BeaCon Open Health Registry, Year 12 Report

Greater detail is available in the complete report available a link elsewhere in the newsletter.

What Dogs May Participate? All Bearded Collies of known parentage, deceased or living, healthy or with a health problem, and from any country.

Who May Submit Information? Owner with whom the dog lives if primary owner, co-owner (with owner consent or otherwise dog goes into the non-public section started in 2008), a breeder (usually puppies before they go home). Information on dogs in the non-public section is used for the yearly report but it is not available in the search or report function of the registry database.

How To Submit Information. This is best done online - www.beaconforhealth.org/sqlweb

Who May Access the Open Registry Database? Anyone who is registered can do searches or reports on dogs in the public section of the database. Owner contact information is not available.

Use of Data and Caveats.
The BeaCon Open Health Registry should not be used as a definitive source for test results. Readers are encouraged to contact owners for confirmation and additional information as needed. The registry is designed to offer objective data on disease and wellness from owners and breeders. It is not to draw conclusions about any particular line, sire, or dam. We leave it to the user to interpret the information as they see fit.

The disease frequencies in this report apply solely to this particular population of Bearded Collies. Until more Bearded Collies worldwide are entered into the Open Health Registry, no conclusions can be drawn regarding the general health status of the breed.

As research uncovers more information on inheritance of disease it becomes increasingly obvious that many diseases are neither simple autosomal dominant or recessive traits. For example, the current research leads us to believe that up to 40 genes may be involved in whether or not a dog gets a particular autoimmune disease! Some genes have been found that affect the likelihood of getting any autoimmune disease while others relate to specific diseases. This supports pedigree analyses, which showed autoimmune disease in particular lines no matter which type of disease, while some breeds have higher incidence of a particular autoimmune disease.

Genes have been found that increase risk of disease while others protect against it, and a dog can carry both. The effect of genes can occur either because of changes in the underlying DNA sequence in one of more gene, or because of non-hereditary factors that cause the genes to behave (or express) themselves differently. Study of non-hereditary factors causing a change in gene behavior is called epigenetics. It has been known that environmental triggers as well as stress – physiological, physical or psychological – is somehow involved in the expression of autoimmune and other diseases, and likely this is the result of epigenetic change.

Other terms that may be heard in this context are penetrance, which refers the % of the population with a genetic variant that shows an associated trait. In some cases penetrance can be quite low meaning other factors are likely involved. If every individual with that variant has the trait there is complete penetrance. Even with complete penetrance some individuals may be more or less severely affected, and this variable is described as expressivity.

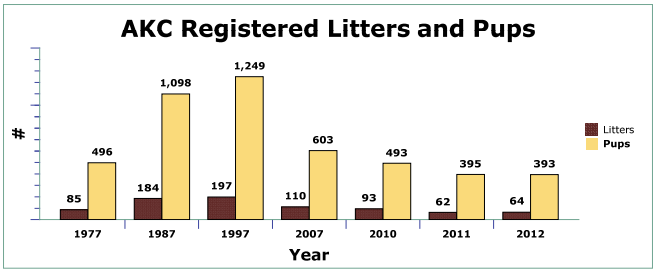
As the understanding of canine inherited disease increases, identifying individual genes responsible for each disease is not going to be possible for many illnesses. There is however, a strong genetic component to their occurrence. This is where a comprehensive open health registry can be of greatest value. If we can go back through generations of dogs – not just in a linear fashion but looking at siblings, aunts, uncles etc. patterns begin to emerge. If a problem appears repeatedly in a particular line, breeding out to a line that has little or no incidence of that disease for several generations might well reduce the Incidence of that condition.

Dog breeding is becoming increasingly multinational with frozen semen and surgical implantation. We are increasingly less likely to have hands on experience with every dog we are considering and its extended pedigree. We may not have all the answers ever, but the more pieces we have of a puzzle the better informed we can be to create dogs that are not just superior in structure and type, but also health and temperament.

The inclusion of dogs in this registry is by the free choice of the owner/co-owner. Absence of dogs from this registry is also by the free choice of the owner/co-owner. Notice of the registry's availability is made through BeaCon's newsletter (Lighting the Way) and web site (www.beaconforhealth.org), and Beardie internet lists.

AKC Registration Statistics for Litters, and Pups

Registration stats for each year are in the complete report online. The decline from 2002-2006 in number of USA litters and number of pups in those litters was statistically significant. For the fifth year in a row, the number of litters and pups (based on AKC litter registration) was below that of the founding year, 1977! Where is this headed? Dialogue is needed.



Number of Dogs and Owners. There are 755 owners and 2182 Beardies. Due to incomplete updating by owners, it is uncertain as to how many dogs are completely well. Considering just those updated in 2012, there were 434 without any health problem which represents 42% of living dogs.

Geographic Location. These are arranged in descending order by number of owners in a country. There was little change this year except for the Netherlands which increased from 8.1% last year to 9.4%.

Country	Owners (#)	Dogs (#)	Dogs (%)
USA	390	922	42.3%
UK	142	476	21.8%
Netherlands	44	205	9.4%
Canada	43	122	5.6%
Germany	31	84	3.9%
Czech Republic	24	73	3.4%
Australia	21	108	5.0%
Others*	60	192	8.8%
Total	**755**	**2182**	

General Information. There were 980 males (60.7% intact) and 1203 females (51.9% intact). The percentage of healthy dogs entered in the last year was 81.4%, no doubt related to the fact that the majority were less than two years of age. Most living dogs are below 10 years of age.

Health Problems.

The five major groups of health problems are autoimmune (n=305), fear issues (n=247), endocrine problems (n=170), cancer (n=157), and allergy (n=128). Autoimmune diseases remain the most common problem. Some diseases are included in more than one group; e.g., diabetes mellitus is both autoimmune and endocrine; inflammatory bowel disease is both allergy and autoimmune.

Autoimmune (AI) Disease

This year vaccination reaction and demodectic mange were added to the list of autoimmune disorders. There were 305 cases of AI disease in 252 dogs. The percentage of the total number of dogs with one of more AI diseases was 11.6% (252/2182), virtually unchanged from last year (11.4%). The frequency of individual AI diseases for the total number of dogs is essentially the same as in previous years.

Although autoimmune thyroiditis belongs with AI health problems, its incidence is unknown in this population. A thyroid panel includes thyroid autoantibodies which are the diagnostic hallmark of autoimmune thyroiditis; too few dogs have had a complete thyroid panel. Data from OFA labs for 605 Bearded Collies through December 2012 indicate that autoimmune thyroiditis was present in 1.3%, idiopathic hypothyroidism happened in 1.0% and, 12.1% had equivocal tests. So, 85.7% of tests were normal. Bearded Collies rank 76 out of 99 breeds which have at least 50 OFA thyroid panels performed. One can hope that those with equivocal tests were repeated and found to be normal. One can also hope that breeders are following the BCCA CHIC thyroid panel testing guidelines to do an OFA thyroid evaluation from an approved lab each year until 5, thereafter every 2 years. Even though hypothyroidism is not listed here as an AI disease, the percentage of dogs with AI diseases and hypothyroidism is reported.

Disease	#	% of All Dogs (n=2182)	% of AI Dogs (n=252)
Addison's disease (hypoadrenocorticism)	81	3.7	32.1
Symmetrical lupoid onychodystrophy (SLO)	73	3.5	29.0
Inflammatory bowel disease (IBD)	27	1.2	10.7
Autoimmune hemolytic anemia (AIHA)	27	1.2	10.7
Systemic lupus erythematosus (SLE)	19	1.5	7.5
Vaccination reaction	19	1.5	7.5
Autoimmune-mediated thrombocytopenia (AITP)	15	0.7	6.0
Rheumatoid arthritis	14	0.6	5.6
Demodectic mange	6		
Pemphigus	6		
Discoid lupus erythematosus	8		
Keratoconjuntivis sicca	5		
Diabetes mellitus	3		
Myositis	2		
Myasthenia gravis	1		

There were 8 with discoid lupus erythematosus, 6 each with demodectic mange or pemphigus, 5 keratoconjunctivitis sicca, 3 diabetes mellitus, 2 myositis, 1 myasthenia gravis. Multiple AI diseases were diagnosed in some dogs; 27 had 2 diseases, 7 had 3 diseases, and 4 had 4 diseases. Hypothyroidism was diagnosed in 21% with Addison's disease, 11.1% of IBD, and 26.7% of AITP. Vaccination reactions were infrequently reported except for 30% of those with AITP; **it is not known if the vaccination reaction occurred in proximity** to onset of the particular disease.

Age of AI disease onset. At least 79% of the seven most

common autoimmune problems begin before age 9 years. Average age of onset (yr) was 4.1 for SLO, 4.3 for IBD and vaccination reaction, 4.5 Addison's, 5.6 AIHA, 7.0 AITP, and 7.6 SLE.

Sex distribution of AI disease was predominantly female except for SLO; vaccination reaction – 84%, SLE and AIHA – 67%, rheumatoid arthritis – 64%, Addison's disease – 61%, SLO – 47%.

Fear Issues.

For those who have dogs fearful of loud unexpected noises (thunder, gun shots, motorized vehicles or equipment you are not alone. The fear reactions of Bearded Collies reported in the open registry are predominantly to loud sounds which can't be anticipated by the dog (other than thunder which follows the lightening precursor); #=209 (9.6%) . The fear of loud sounds has been recognized for some years. Although fear and hypothyroidism co-exist, it is unclear whether that signifies causation. Certainly the fear is ameliorated in some dogs when hypothyroidism is corrected by treatment. Among those who were fearful to loud sharp noises, 44 (21.9%) are documented to be hypothyroid. Since many dogs have not been tested for hypothyroidism, this percentage could be higher.

Endocrine Problems. Hypothyroidism is by far the most common endocrine problem; . See the autoimmune section for comments about autoimmune hypothyroidism. Both hypothyroidism and Cushing's disease had a wide range of ages at diagnosis. There were 3 cases of diabetes mellitus, 1 insulinoma.

Disease	N (%) of All Dogs	Age Diagnosis (yr) (av, min, max)
Hypothyroid	138 (6.3)	7.3, 0.5, 15.8
Addison's disease	81 (3.7)	4.5, 0.5, 12.5
Cushing's disease	22 (1.0)	10.4, 5.4, 14

Cancer

The locations of cancer are given in the following table. The frequency considering all cases (# 157) was 7.2% of all dogs. The 69 "other" cancers were in no predominant location. As a result of low necropsy rate (so few pathology studies) and uncertainty about location by the treating veterinarian, the prevalence and types of cancer within the breed remain indeterminate.

Location	#
Mammary	17
Liver	14
Spleen	12
Nasal	11
Stomach	9
Bone	7
Abdominal, hemangiosarcoma	5 each
Testicular	4
Kidney	3
Other	69

Immunoglobulin Mediated Disorders

It is not known how diagnosis of these problems was made – i.e., whether the most sophisticated tests were used. The open registry doesn't specifically ask for this information although there is space to provide it. For examples, allergy generally and flea bit allergy specifically, are mediated by immunoglobulin E (Ig E) whereas, food sensitivity and intolerance is mediated by immunoglobulins A and M (IgA and IgM). Inflammatory bowel disease is related to food sensitivity or intolerance. This group of disorders is the fourth most common. Together (n=129) they occurred in 5.9%.

Disease	# (%) of All Dogs
Dietary allergy/food intolerance	44 (2.0)
Atopy	31 (1.4)
Inflammatory bowel disease	28 (1.3)
Flea bite allergy	26 (1.2)

Other Diseases

Frequency is calculated if there were 20 or more cases.

Problem	# Dogs	% All Dogs
Umbilical hernia	64	2.9
Hip dysplasia	59	2.7
Arthritis (note 1)	57	2.6
Cataract	39	1.8
Eye, other	31	1.4
Depigmentation	30	1.4
Hearing loss (note 2)	25	1.2
Pyometra	24	1.1
Cystic ovaries	22	1.0
Teeth, overshot	20	0.9
Cryptorchid	20	0.9
Hot spots	19	
Cognitive dysfunction	17	
Vestibular disease	17	
Kidney failure, cause unknown (note 3)	16	
Monorchid (note 5)	14	
Aggression, dog	15	
Hyperactivity	13	
Obsessive compulsive disorders	13	
Epilepsy, idiopathic (note 4)	12	
Stroke	12	
Bladder stones	11	
Aggression, family	10	
Exercise induced hyperthermia	10	
Neurological, other	10	

Note 1: Arthritis. Age of onset was given for 59 dogs and it was over 6 years of age in 54

Note 2: Hearing loss. Two dogs had early onset. One was deaf at a month of age; the other began to go deaf at age 5 yr 3 mo and was almost completely deaf by age 7 yr. The latter dog had two deaf littermates, so the cause was considered genetic by the owner.

Note 3: Kidney failure of unknown cause. Eight (50%) with this diagnosis had onset of disease before age 9 years (average age of onset was 5.5 yrs). 1 case was diagnosed as chronic interstitial nephritis by biopsy. 1 case was associated with SLE; a littermate also died early of kidney failure and their dam died of SLE. In three the kidney failure resolved according to the information provided. In three, the course of the kidney failure isn't known. Beyond these cases, it should be remembered that kidney failure is a common finding in dogs with Addison's disease at first presentation.

Kidney and liver failure are symptoms of leptospirosis (as is uveitis). Antibiotic therapy should be instituted immediately in all suspected cases of leptospirosis, even if the dog was vaccinated as vaccines are unreliable at best. It should also be realized that titers are unlikely to be positive until at least 10 days after symptoms first appear, so the dog should be titered again.

Note 4: There is insufficient information given in the cases of idiopathic epilepsy with respect to how the diagnosis was made. Review of the cases doesn't provide history for most that would be compatible with the diagnosis; namely, few had persisting seizures or required anti-convulsant medication for control.

Note 5: Monorchid means that the dog only has one testicle anywhers in its body and is extremely rare, likely some dogs reported as monorchid are actually cryptorchid which means that one or both testicles have failed to settle in to the scrotum by age 12 weeks but are present elsewhere in the abdomen. This is a relatively common condition.

Mortality. As last year, the percentage of deaths in each age group is calculated by # deaths/total deaths regardless of whether or not the cause of death was given. There were 652 (29.5%) deaths reported and 619 dogs with a known date of death and birth. For the latter, the average of death was 11.9 yrs (minimum 0.1 yr, maximum 17.6 yrs). Necropsies were conducted on 38 (5.8%). If more necropsies were done in those where death is not due to very old age, there would certainly be more identifiable causes of death.

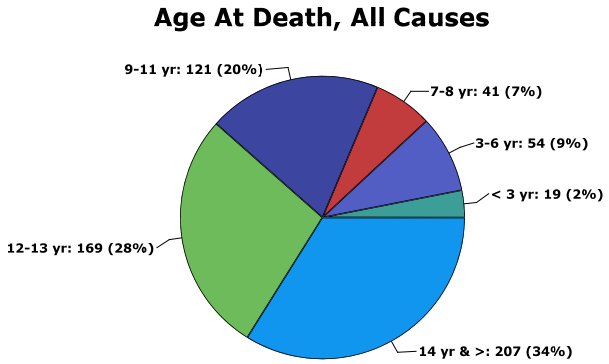
Mode of death was natural in 88, euthanasia in 466, accidental in 21, and undocumented in 36.

The leading causes of death before 9 years of age were autoimmune (n=24), accidental (n=14), and cancer (n=11 in the 7-8 yr group). The high number dying from autoimmune disease at a young age is of concern and should be the focus of research to identify cause(s) and trigger(s), and hopefully elimination of these problems where feasible.

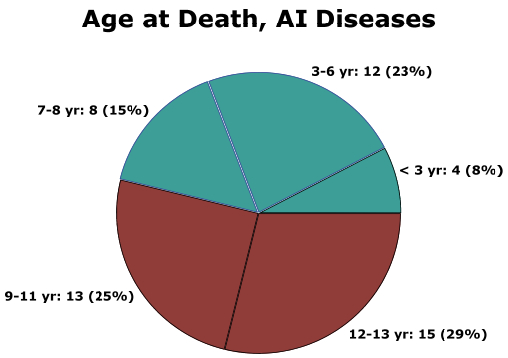
The table gives the number and percentage of deaths in age groups used in previous years' registry reports.

Demographics	**Age at Death (yrs)**					
	< 3	**3-6**	**7-8**	**9-11**	**12-13**	**>13**
#	19	54	41	121	169	207
% of deaths	3.1	8.7	6.6	19.6	27.3	33.4
Problem/Issue	**Percent Deaths in Age Group Caused by Problem/Issue**					
Autoimmune	21.1	22.2	19.5	10.7	8.9	-
Cancer	-	16.7	24.4	38.0	24.2	15.0
Accidental death	26.3	11.1	7.3	2.5	1.2	1.0
Stroke	-	-	-	1.0	4.7	4.3
Old Age	-	-	-	1.7	16.6	50.7
Other	31.5	20.4	29.3	22.1	29.3	14.3
Unknown	21.1	29.6	19.5	24.0	15.4	14.0
Autoimmune Disease	**# Cases**					
Addison's	1	2	4	5	6	1
SLO	1	1	1			
IBD	1	1			1	
AIHA	1	3	2	5	1	
SLE		3	1	1	2	
AITP		1		1	1	1
Other		1		1	4	

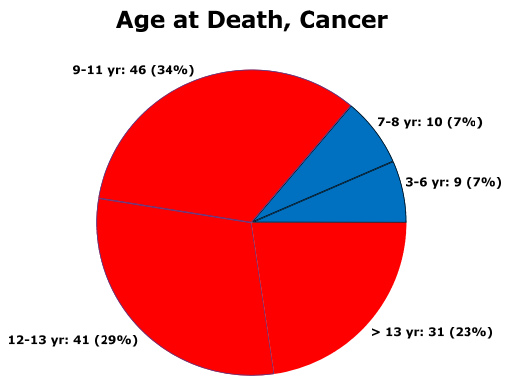
Mortality Charts



Although only 19% of all deaths occurred before 9 years of age, 57% of these were due to autoimmune disease, as shown in the turquoise color of the second chart.



The reverse is true for cancer as the cause of death; 86% of cancer deaths occurred over the age of 8 years as shown in the red color of the chart below.



Coefficient of Inbreeding (COI)

The COI values were calculated using the Breeder's Assistant (BA) Pedigree Software **for ten generations of ancestors.** Further information about COI's and their meaning can be found on the internet and also on BeaCon's web site in the section on open health registry data. The data for the USA 1997 AKC stud book were calculated by trying to use just one dog from each litter so as to represent unique breedings. There were 939 Bearded Collies registered as foundation stock.

The data are arranged by decreasing COI by country. Given the large standard deviations, the differences between countries are not significant. The values simply reflect the current breeding pool and practices with respect to more or less line breeding. Almost all countries have a maximum COI over 40; the two exceptions are the Netherlands with a maximum of 37.5 and Finland with a maximum of 31.4. All countries have a minimum COI of 9-14 except for the UK which is zero, due to one breeder who is utilizing non-KC registered sires in their breeding program.

Year Report/Other	**Coefficient of Inbreeding**				
	# dogs	**Av**	**Min**	**Max**	**Std dev**
USA – 1977 stud book	318	18.3	3.8	40.1	
USA – 2011 Specialty BOB	72	22.9	11.9	40.3	
Year 12					
All dogs	2141	23.3	0	49.9	6.5
UK	459	24.0	0	44.0	7.3
USA	907	23.8	11.2	49.0	5.8
Canada	119	23.0	9.2	47.5	7.0
Belgium	26	22.4	14.3	38.9	6.7
Finland	51	21.6	9.9	31.4	5.6
Czech Republic	72	21.8	11.2	47.3	6.2
Australia	107	21.6	10.8	42.1	5.5
Netherlands	201	21.3	9.2	40.8	6.0
Germany	83	20.1	8.9	42.4	6.7