BeaCon Voluntary Open Health Registry

Year 9 Report

March 15, 2010

Welcome to BeaCon's Open Health Registry Report for year 9. This is BeaCon's 10th year in existence and the ninth year of reporting health conditions for the breed. BeaCon's directors thank each and every Beardie owner and breeder who has made information on their dogs available through this open health registry. You have made an important contribution to the breed by providing current and future breeders with valuable information. For those who only put in their healthy dogs and don't report those with health problems, please reconsider for the sake of future generations.

Participation

What Dogs May Participate?

- **ALL BEARDED COLLIES** of known parentage
- Deceased or living
- Healthy or with a health problem
- From any country

Who May Submit Information?

- Owners with whom the dog lives.
- A co-owner (consent from primary owner is needed before the dog's record is public).
- A breeder. Starting in the spring of 07, a breeder may also submit information. In the case of a breeder entering pups in a litter prior to sale, if their contract notes the pup is in BeaCon's open registry that suffices as consent. Otherwise consent from the primary owner is needed before the dog's record is public.
- Primary owners whose co-owner refuses to let a dog be in the open health registry can still enter the dog in a non-public section (started 2008). This is done by entering a co-owner name in the appropriate field. Such dogs' data will remain private; they cannot be found in searches or reports of the database. Those dogs' individual data will be included in the general tabulation of data, such as the number of dogs with a particular disease, ages, causes of death, etc.
- Breeders who enter a sire or dam can indicate if the dog has produced a disease in offspring. This policy was started in year 3 because breeders are not always able to convince their puppy buyers to participate in the open registry. Dams producing progeny with a disease can have the number of cases and the litter (s) indicated. Sires producing progeny with a disease may have the number of cases indicated. The name of a dog with the specific disease produced cannot be listed.

How To Submit Information.

This may be done either by hard copy form or on-line at www.beaconforhealth.org/sqlweb.

Documentation.

No changes have been made from previous years. Copies of health screening test results are requested. This is especially important for dogs from countries other than the USA. We attempt to validate the information for USA dogs through the on-line registry databases (OFA or CERF). When that is not possible, it is so noted in the dog's report.

Health screening tests that have not been submitted to another registry can be included in BeaCon's registry. Preferably, a copy of the documentation form is sent to BeaCon; e.g., a copy of the CERF ophthalmologists' exam for an eye exam.

Updating.

Reminders are sent each calendar year to owners of all living dogs in the registry as of the most recent data entry. Updating should be done yearly, even if the dog has had no changes. You

can also update whenever there has been a change in your dog's health or new health screens done – at any time.

Newer Features

- Use of search and report functions is free to anyone who is registered, starting March 2009. There are 160 registered users who do not have dogs in the open registry.
- Since Fall 2008, there is a non-public section if an individual prefers that their dog's information not be in the public view or when a co-owner refuses to give the primary owner permission to put the dog into the open registry. "Non-public" entries are collated in the yearly statistics only and are not available to the search and report functions. This year there are 34 dogs in the non-public section.

The Value of Large Numbers of Participants

- A large number gives a more comprehensive view of the extent of health problems in the breed because disease frequency is determined by the number of both affected and normal dogs.
    - For example, if there are 57 dogs with Addison's in a total of 916 dogs, the frequency of Addison's is 5.9%. If the total number of dogs is 1800 dogs, the frequency of Addison's diseases is 3.1%.
- To provide whole family information which breeders can use for relative-risk pedigree analysis in diseases that are autosomal recessive.
- To provide data for researchers.
- To allow prospective puppy buyers data on the health conditions affecting Bearded Collies and their prevalence which may enable them to make more informed choices, or at least know what questions to ask breeders.

Pedigrees and Coefficient of Inbreeding (COI)

Every effort is made to have the pedigree be accurate. As new dogs are entered into the database, a five generation pedigree is generated offline and posted. Owners are notified and asked to confirm accuracy of the pedigree. Data for pedigrees come from many sources including pedigrees submitted by owners and online databases. With the advent of the on-line registry system, fewer hard copy pedigrees have been submitted; thus the dependence on other sources. Pedigrees are generated with Breeder's Assistant, starting in January 2006. If an error is found in a pedigree, please notify E. Sell (beaconbb@bellsouth.net) with the correct information.

A COI is the mathematical definition that elucidates closeness of relationship in a pedigree. It is usually expressed as a percentage and it was developed by Sewall Wright (Coefficients of inbreeding and relationship. Am Nat. 56:330-8, 1922). Basic principles are that inbreeding only exists if the ancestor appears on both sire's and dam's side of the pedigree.

COI's can be calculated by hand, but it is complex; various online sites describe how to do this. It isn't complex if one uses a pedigree software program with the built in calculation. The Breeder's Assistant software was used to calculate 10 generation COI's for the OHR. The COI is displayed at the top of each dog's pedigree.

Resistance and Dilemmas

Uncertainty about entering dogs into this open health registry persists. Some are fearful that a breeder and his/her kennel will be maligned. That is an honest fear because such has happened. BeaCon's board encourages owners and breeders alike to give consideration to balancing such fear with the importance of establishing a record of the breed's health.

With each passing year, the resistance predicament remains pressing. The number of AKC registered Bearded Collie litters remained as last year's, which was a sixth year of steady decline. Additionally, it is observable fact that the average COI (10 generations) of the OHR dogs from the USA is 5.2 points higher than the original USA foundation stock. Numerous authors have written about the phenomenon of the popular sire use which lowers genetic diversity over generations (http://www.beaconforhealth.org/Popular_Sire.html

New breeders in particular face limited amounts or selectively offered information from which to make informed decisions. If you are a new breeder make sure that you ask to see the original health screening certificates for proposed mates. You can also check these certifications on the OFA Web site (www.offa.org) by entering a dog's AKC registration # or registered name. If you don't find the expected certification for a dog of breeding age it is prudent to suspect that the dog failed to meet the standard for that test. If the prospective mate has a CHIC #, be aware that the required tests to not have to be normal to obtain a CHIC #. You must ask to see the certificates (or do the online check). If you are in a country other than the USA and do not have on-line access to verify test results, then you should ask to see the certificate or letter or form with evaluation results.

Use of Data and Caveats

Viewers of the open health registry data are responsible for interpretation and use of the information. The purpose of this registry is to give objective data on disease and wellness, not to draw conclusions about any particular line, sire, or dam.

Currency of health information is dependent on owner updating and every effort is made to reach owners of all living dogs in the registry (as of the last data entry time).

A caveat for disease frequencies is that they apply to this specific population of Bearded Collies. Whether the findings are applicable to the general population of Beardies awaits more numbers entered in the registry.

We caution the reader that a sire or dam cannot be assumed to be a carrier of an undesirable genetic trait simply because that health problem is reported in a single progeny. Furthermore, the expression of many genetic diseases may be influenced by environmental factors, many of which are still unknown..

Geneticists believe the following circumstances are indicative of heritability:

- Relatively frequent occurrence of the disease
- Mating a sire and dam several times results in the same health problem in more than one litter.
- Mating a dog or bitch with different mates results in the same health problem in several litters.

If several dogs from the same kennel are reported with the same problem, you cannot assume that the problem occurs with high frequency. You have to know the status of the other dogs from that kennel before making any assessment regarding prevalence. This means that full participation by a breeder is important, rather than selectively entering certain dogs in the registry.

Many hereditary problems, other than those transmitted by an autosomal dominant mode of inheritance, involve healthy parents, one or both of whom are carriers of the genes responsible.

Information that a particular dog or bitch has produced a problem is vital to any breeder. This is especially critical for novice breeders just establishing their programs because they are least likely to have a good network for finding and verifying such information.

BeaCon encourages breeders to enroll pups in BeaCon's Open Health Registry before they go to their new homes. Having a large number of healthy young dogs to follow over the long term is an optimal resource for determining frequency of diseases in any breed.

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.

Notice of Copyright

Respectfully submitted, the Board of Directors for the Bearded Collie Foundation for Health (BeaCon)

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March 15, 2010

How Many Beardie Collies are Registered or Born in the USA and UK?

USA data begin with 1977 when the breed was recognized by AKC. The decline in number of USA litters and number of pups in registered litters from 2002-2006 was statistically significant.

1) AKC dog registrations for most breeds have been declining in recent years; however the relative rank of the breed has dropped as well.
2) In 2009 the number of registered litters was essentially unchanged from 2008; the number of pups in litters were slightly higher than for 2008, yet still below the 1977 numbers.

Denise Barley provided the UK figures

	USA				UK		
Year	# Dogs Registered	# Litters Registered	# Pups in Litters	Av # pups/ Litter	# Registered	# Litters	av# pups per litter
2009	331	78	445	5.7	528	90	5.9
2008	393	82	421	5.1	643	113	5.7
2007	413	110	603	5.5	606	98	6.2
2006	447	90	537	5.2	720	119	6.1
2005	485	109	658	6.0	650	113	5.8
2004	562	150	842	5.6	821	129	6.4
2003	543	154	897	5.8	668	109	6.2
2002	587	159	943	5.9	901	140	6.4
2001	620	165	953	5.8	721	121	6.0
2000	682	183	1031	5.6	952	150	6.4
1999	614	196	1202	6.1	1034	175	5.9
1998	752	175	1077	6.2	1119	179	6.3
1997	711	197	1249	6.3	1286		
1996	720	178	1031	5.8	1318		
1995	762	186	1105	5.9	1467		
1994	640	177	1057	6.0	1337		
1993	749	157	912	5.8	1506		
1992	766	182	1092	6.0	1575		
1991	796	194	1162	6.0	1621		
1990	700	181	1062	5.9	1715		
1989	713	185	1128	6.1	1945		
1988	817	190	1175	6.2			
1987	760	184	1098	6.0			
1986	797	185	1175	6.4			
1985	858	191	1253	6.6			
1984	858	209	1330	6.4			
1983	895	201	1190	5.9			
1982	763	196	1257	6.4			
1981	723	172	1095	6.4			
1980	653	155	909	5.9			
1979	588	127	782	6.2			
1978	472	111	684	6.2			
1977	446	85	496	5.8			
1976	-	-	-	-			

THE OHR – Owners, Dogs and Registry Years

Number of Owners and Dogs

There are 606 participating owners, an increase of 46 from the previous year, and 1570 Beardies, an increase of 144. There is little change in the frequency of the most common health problems; fear issues and autoimmune problems continue to lead the list. The frequency of health screens is also little changed. Puppy mortality is 5% stillborn and an additional 7-8% dying by 6 weeks of age. The following table shows the cumulative participation over the years.

Year	# Owners	# Dogs	Dogs added
1	169	303	-
2	205	410	107
3	278	593	183
4	315	678	85
5	357	808	130
6	410	961	153
7	491	1203	242
8	560	1426	223
9	606	1570	144

Definition of Registry "Years"

- Year 1. July 2000 – Aug 2001
- Year 2. Sept 2001 – Nov 2002
- Year 3. Dec 2002 – Nov 2003
- Year 4. Dec 2004 – Nov 2004
- Year 5. Dec 2005 – Jan 2006
- Year 6. Feb 2006 – Feb 2007
- Year 7. Mar 2007 – Mar 15, 2008
- Year 8. Mar 16, 2008 – Mar 6, 2009
- Year 9. March 7, 2009 – February 26, 2010

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Demographic Information

Item	#	
Owners	606	
Australia	17	
Belgium	7	
Canada	35	
Czech Republic	22	
Denmark	1	
Finland	11	
France	1	
Germany	26	
Hungary	3	
Ireland	1	
Netherlands	30	
New Zealand	3	
Portugal	1	
Scotland	2	
Slovakia	3	
South Africa	3	
Spain	1	
Sweden	1	
United Kingdom	87	
USA	348	
Not indicated	2	
Dogs	1570	
Location		% of total dogs
USA	753	48.0
UK, Scotland	329	32.0
Netherlands	89	5.7
Australia	83	5.3
Canada	83	5.2
Germany	59	3.7
Czech Republic	57	3.6
Finland	37	2.4
Belgium	22	1.4
Others	59	3.8
Sex - male	705	44.9% of all dogs
intact	399	25.4% of male dogs
castrated	294	41.7% of male dogs
unknown	12	
Sex - female	865	55.1% of all dogs
intact	435	50.3% of female dogs
spayed	420	48.6% of female dogs
unknown	10	

Health Problems

Healthy.

The percentage of healthy dogs was 47.4% in year 7, 55.8% in year 8, and 53% in year 9. This trend toward healthier Beardies reflects an increased entry of younger dogs and/or failure of owners to update and provide information about health problems.

Health Problem Frequency.

This is calculated if there are more than 20 cases. Some owners entered health problems only into update notes, so that information was transferred to a health record for a more accurate accounting.

Health Problem	# of Dogs	% of All Dogs
None	838	53.4%
Fear, loud sharp noises	185	11.8%
Autoimmune diseases (see separate section)	181	11.5%
Hypothyroidism*	116	7.4%
Cancer (all types)**	115	7.3%
Umbilical hernia	64	4.1%
Hip dysplasia	53	3.4%
Dietary allergy/food intolerance	32	2.0%
Cataract	32	2.0%
Aggression, all types	30	1.9%
Atopy	29	1.0%
Fear, other	26	1.7%
Allergy, flea bite	25	1.6%
Depigmentation	23	1.5%
Inflammatory bowel disease	22	1.4%
Teeth, overshot	18	
Vaccination reaction	17	
Pyometra	17	
Hearing loss	16	
Cognitive dysfunction	15	
Cryptorchid	15	
Hot spots	15	
Nail problems, other	13	
Monorchid	14	
Hyperactivity	13	
Cushing's disease	13	
Kidney failure	13	
Obsessive compulsive	11	
Epilepsy, idiopathic	11	
Exercise induced collapse	8	
Diabetes mellitus	2	

Note: Some cases of depigmentation can be autoimmune in nature (e.g., vitiligo, or associated with lupus or pemphigus). Since there are other causes of depigmentation, it was not placed into the table with

autoimmune diseases. Cataracts – age of onset wasn't given for 5, at or over the age of 8 in 17 (i.e., related to older age most likely), and under the age of 8 in 10. An additional 6 had punctate cataracts.

* The incidence of autoimmune thyroiditis in the open health registry dogs is unknown; data from OFA labs suggest it is of relatively low incidence – 1.3% of 380 having OFA panels (with 1.1% idiopathic hypothyroidism, 13.7% equivocal, 83.9% normal)..

****** Cancer diagnoses are listed below (see the online OHR search facility for a look at the less common cancers - select cancer, other). To assure an accurate count, the cancer causes of death are checked against a dog's health problem list. If such a diagnosis had not been added to the health problem list by the owner, it was added by the database administrator.

mammary – 11
nasal – 11
liver - 10
stomach - 9
skin (various types) - 8
bone - 7
spleen – 7
hemangiosarcoma – (plus 1 of liver and spleen), fibrosarcoma or sarcoma – 4
kidney, testicular, pancreas (1 was insulinoma) – 3 each
abdominal, small intestine – 2 each
other - 44

With the low necropsy rate and the fact that either a primary site is unknown or the diagnosis was "suspected" cancer, it is not possible to be certain which are the most prevalent cancers in the breed.

Autoimmune (A/I) Disease

The number of individual A/I diseases was 216. The number of dogs having A/I disease(s) was 181, or 11.5% of all dogs. Although the frequencies appear to be unduly high in this population of Bearded Collies, it is not known if the figures are applicable to the general population of Bearded Collies worldwide. There was a small increase in the number of cases for most diseases this year; the increase for SLO was greater, likely due to the research focus on SLO for the past year and a half.

Disease	**#**	**% of All Dogs**	**#(%) with > one A/I disease****
Addison's disease (hypoadrenocorticism)	69	4.4%	11 (15.9%)
Symmetrical lupoid onychodystrophy (SLO)	48	3.1%	8 (16.7%)
Inflammatory bowel disease (IBD)	22	1.4%	6 (27.2%)
Autoimmune hemolytic anemia (AIHA)	20	1.3%	5 (25%)
Systemic lupus erythematosus (SLE)	18	1.2%	5 (33.3%)
Rheumatoid arthritis*	12	0.8%	5 (41.7%)
Immune-mediated thrombocytopenia (ITP)	10		6 (60%)
Pemphigus	7		4 (57%)
Discoid lupus erythematosus	4		2 (50%)
Myositis	3		1 (33%)

* These include cases of suspected immune polyarthritis

**This does not include hypothyroidism because thyroid panels were not available until recent years

25 dogs had more than one disease:

18 dogs had 2 A/I diseases
5 dogs had 3 A/I diseases
2 dogs had 4 A/I diseases

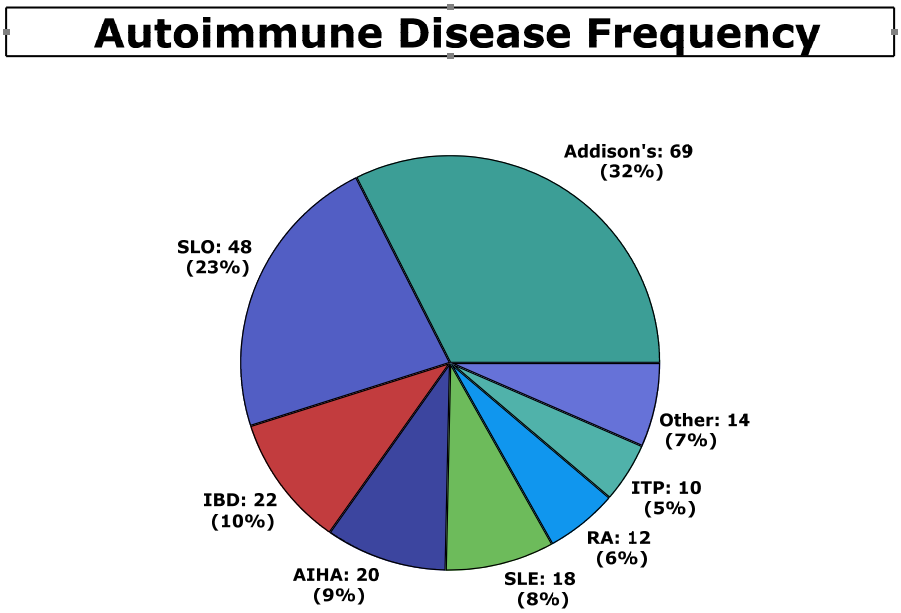
Addisonian dogs

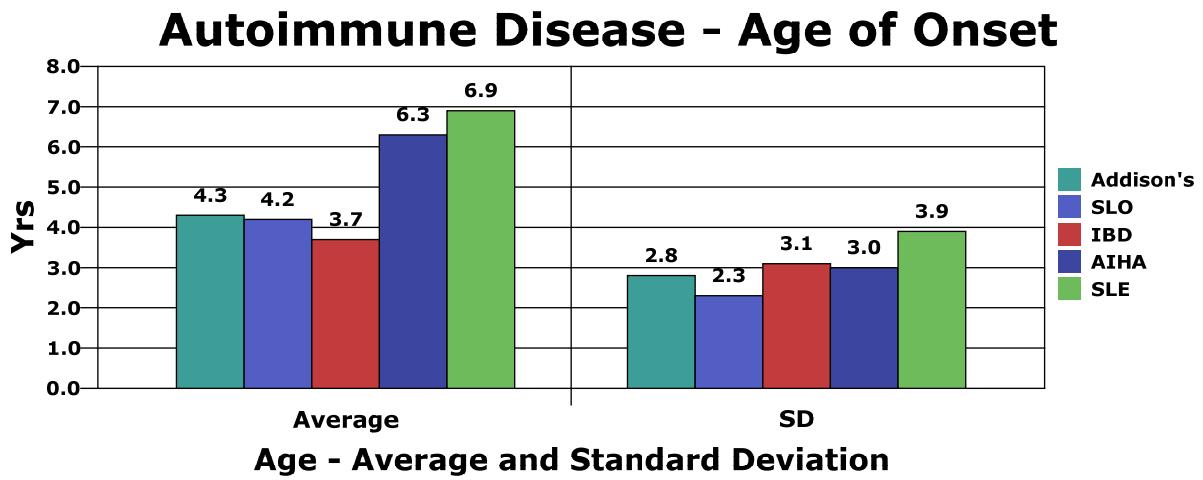
16 (23.2) are hypothyroid
20 (29%) have fear of loud sharp sounds
9 (13%) have at least one other A/I disease

SLO dogs

6 are hypothyroid
3 each have pemphigus and Addison's
2 have rheumatoid arthritis
1 each has SLE and AIHA

A/I diseases - frequency and age of onset (charts).





A younger average age of onset exists for Addison's disease, SLO, and IBD in this population of Bearded Collies; the average for AIHA and SLE is 2 years or more higher.

Health Screening Tests

Screening Test Done	#	% of All Dogs
Hips	601	38.3%
Eyes	544	34.7%
Thyroid	397	25.3%
Elbows	121	7.7%
Hips and eyes	305	19.4%
Hips and elbows	183	11.7%
Hips and thyroid	117	7.5%
Hips, eyes, and thyroid	144	9.2%
MDR-1	22	
Von Willebrand Disease	11	

The frequency of individual health screening tests and the various combinations were minimally changed from the previous year. Mutation of the MDR-1 gene results in an inability of the blood-brain barrier to exclude certain drugs (such as ivermectin) from the CNS resulting in neurological disease. In rough and smooth Collies one in five dogs carries this gene mutation. None of the Beardies reported in the registry had the MDR-1 mutation, and the same was true for the 97 purebred Bearded Collies tested for the mutation at the 2006 BCCA national specialty..

Of interest, there are several working Beardies in the registry. One breeder has had eye exams done on breeding stock of working origin and for several generations. This has been done because of concern that outcrossing KC registered Beardies to working Beardies would introduce eye problems in the progeny. To date, all eye exams have been normal.

Reproductive Outcome

Dogs. There were 129 with reproductive history recorded; only 56 had semen checked and few of those much detail; 129 were bred. The following table shows the number of bitches bred, the number of litters and puppies produced.

Item	#	Av
Bitches bred	430	3
Litters produced	390	3
Total puppies produced	2288	21
Total female puppies produced	989	10
Total male puppies produced	993	10

Not all breedings resulted in a pregnancy. For some dogs the number of puppies produced was not listed, so the number of total male and female puppies is less than the total number of puppies.

Problems developing in the dogs' progeny were:

Health Problem	# dogs producing problem	# progeny with problem
Addison's	7	14
Symmetrical lupoid onychodystrophy	8	13
Systemic lupus erythematosus	2	2
Hypothyroid	10	11
Other	11	15
Cryptorchid	16	34

Bitches. 260 bitches were successfully bred; they produced 484 pregnancies for 421 litters and 2777 pups. Cesarean section delivery was done in 45 (10.7% of all litters).

Breeding methods that resulted in live pups were:

Natural	297 (70.6%)
A/I fresh	48 (11.4%)
A/I chilled	19 (4.5%)
A/I frozen	11 (2.6%)
A/I operative	13 (3.1%)
Natural and A/I fresh	12 (2.9%)
Not recorded	44

The number of progeny and early identifiable issues are given in the next table.

Male pups		
	#	% of total
total born	1439	-
live born	1336	92.8%
live @ 6 wks	1236	85.9%
		% of those alive at 6 weeks with problem
cryptorchid	73	5.9
mismark	60	4.9
umbilical hernia	51	4.1
bad bite	14	
poor pigment	12	

cleft palate	3	
Female pups		
	#	% of total
total born	1338	-
live born	1268	94.8%
live @ 6 wks	1169	87.4%
		% of those alive at 6 weeks with a problem
mismark	63	5.4
umbilical hernia	52	4.5
bad bite	13	
poor pigment	5	
cleft palate	2	

Specific later health problems in the progeny of bitches are shown in the next table.

Health Problem	**# dams**	**# progeny**
Addison's	11	16*
Symmetrical lupoid onychodystrophy	10	13
Systemic lupus erythematosus	4	4
Hypothyroid	9	10
Other	26	25**

* One bitch produced 6 Addisonian puppies

** Among the early, potentially congenital or heritable conditions were:

- 6 heart problems (3 PDA; 1 persistent right aortic arch; 1 murmur, diagnosis unknown; 1 heart anomaly, diagnosis unknown)
- 3 exocrine pancreatic insufficiency
- 2 renal dysplasia
- 1 each - hyperthyroid, discoid lupus, autoimmune hemolytic anemia, pyelonephritis (early death at 3 wks), kidney failure (several died as young dogs), myositis, hip dysplasia, ulnar shortening.

Mortality

There were 381 (24.3%) deaths reported. The average age at death regardless of cause of death was 11.7 years. Some owners didn't provide information about cause of death. Other dogs may also be deceased but their owners have not responded to update requests.

Necropsies were conducted on 25 (6.6%) of the deceased dogs. Owners should remember that necropsies will sometimes be helpful in establishing the cause of death. If more necropsies were done in those where death is not due to very old age or is "unknown", there would certainly be more identifiable causes of death.

Mode of death was natural in 56, euthanasia in 283, accidental in 15, and not documented in 27.

Owners sometimes gave age of death, or month and year, or only year of death. For those, an estimated exact date of death was calculated from the information given by an owner by assigning the date as the first day of the month (if month and year were given) or assigning the date as 1/1/yyyy (if only year was

given). In no case did the assignment of estimated exact date of death change the age group that the dog was in for purposes of evaluating causes of death.

Of note were three cases of gastric torsion (1 with stomach cancer) in older Beardies (ages 10.8, 14, and 15 years). Bloat/gastric torsion is very uncommon in Beardies; its occurrence in the older dog should alert owners to be aware of the signs and to seek emergency care immediately.

The leading causes of death before 9 years of age were autoimmune (n=20) and accidental (n=10). The high number dying from autoimmune disease at a young age is of concern and we should focus on supporting research to identify cause(s) of the problems, and hopefully elimination of these problems where feasible.

Age Group – 0 to 3 yr

There were 12 deaths (3.2% of total with cause of death recorded).

- Accidental – 3
- Autoimmune – 3 (1 each pemphigus/SLO, IBD, Addison's)
- Aggression, directed at dogs' family – 2
- 1 each intussusception (after hemorrhagic gastroenteritis), epilepsy idiopathic, meningitis, pyometra.

Age Group – 3-7 year

There were 30 deaths (7.9% of total)

- Autoimmune - 10
  - SLE – 3
  - AIHA – 2
  - 1 each: SLO with aggression due to pain, ITP, Evan's syndrome (ITP & AIHA), Addison's, IBD
- Accidental – 5
- Unknown – 2
- Cancer – 3 (10% of age group)
- Poisonings – 2
- 1 each: acute renal failure, chronic interstitial nephritis, respiratory failure (in an Addisonian), acute fulminating pancreatitis after whelping, neurologic other (had hip dysplasia and developed rear paralysis from a pinched nerve), liver failure, sudden acute retinal deterioration (unable to deal with visual loss), chronic pancreatitis.

Age Group – 7-9 yr

There were 27 deaths (7.1% of total)

- Autoimmune – 7 (25.9% of age group)
  - Addison's – 3 (either primary cause or associated)
  - 1 each – autoimmune muscle disease, AIHA, rheumatoid arthritis, SLE
- Cancer – 5 (18.5% of age group)
- Unknown – 4
- Accidental – 2
- 1 each: family aggression, pet food poisoning, rear end paralysis, sepsis, sudden breathing distress, after surgical A/I, pyometra, unidentified illness for 6 mo, pancreatitis & kidney failure

Age Group – 9-14 yr

There were 190 deaths (49.9%)

- Cancer 58 (30.5% of age group)
    - Nasal – 11 (1 of those has severe nose bleeds but no confirmed dx)
    - 5 – spleen
    - 4 – liver
    - 3 each – bone, hemangiosarcoma, stomach, abdominal
    - Remainder had only 1 or 2 cases
- Autoimmune – 18 (9.5% of age group)
    - Addison's – 7 (1 with kidney failure)
    - AIHA – 4 (1 with ITP [Evan's syndrome])
    - SLE - 3
    - Diabetes, IBD, pemphigus, rheumatoid arthritis – 1 each
- Cognitive dysfunction – 6
- Old age – 17 (av age = 13.2 yrs)
- Stroke – 9 (av age = 13.0 yrs)
- Other, unknown, mostly single diagnoses - 79

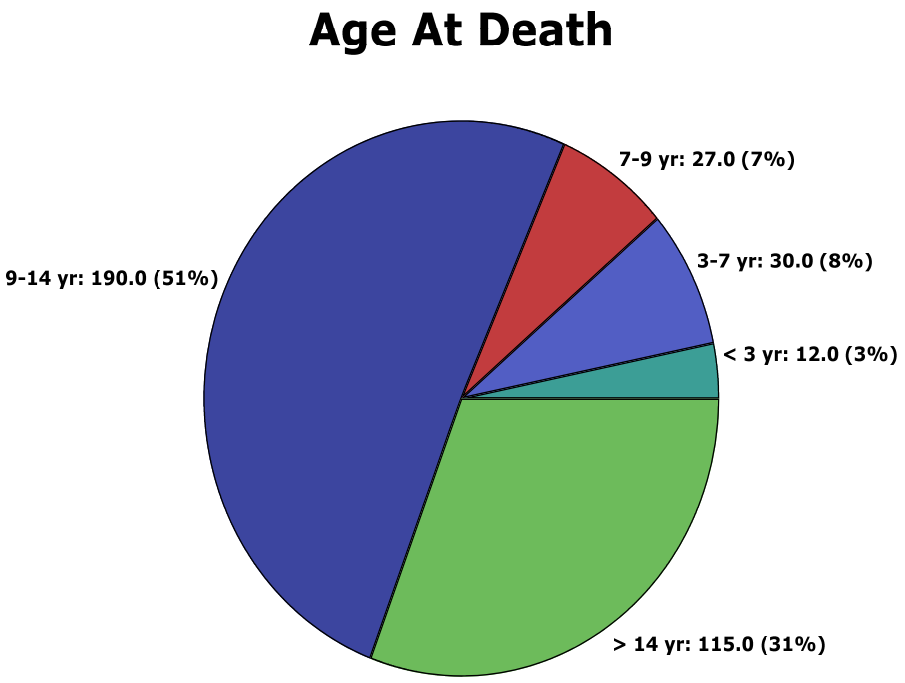
Age Group >14.0 yr

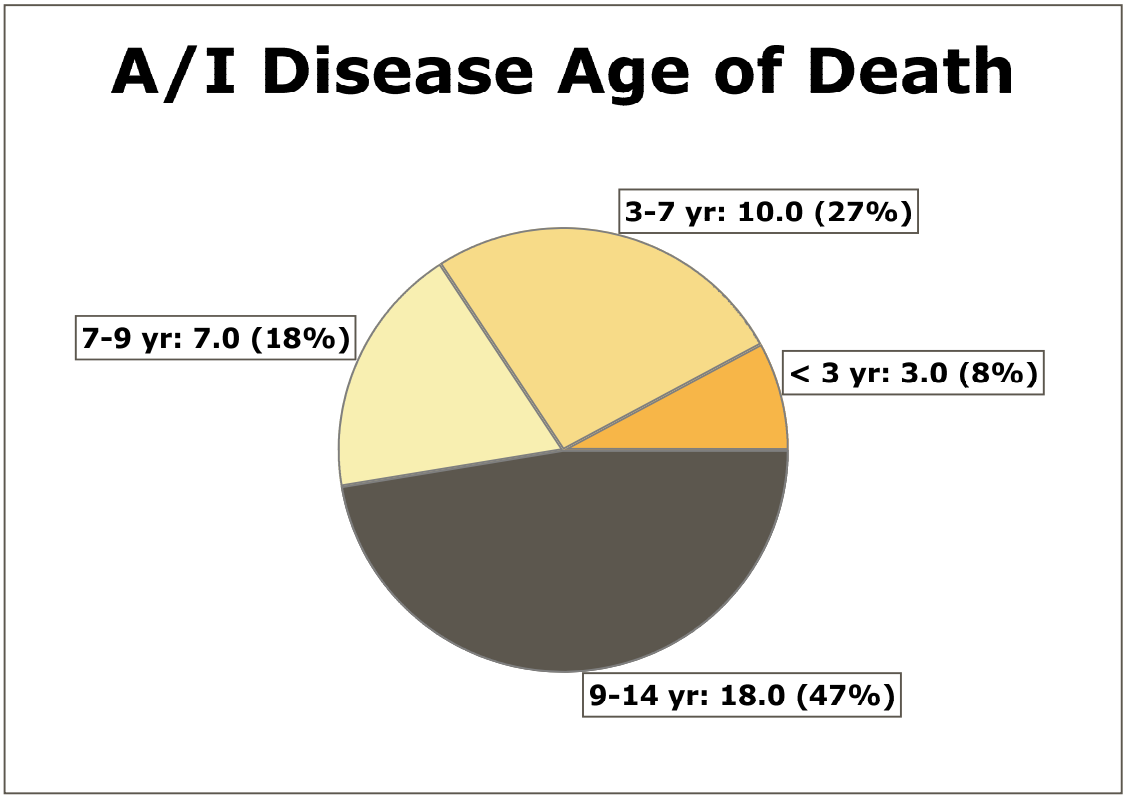
There were 115 deaths (30.2%)

- Old age or cognitive dysfunction – 63 (54.8% of age group)
- Cancer – 18 (15.7% of age group)
- Stroke – 8
- Other or unknown - 26

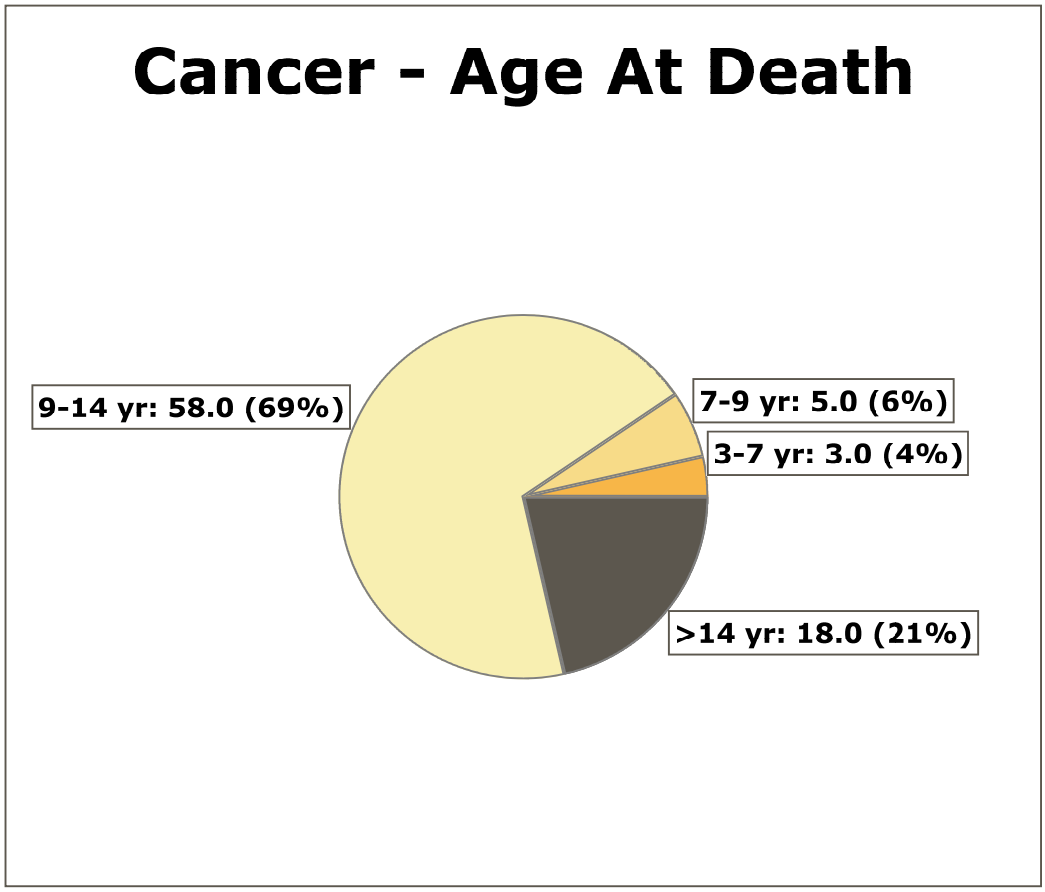
No age Given for Death (n=8)

Distribution Charts – Age at Death, general; A/I Disease; Cancer





As in previous years, the majority of deaths from autoimmune causes occurred prior to 9 years of age.



The vast majority of cancer deaths occurred in those 9 years and older.

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 as of October 1, 1976.

	Coefficient of Inbreeding				
Year Report/Other	**# dogs**	**Av**	**Min**	**Max**	**Std dev**
USA – 1977 stud book	318	18.3	3.8	40.1	
Year 9					
All dogs	1570	23.4	0	47.3	5.8
USA	746	23.5	11.2	42.8	5.3
UK	311	24.9	0	40.5	6.4
Netherlands	88	20.9	9.2	36.0	5.6
Canada	81	23.3	9.2	35.2	5.2
Australia	83	22.3	12.4	42.1	5.3
Germany	58	20.2	10.8	38.4	6.0
Czech Republic	56	22.6	12.2	47.3	6.3

Research on Autoimmune Disease.

The two most frequently reported A/I diseases are the subject of several research projects.

Summary of Dr. Oberbauer's Research on Bearded Collies

Introduction.

Autoimmune disorders occur when the body's defense system (the immune system) becomes mistargeted and attacks one or more body tissues instead of foreign invaders such as bacteria and viruses. *Hypothyroidism*, abnormally low function of the thyroid gland, is an example that has been raised as a concern by breeders of different breeds; the disorder also occurs in dogs of mixed breeds. *Hypoadrenocorticism*, abnormally low function of the cortex (outer tissue layer) of the adrenal gland, is commonly known as *Addison's disease*. Like hypothyroidism, it can occur as an autoimmune disorder in Bearded Collies: The immune system becomes mistargeted and attacks the cells of the adrenal cortex, destroying this tissue over time.

We know from breed-specific research such as that done in Bearded Collies that some dogs may develop more than one autoimmune disease. This medical evidence suggests that different autoimmune diseases may reflect the activity of a common set of susceptibility genes. In an individual dog, the result of gene expression depends on the whole set of genetic mutations (the abnormal forms of genes) present in the dog and the dog's exposure to and response to environmental triggers.

Summary Regarding Generalized Autoimmune Dysfunction.
The 12-month Acorn grant was used to examine the entire canine genome in Bearded Collies (using technology called SNP microarrays) to search for chromosomal regions associated with hypothyroidism. No significant linkage was detected for any chromosomal region when evaluating either hypothyroidism alone or hypoadrenocorticism alone when compared with DNA from dogs that had neither condition.

However, when dogs that had both hypothyroidism and hypoadrenocorticism (dogs considered to have a generalized autoimmune condition) were examined in comparison to dogs without either condition, a specific chromosomal region (2.7 MB in length) demonstrated a statistically significant association with the presence of generalized autoimmune status. Dr. Oberbauer and her colleagues hypothesize that a set of susceptibility genes common to autoimmune disease exists within that region and they are planning to map this region in finer detail.

Summary Regarding Addison's disease.

In Bearded Collies, Addison's disease is a disorder characterized by inadequate amounts of two types of hormones produced in the adrenal cortex, one that helps balance glucose

levels within the body (called glucocorticoids) and another that helps balance electrolyte levels in the body (mineralocorticoids). Evidence from the human literature pertaining to autoimmune diseases suggests susceptibility rests with a set of genes that express differently depending upon environmental triggers. The 12-month Acorn grant examined the entire canine genome with the same technology used to search for chromosomal regions associated with hypothyroidism and hypoadrenocorticism in the Bearded Collie. Four distinct chromosomal regions were significantly associated with the presence of hypoadrenocorticism; two were identified in past research (CFA 12 and another that is the subject of ongoing collaboration), one was also detected in the current research when categorizing dogs with hypothyroidism and hypoadrenocorticism together as a generalized immune condition (see above), and a fourth region was identified that has not been previously implicated. It is currently being fine mapped.

Taken together, the data from the last 12 months of research are substantial and suggest that a set of susceptibility genes common to autoimmune disease exists. In addition, a second set of genes more specific for development of hypoadrenocorticism in the Bearded Collie also appears to exist.

Symmetrical Lupoid Onychodystrophy (SLO).

BeaCon initiated a survey of Beardies with SLO or a chronic nail problem that clinically resembles SLO in 2008. The short term goals are to establish a baseline of clinical findings and other factors that are possibly associated with SLO expression (e.g., vaccination, allergic problems, stress, family history of similar disease).

Ongoing are breeder interviews to learn if a similar condition exists in littermates, parents, and other close relatives. Breeders are being contacted only if the SLO dog's owner gave permission. Breeders are free to contact Cindy Alspaugh (stonebaybeardies@yahoo.com) if they have cases/information to contribute. Breeder cooperation is essential. Let's make this health problem different from the startup of study of Addison's disease. Possibly a third step will be to identify and obtain similar clinical information from a group of healthy controls. Finally, all data will be put into a report, along with family pedigrees for study by genetic researchers.

SLO Survey Results

The information below comes from 59 Bearded Collies with completed surveys as of mid-February 2010. There were 49 owners (30 USA, 7 UK, 3 each Netherlands and Canada, 2 or 1 from other countries). Some owners have yet to return surveys, so the number will increase later on. Some dogs from the open registry who have SLO but no survey will be included in family pedigrees.

Age of Onset.

This was before 8 years in 88.8%. The average age was 4.1 years in 46 dogs in whom exact age of onset is know.

Diagnosis.

Twelve dogs had nail biopsy. Others were diagnosed by clinical response to treatment regimens for SLO. Reluctance on the part of owner and/or general veterinarian to do a

biopsy led to clinical response as the diagnostic means. This is not ideal from a research perspective, yet it is the practicality of everyday life.

Environment.
All dogs lived in homes; 41 were either born at home or placed in their home by 9 weeks of age. Others were placed later and six dogs were rehomed as adults. There were no differences in house flooring exposure or outdoor surface exposure before or after onset of SLO.

General Health.
The table shows other health conditions experienced.

Condition	**# (% of total)**
Ear infections	13 (22%)
Hypothyroid*	6 (10.2%)
Weepy eyes	6 (10.2%)
Skin infections	5 (8.4%)
Eye infections	4 (6.8%)
Atopy	3 (5.1%)
Crusty nose	3 (5.1%)
AIHA, Lyme disease, dental problems	2 each

*One hypothyroid dog also had atypical Addison's. 17 others were normal thyroid.

A/I Problems In Relatives.
There were 33 dogs who had relatives with an A/I problem. The other dogs didn't have the A/I problem in a relative specified. Five dogs with SLO produced progeny with SLO and six dogs with SLO produced other A/I problems.

A/I Problem in Relative	**Number (% of total)**
SLO*	9 (15.3%)
Addison's**	7 (11.9%)
AIHA***	5 (8.4%)

*5 of these had more than 1 relative with SLO
**2 of these had more than 1 relative with Addison's
***2 of these had more than 1 relative with AIHA

Vaccination and Preventive Use.
Interestingly, 15 (25%) of the dogs never received rabies vaccination; 34 received rabies boosters (after the initial puppy vaccination) every 3 years. The other vaccination schedules were so varied and with different (or unknown) products that it will take a research team to evaluate. Other antecedent events within six months of SLO onset were vaccination in 19, showing/trialing in 12, rehome or move in 5, and miscellaneous events in some others. Heartworm preventives were used in 33 (55.9%) and flea/tick preventives were used in 41 (69.5%).

Nail Clinical Findings (either initially and/or during course of disease).

Clinical Sign	# dogs	% of all dogs (n=62)
Pain	54	87.0%
Abnormal nail growth	49	79.0%
Nails fall off	49	79.0%
Split	44	71.0%
Bleeding	44	71.0%
Persistent licking	39	62.9%
Lameness	34	54.8%
Infection	33	53.2%
Offensive odor	13	21.0%

The clinical findings are similar to those reported in peer reviewed published papers on SLO in multiple breeds. Most dogs in the BeaCon survey had more than one clinical findings and involvement of more than one paw.

Recurrence.

There was no recurrence in 11, and either the problem was ongoing or recurring in 51; in 4 there was no information. Some of those with ongoing disease referred just to the persistence of abnormal nails without other signs of disease.

Treatment.

The dog's medical management was by a generalist in 43 (3 had treated SLO in other dogs; 5 also saw a dermatologist), dermatology 16, internist or other, 2 each; not specified in others. A wide range of treatments were used (see table); dosages and duration were quite varied. Several dogs had loose nails removed surgically.

Treatment	# (% of total)
Fatty acids (e.g., fish oil capsules)	50 (80.7%)
Tetracycline type antibiotic	38 (61.3%)
Niacinamide	26 (41.9%)
Antibiotic other than tetracycline	25 (40.3%)
Pain control	19 (30.7%)
Antifungal	11 (17.7%)
Prednisone	8 (12.9%)
Vitamin C	6 (9.7%)
Trental (pentoxyfylline)	4 (6.5%)

Family History.

This aspect of the survey work is incomplete because breeder information remains to be collected from breeders about littermates of the affected dogs. The following table shows that some cases (n=47) fit into families, thus supporting the concern of some participating breeders that genetics has a contributing role in expression of the disease. Families are "named" by an alphabet letter for convenience. There are some ancestors common across several families too.

Family	# SLO cases

A	6
B	10
C	9
D	2
E	3
F	3
G	3
H	6
I	2
J	2

Finnish Study of SLO in Bearded Collies.

A recently completed study documented similar findings with respect to young age of onset and the most prominent early symptom being claw (i.e., nail) pain manifest by licking of the paws, lameness, whining or screaming when running or playing or upon pressure to the paw. Nail regrowth was abnormal in 13/14 dogs. The painful phase was 2-6 months. Antibiotics were given to all dogs at least briefly, pain medications to 13/14, and corticosteroids to 4. Maintenance medications were supplement fatty acid preparations and/or oils and vitamin B preparations, either continuously or periodically. Pedigree study suggested that one or several recessive genes were involved. This paper was published in the Finnish Beardie Magazine in the fall of 2009. It will also be submitted by the author (Suvi Taponen, DVM, PhD and Nina Janger) to a peer review journal.