other diagnoses	14	23	2,8		