

Breeding strategy for Irish Wolfhounds in Norway



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**Norsk
Kennel Klub**

HUNDEEIERNES ORGANISASJON

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Introduction

This breeding strategy was created by the Health committee of Irsk Ulvehundklubb Norge on assignment from the Club's board. Data collection and base work is done from August 2013 - May 2014 with data spanning a ten-year period. Sources are given in each part of this document. Computational methods are explained in each chapter.

This breeding strategy is a live document and will undergo major revisions every five years.

General

History, background and development

The Irish Wolfhound comes from Ireland. Up until the late 18th century it was used in hunting wolves and other big game like deer. The Irish Wolfhound was also used in hunting wolves throughout Europe wherever the wolf-population was large before urbanisation and wood-clearing.

The breed's origin is probably in Celtic, greyhound-like dogs. Similar to their continental relatives, the Irish Celts were interested in breeding large hunting dogs.

These large, Irish hunting dogs could have smooth or rough coats, but over time rough coats started to dominate, probably due to the Irish climate.

The first written account of these hunting dogs was by a Roman consul in 391AD, but they were already established in the first century AD when Setanta changed their name to CuChulainn (Culann's hunting dog).

The clan of Uisneach was documented bringing 150 dogs to Scotland when they fled Ireland in the first century AD. These Irish hunting dogs were without a doubt the founders of the Scottish Deerhound.

Couples of Irish Wolfhounds were highly appreciated gifts to the monarchies throughout Europe from the Middle Ages until the end of the 17th century. They were sent to Rome, England, Spain, France, Sweden, Denmark, Iceland, Persia, India and Poland.

In the 15th century every Irish county had to hold 24 wolfhounds to protect livestock against wolves. Cromwell's prohibition of export in 1652 contributed to breed preservation for a while, but gradual extinction of wolves and continuous interest from abroad reduced the breed to near extinction at the end of the 1700s.

Interest in the breed was revived with Irish nationalism in the late 19th century. The Irish Wolfhound became a living symbol of Celtic splendour and Irish culture. Corresponding with the increasing interest in Ireland, an enthusiast, Captain G A Graham, started collecting the few remaining hunting dogs of wolfhound type still to be found in Ireland. He and his contemporaries started a planned breeding programme to revive the breed, crossing in Scottish deerhounds, Borzoi, Great Danes and rarely a Mastiff. Eventually they managed to stabilize type through generations, and the result was considered a legitimate revival of the breed.

The Kennel Club accepted the Irish Wolfhound at their show in April 1879, and a breed club was established in 1885.

The first Irish Wolfhound came to Norway around 1000 AD. It was a gift from Ireland to Gunnar Jarl. After this gift, no wolfhounds are known in Norway until 1923 when Jorgen W Cappelen imported two specimens from Kennel Ifold in London. They were Heks of Ifold (Eogan X Felixstowe Ballyneety) and Varg of Ifold (Michael X Ferb).

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Cand Philos Ragnvald Henrichsen imported two littermates from Scotland some years later. They were Kirkhope and Annelshope (Felixstowe Kilbarron X Love In the Mist). The breeder of these two was Ms C Alice Muir-Dunlop. She was kennel maid at the famous Felixstowe kennel.

The first Norwegian breeding occurred at Bårdshaug Herregård by Mrs Thams. She is assumed to have had two litters where the puppies were mainly sold abroad. Since the dogs were expensive to keep, the remaining Irish Wolfhounds were culled during WWII.

From the 1960s, Irish Wolfhounds have been bred continuously in Norway. The breed has had increased popularity and today we have more Irish Wolfhounds in Norway than ever before.

Norway has around 15 Irish Wolfhound breeders. Quite a few dogs are imported while dogs are also exported from Norway.

Main goal for the breed

The main goal for the breed is to have healthy, long-lived, breed-typical animals with a gentle disposition.

Breed population

Size of population

Data on population is extracted from Dogweb, and calculations are done in software developed by the Club. We know that not all dogs with Norwegian owners are registered in Dogweb, and we know that registrations in certain cases are delayed. Our dataset is up-to-date with Dogweb as of 31st December 2013.

In calculations we have used the owner's address as stated in NKK registers to determine whether a dog is locally owned and the breeder's current address to determine whether the dog is bred in Norway.

The breed's population is hard to calculate as we don't know their exact longevity and we have huge variation in how many puppies are born each year.

Average longevity is usually calculated to 6.7¹ years for the breed, although different studies give different results. Bernardi's (1986) data indicated an average longevity of 6.47 years², Prokopenko (1998) states 7.65 years and Murphy's (1991) data indicates 8.75 years³. The Kennel Club states average longevity as 7 years. In our calculations, 7 years is set as average longevity.

Given an average longevity of 7 years and all dogs being registered with NKK, the breed has a population in Norway of 359 animals. The population has increased over the last ten years and peaked in 2011. The ten-year period shows an increased interest in the breed and the trend shows a growing number of Irish Wolfhounds in Norway.

¹ <http://www.wolfhoundweb.com/breedinfo/health/longevity/bernardi.html> and "Summary results of the Purebred Dog Health Survey for Irish Wolfhound" - The Kennel Club

² <http://www.wolfhoundweb.com/breedinfo/health/longevity/bernardi.html>

³ Data collected from Silvan Urfer's paper:
http://www.vetsuisse.unibe.ch/unibe/vetmed/housing/content/e9361/e9372/e90449/e90455/files90472/Diss_Urfer_2007_ger.pdf

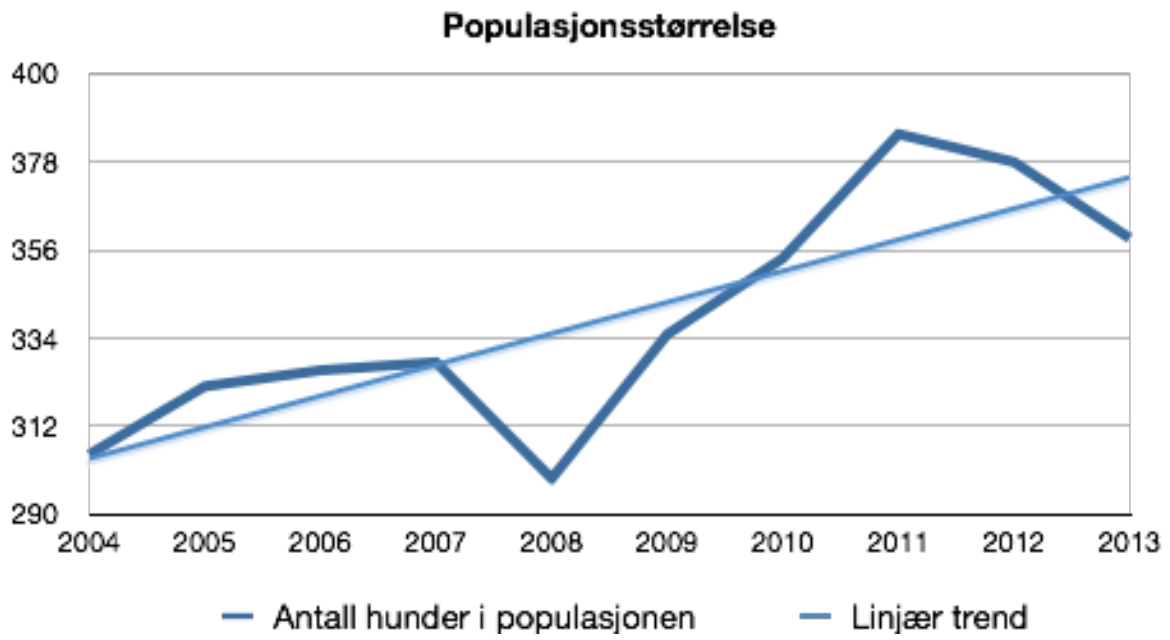


Figure 1 Population size. Dark blue line showing number of dogs, the light blue line showing a linear trend

Average litter size

The number of litters of Irish Wolfhounds bred by Norway's breeders shows huge variation from year to year. In the period from January 2004 through 2013, a total of 77 litters were registered in Norway. 2006 and 2013 were low points with only 5 litters, whereas both 2005 and 2009 had ten litters registered.

These 77 litters have given a total of 462 registered puppies, giving an average litter size of 6. There is a huge variation in litter size (1-12 puppies), which makes average numbers vulnerable to bias. One large or small litter will skew the data. We found it more useful to calculate median-values, which will give a more correct "normal" value for litter size. The median value for litter size over the ten-year-period is six puppies.

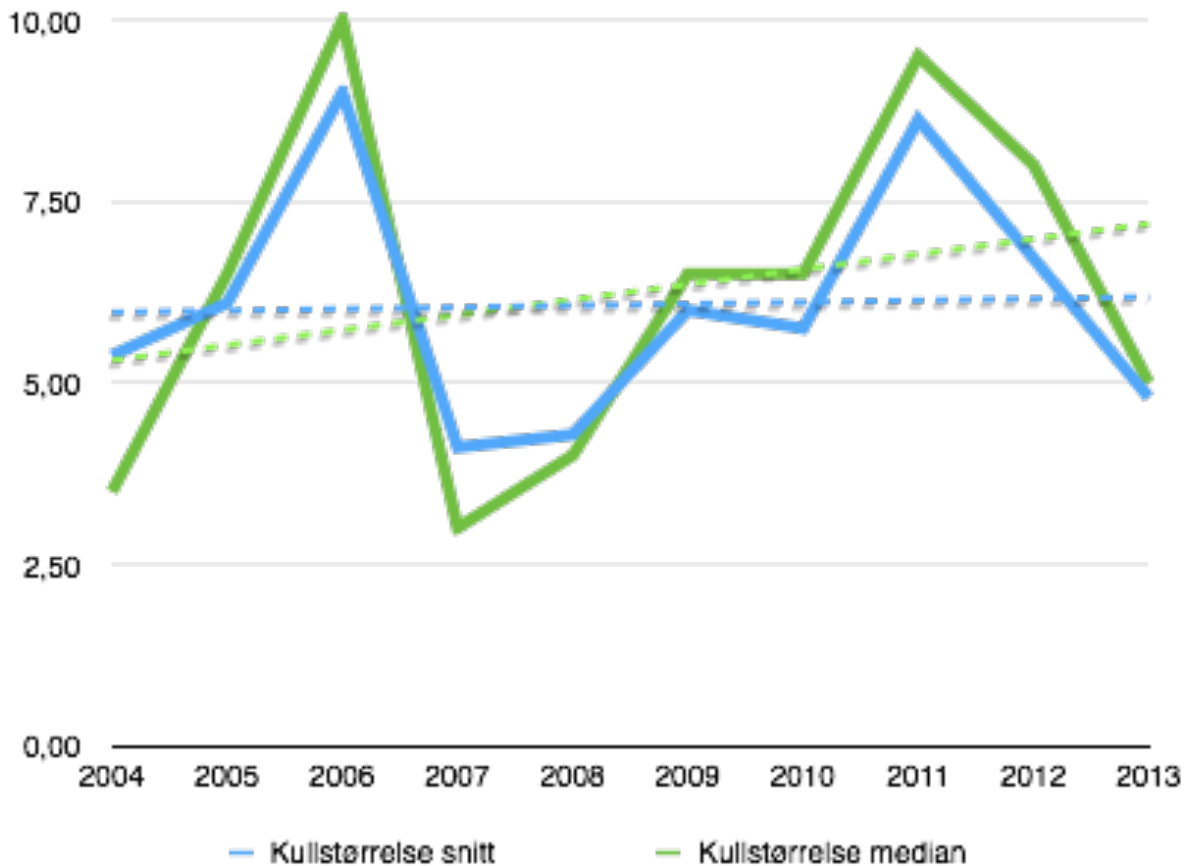
There are variations in litter size and development. Given the relatively small number of litters, it's likely that the variations seen are coincidental. A trend-analysis shows a small increase in litter-size, but a stable median-value. Of 462 registered offspring in the period, 201 are dogs and 261 are bitches.

The table shows development through the ten year period:

Year of birth	#Litters	#Puppies	Avg Litter size	Median litter size	Dogs	Bitches	Largest Litter
2004	8	43	5.38	3.5	19	24	12
2005	10	61	6.10	6.5	31	30	9
2006	5	45	9.00	10	16	29	12
2007	9	37	4.11	3	15	22	9
2008	7	30	4.29	4	13	17	7
2009	10	60	6.00	6.5	19	41	11
2010	7	46	6.57	6.5	19	27	12
2011	8	69	8.63	9.5	34	35	12
2012	7	47	6.71	8	19	28	11
2013	5	24	4.80	5	16	8	8
Total/avg	76	462	6.08	6	201	261	10.3

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The graph below shows development in litter size. Blue lines indicate average litter size; green lines indicate median litter size. (Dotted lines indicate trends):



Effective population size

Effective population size is normally calculated to see how many unrelated individuals are used in breeding. In the following we have looked at how many individuals are used without calculating their relationship with each other. The ideal population has the same number of males and females reproducing and all individuals in the population can mate and have offspring with any other member of the population⁴. A low effective population size will normally mean reduced genetic diversity in the breed.

Effective population size is unfortunately hard to calculate precisely given NKK data. We know the breed is young and has a relatively shallow gene pool, especially after three major reductions over the last 150 years. This leads to all Irish Wolfhounds being closely related. By studying pedigrees, we will also see that a relatively small number of individuals are present in a large number of pedigrees. We don't see much matador [is this the same as popular sire?] breeding and most breeding stock will have relatively few litters. An additional weakness is the lack of pedigree data in Dogweb which makes it even harder to calculate effective population size.

⁴ http://snl.no/effektiv_populasjonsstorrelse

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We can however calculate how many animals are used in each generation and the size of the effective population within these parameters. The median age for the dam at birth of a litter is 3.5 years, while the sire's median age is 4.1 years. Given these values, we calculate a generation to 4 years. We calculate the population size within a given generation.

Population size in Norway:

Period	Sires used	Dams used	#Litters	Population size (N_e)	Population size/Litter
2001-2004	20	25	29	45	1.56
2005-2008	23	26	31	49	1.57
2009-2012	25	25	31	50	1.61

Population size in Sweden:

Period	Sires used	Dams used	#Litters	Population size (N_e)	Population size/Litter
2001-2004	57	57	814	114	1.36
2005-2008	54	55	84	109	1.30
2009-2012	65	66	90	131	1.46

Population size in Norway and Sweden Combined:

Period	Sires used	Dams used	#Litters	Population size (N_e)	Population size/Litter
2001-2004	65	66	113	131	1.16
2005-2008	70	71	115	141	1.23
2009-2012	82	83	121	165	1.36

Population size (N_e) is calculated with the formula

$N_e = (4 * N_m * N_t) / (N_m + N_t)$ where N_m indicated sires used and N_t indicates dams used in breeding.

Given the extensive use of foreign material in the breed, combined with a high number of imports from other countries (63 of the 359 animals in the expected population are imported, a percentage of 17.5%), the low effective population size in Norway isn't giving concern by itself, but is rather a natural consequence of litter sizes, the number of breeders and general interest for the breed. We consider the aggregated effective population size of Norway of Sweden to be satisfactory.

Inbreeding coefficient

We have calculated the coefficient of inbreeding (COI) from NKK data in Dogweb⁵ given a six generation pedigree (including the offspring). Dogweb does not calculate COI correctly when foreign dogs are in the pedigree. We have, therefore, also calculated COI in Martha Ryan's database IWPedigrees⁶ where inbreeding is calculated over 10 generations + the offspring, 11 generations in total. We have chosen to calculate COI on a litter basis instead of for individuals. For 2013 we only have 11 generation data for one of the five litters.

Year	# Litters	# Puppies	6 gen max COI	6 gen # litters where COI > 6.25%	6 gen avg COI	11 gen Max COI	11 gen # litters where COI >8.75%	11 gen avg COI
2004	8	43	8.05	1	1.77	13.7	2	7.93
2005	10	61	15.91	1	2.52	23.2	6	10.04
2006	5	45	1.17	0	0.49	11.4	1	7.20
2007	9	37	4.83	0	1.29	13.3	3	7.73
2008	7	30	15.27	1	3.33	17.7	1	8.36
2009	10	60	4.69	0	0.80	8.8	0	5.68
2010	7	46	5.86	0	1.30	9.5	2	4.91
2011	8	69	13.48	1	2.21	18.5	2	6.09
2012	7	47	17.32	1	3.64	18.6	2	6.97
2013	5	24	8.99	1	3.13	7.3	0	7.30
Total/Avg	76	462	9.557	6	2.05	14.2	19	7.22

The data shows a shrinking COI over the last few years when seen over a ten generation perspective, but a small increase over six generations. It is likely that the six generation increase is due to better data over time in Dogweb. The number of litters with a medium to high COI has decreased.

⁵ NKK Dogweb

⁶ <http://www.iwpedigrees.com/>

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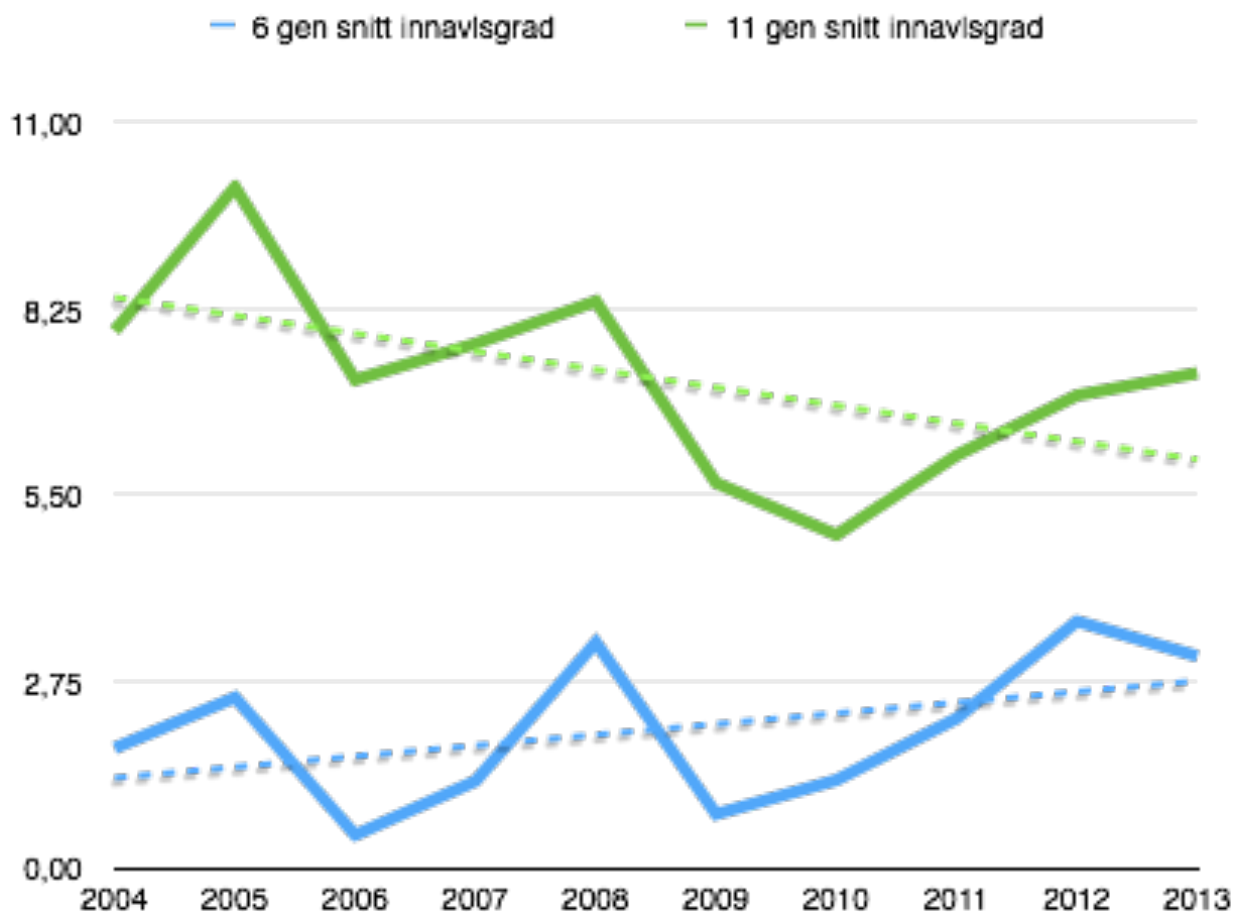


Figure 2 Data showing development in COI over time. Blue bars are 6(5) generation COI whereas green bars are 11(10) generations. The dotted lines are trends.

The breed is below NKK recommendations⁷ on keeping average COI below 2.5% measured over six generations. Unfortunately, the main reason for this is incomplete data in DogWeb. If we use the 11 generation COI as a baseline and remove 0.5% per generation, we end up with an average COI of 4.7%. The data shows that a low number of litters are contributing disproportionately to the average COI in the breed.

⁷ Kristin Aukrust at Ulvehundseminaret 2014

Use of breeding stock

Of the 76 litters born in Norway over the last ten years, 45 unique sires and 53 unique dams are used. In Norway and Sweden combined, 327 litters are born in the period. 189 unique sires and 254 unique dams are used. The number of litters per sire/dam are distributed like this:

#Litters	Individuals with litters in Norway		Individuals with litters in Norway and Sweden combined	
	Sires	Dams	Sires	Dams
1	30	41	125	191
2	10	8	29	50
3	2	4	15	12
4	2		13	
5	1		2	
6			2	
7			1	
8			1	
9				
10			1	

Given the large variation in litter size and the number of litters, it's hard for breeders to keep below the stated goal that no dog should have more offspring than 5% of the registered dogs in a country if we see Norway isolated. On average 53 Irish Wolfhounds are registered yearly in Norway⁸. 5% of the registered population will then suggest that no dog should have more than 13 offspring. Our opinion is that the Irish Wolfhound should be treated as a numerically small breed, making it necessary to also look at the Swedish population to calculate the matador breeding. Cooperation with Sweden is extensive and Sweden is the country of origin for around one in four of the Norwegian breeding stock. Sweden has an Irish Wolfhound population which is about three times higher than Norway's.

Based on this, we calculate the registrations to be around 900 animals in a 5-year period and a limit of 45 offspring/dog. Two sires in Sweden are above this limit.

Genetic variation is also closely connected to the usage of offspring after popular sires. In our breed, some individuals are extensively seen in six generation pedigrees. In today's population, 26 animals appear in more than 300 six generation pedigrees in Norway and

⁸ NKK statistics 1980-2012 - http://web2.nkk.no/wp-content/uploads/2012/06/2012_Registrering-for-alle-raser-alle-ar-siden-1980-EXCEL-raddata-WEB.xls

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Sweden combined⁹. There's reason to believe that some of the more popular animals of the past are present in close to 100% of all pedigrees of living Irish Wolfhounds if we extend the search to ten generations. The breed is heavily exposed to genetic bottlenecks with an associated weakening of genetic diversity. The 26 animals present in more than 300 Norwegian and Swedish pedigrees are listed below:

Name	Presence in pedigrees	Norwegian Pedigrees	Sex	Country of Origin	Born	# Litters	# Offspring	#Offspring bred from
Nasch From The Good Heath	784	160	M	Belgium	1989	16	109	20
Miss-Marple From The Good Heath	652	133	F	Belgium	1988	2	17	7
Wolfsbane Pre-Eminence Black Magic	622	198	F	Norway	1996	5	29	11
Quincy Of Kilmara	570	166	M	Belgium	1992	41	206	69
Sixpence Of Kilmara	518	162	M	Belgium	1994	2	19	5
Pre-Eminence's Gentle On My Mind	477	127	M	Sweden	1990	7	36	7
Stoneybrook Atreyu	473	54	M	USA	1991	14	52	18
Wolfhouse Metaphor	470	148	M	Denmark	1999	5	37	15
Violet Dickson O' Marksby	448	127	F	Norway	1991	2	13	3
Seplecur Bryn	427	51	M	UK	1996	8	45	10
Solstrand Qvist	408	78	M	UK	1987	15	71	17
Xecel Fionnmae	401	52	M	Netherlands	1996	33	203	46
Stoneybrook Konjur	400	53	M	USA	1994	21	107	28
Tenderfoot Of Kilmara	391	165	M	Belgium	1995	9	50	13
Bokra Solstice	384	79	M	UK	1995	10	44	12
Shadow Of Kilmara	379	57	M	Belgium	1994	25	169	43
Westmount Zaxen Borka	364	72	M	Sweden	1998	11	61	18
Blossom of Nutstown	347	107	F	Ireland	1992	4	15	9
Westmount Hermione II	345	55	F	Sweden	1992	2	5	3
Fingal of Nutstown	340	125	M	Ireland	1994	22	62	41

⁹ Source: The Club's breed database.

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Furlongs Quinn	333	45	M	Sweden	1990	11	64	13
Wolfhouse Melody Maker	326	92	M	Denmark	1999	15	91	29
Cùroí Jazz	315	65	M	Netherlands	1994	19	140	23
Donaghmore Daisy Of Seplecur	312	22	F	UK	1994	2	8	2
Simon Nicholas Of Seplecur	312	22	M	UK	1995	4	18	2
Eithne Of Nutstown	304	66	F	Ireland	1998	2	7	5

Usage of breeding stock from other countries

Of the 101 animals used in breeding in Norway, 54 are bred in Norway. There is a significant import of breeding stock into the country. In addition, foreign owned breeding stock is extensively used. The following table show usage of breeding stock in Norway based on the dog's country of origin:

Countries	Sires		Dams	
	#	#Litters	#	#Litters
Norway	18	31	36	51
Belgium	5	8		
Denmark	4	5	2	4
UK	3	4	1	1
France	1	1		
Ireland	1	2	2	3
Netherlands	1	2	1	1
Russia	1	2		
Sweden	11	15	9	14
Germany	2	5	1	1
USA	1	1	1	1

Description of goals

1. Highest possible genetic variation within the main goals of the breed.
2. Increase the effective population size in Norway to at least 60 before 2020 by using more individuals in breeding.
3. Avoid litters with a 6-generation COI (NKK) over 6.25%
4. Achieve an average COI below 2.5% measured over six generations.

Strategy to achieve goals

The main goal in this area is to achieve the highest possible genetic variation within the goals for the breed. The Club doesn't have and don't want to have a breeding council. We want to give a huge degree of responsibility to our breeders and contribute to their work. Information is, in our opinion, the key to success. The following actions are recommended:

- Communicate numbers for matador-breeding
- Inform and work with breeders to reduce COI
- Increase knowledge on the importance of genetic diversity and inform about dogs that are present in many pedigrees.
- Articles on the breed's population in Ulvehunden
- Open breeder conferences every second year
- Continued surveillance and retrieval of breeding data.

Health

The data in this chapter is collected through Agria Sweden's data, supplemented with data from Dogweb, Gjensidige Forsikring Norge and the Club's own health surveys. References are given when applicable.

General description of health in the Irish Wolfhound

The breed is characterized by a relatively low longevity. Internationally an average longevity of 6.7 years is estimated (Irish Wolfhound Foundation), whereas Agria estimates a median longevity of 4.7 years in males and 6 years in bitches for the period 2006-2011. In general, Irish Wolfhounds are relatively healthy until they are hit by life-threatening diseases, too often early in life. Due to the dog's size and the seriousness of some of these diseases, the end result is often death.

Occurrences of health problems, disease and/or defects

Agria has developed comprehensive statistics for the period 1995-2011 based on Swedish data. Their data shows the following to be the most important causes of death in the breed:

- Pneumonia and other respiratory diseases
- Osteosarcoma
- Heart failure/Cardiomyopathy
- Bloat
- Skeletal disorders

In Gjensidige's data on the treatment of Irish Wolfhounds, kidney problems are also listed as a major factor. These diseases are also a major factor in Agria's data on problems requiring veterinary treatment.

In addition to these problems, Portosystemic shunt is present in the breed.

In Dogweb, screening results for Hip Dysplasia (HD), Elbow Dysplasia (ED) and eye-examinations are recorded. The numbers show that relatively few are screened for HD and/or ED and even fewer have their eyes examined. The number of dogs screened for HD/ED is increasing and in 2013 35 dogs were X-rayed for HD, while 31 were screened for ED.

Pneumonia and other respiratory diseases

While the Club health survey ten years ago hardly had any occurrences of pneumonia, the problem has increased significantly over the last ten years. Gjensidige has lung-problems listed as the main reason for veterinary treatment (15.1%). Agria counts pneumonia as one of the most important causes of death in the breed.

Previously, not much research has been done on pneumonia in the Irish Wolfhound. We do know that Irish Wolfhounds are particularly vulnerable to pneumonia if they do get infections in their respiratory systems. We also know pneumonia to be an acute, life-threatening condition for the Irish Wolfhound.

We don't know much about why these problems seem to be increasing. We know kennel cough to often be present before an outbreak of pneumonia, but don't know why occurrences seem to increase in certain periods and decrease in others. When some animals or lines suffer from multiple occurrences of pneumonia it's generally believed to be related to PCD (Primary Ciliary Dyskinesia)¹⁰, a heritable, genetic defect, making the cilia transport foreign particles to the lungs instead of removing them. PCD has been seen in the Irish Wolfhound¹¹.

Osteosarcoma

Osteosarcoma is an aggressive form of cancer, attacking the dog's skeleton, typically at the end of long bones. The disease has a rapid development and a high risk of metastases. Osteosarcoma has a high mortality rate¹². Osteosarcoma in dogs primarily attacks in middle age with an average age at death of 6.5 years.¹³

In the study "occurrences of bone tumours in different breeds of dogs in Norway in the period 1989-1998"¹⁴, published in Hundesport 10/2002, the writer concluded that Irish Wolfhounds had the highest risk of getting osteosarcoma among the studied breeds. The risk for Irish Wolfhounds was stated to be twice as high as the next nearest breed.

Cancer is in general identified as the most common cause of death in Irish Wolfhounds. In 2009 a study was started on osteosarcoma in four different breeds in Norway, and research is ongoing across the world. In Sweden research is focused on finding the genetic causes to increased risk of osteosarcoma. In a study from 2013¹⁵, the researchers have found four regions in the Irish Wolfhound genome they believe to influence development of osteosarcoma. The report indicates a complex polygenetic inheritance model.

Irsk Ulvehundklubb Norge encourages donation of blood and general contribution to these projects and have collected samples for the project at the Swedish agricultural university. The projects must be seen in a long term – at least ten years – perspective and no new conclusions are seen that may reduce occurrence. In general, osteosarcoma is assumed to have a strong genetic component, enhanced through trauma.

Irish Wolfhounds will rarely be given anything but palliative treatment for osteosarcoma. Chemotherapy and amputations happen to a small degree, and the ethical foundation for these treatments in Irish Wolfhounds is under discussion.

¹⁰ Dr Angela Bodey BSc BVSc PhD MRCVS at the IW Health Group seminar, Coventry 23 November 2013

¹¹ <http://www.irishwolfhounds.org/rhinitis.htm>

¹² <http://link.springer.com/article/10.1007%2Fs10555-009-9186-7>

¹³ <http://www.wolfhoundweb.com/breedinfo/health/longevity/bernardi.html>

¹⁴ <http://web2.nkk.no/wp-content/uploads/2012/01/Publ-Beinkreft-Hundesport.pdf>

¹⁵ <http://genomebiology.com/2013/14/12/R132>

The occurrence of osteosarcoma is high, but apparently stable. According to a Czech study by MVDr Zuzana Málková, 24.4% of Irish Wolfhounds get cancer. Among these, 60% have osteosarcoma.¹⁶

The club recommends to avoid doubling of lines where osteosarcoma occurs.

Heart diseases

The Irish Wolfhound is generally highly exposed to cardiac diseases. Agrida's data show heart failure to be the most common cause of death in Irish Wolfhounds. In the UK, the Irish Wolfhound club has had a screening program going for 27 years¹⁷. The screening process is done through

- Auscultation
- ECG
- Echocardiographic ultrasound

The screening program has so far covered 1899 dogs with altogether 3407 screenings, and is regarded as the most complete screening program on the heart in Irish Wolfhounds. The program has uncovered that the Irish Wolfhound is vulnerable to a wide spectrum of heart problems with a large variation in age. The problems can be categorized as such:

- ECG abnormalities with no ultrasound changes
- Increased heart size / reduced left ventricular function on ultrasound with no, or minor, ECG abnormalities
- Mitral/aortic valve abnormalities
- Right ventricular cardiomyopathy

The screening program has uncovered different occurrences of heart failure through ECG. The most common ECG-measurable diseases are (percentage of affected animals in %)

- Atrial Fibrillation (AF) (15%)
- Supraventricular premature contractions (6%)
- Ventricular prematures (7%)
- First degree AV Block (4%)
- Left interior fascicular block (7.5%)

Around 40% of the examined dogs had ECG-abnormalities

The people responsible for the British screening program claim that all dogs they have seen in acute heart failure also had atrial fibrillation at the time of heart failure.¹⁸

¹⁶ <http://www.irskyvilkodav.cz/o-irskem-vlkodavovi/352-irish-wolfhound-age-and-cause-of-death>

¹⁷ Source on all screening data: Dr Serena Brownlie's presentation at Ulvehundseminaret 2014

¹⁸ Dr Serena Brownlie at Ulvehundseminaret 2014

The Club's ethical guidelines states that dogs with inherited heart failure should not be used in breeding. Mating between two dogs with the same type of heart disease is strongly discouraged.

Dilated cardiomyopathy

Heart disease in dogs

Cardiac problems are the third most common cause of death in dogs. Dilated cardiomyopathy (DCM) is the second most common heart-disease in dogs, mostly attacking big and giant breeds. DCM is assumed to affect one in three Irish Wolfhounds¹⁹ and is considered the most common heart disease in the breed.

Heart problems occur either as a consequence of other diseases or as a primary disease. For the primary heart diseases causes are often unknown. They may be innate or acquired. In most cases they will be hereditary in nature.

DCM

The second most common heart disease in dogs is DCM. In dogs with DCM, the heart muscle is weakened, which in turn leads to heart growth in a futile attempt to compensate for the weakened muscles. An enlarged heart is not able to pump blood as effectively as a normal heart. This leads to blood accumulating in veins leading to the heart and fluid accumulating in lungs (pulmonary oedema) and/or in the abdomen.

Which dogs are affected?

Big or giant breeds are more affected than others. Dogs may develop the disease from the puppy-stage until they are old, but DCM is most commonly seen around they age of 5²⁰. Females will normally develop DCM later in life than males.

In a genetic research-project on DCM at the Swedish agricultural university in Uppsala, they are focusing on Newfoundland dogs, Great Danes and Irish Wolfhounds, although other breeds are also affected by DCM.

Symptoms

A small number of dogs with DCM may live apparently normal lives without showing any symptoms. Normally the dog will have a low tolerance for play and training. It will want to stay quiet, will easily acquire breathing problems and symptoms such as tiredness, decreased appetite and coughs. It is important to seek veterinary guidance if the aforementioned symptoms are seen. If left untreated, the dog will develop disturbances in their heart rhythm and eventually full cardiac failure.

Diagnosing

Certain medical examinations are necessary to confirm a DCM diagnosis and exclude other diseases in evaluating the dog's medical condition. Electrocardiography (ECG) may uncover

¹⁹ <http://www.ufaw.org.uk/DILATEDCARDIOMYOPATHYIRISHWOLFHOUND.php>

²⁰ http://hunddna.slu.se/artikelserie/dcm_jens.pdf

atrial fibrillation and ventricular problems. Ultrasound is necessary to confirm DCM in a dog. This procedure will show heart size and the ability of the ventricles to contract.

If the animal is affected by DCM, the ultrasound-scanning will uncover a magnified left ventricle and atrium with a corresponding low ability of contraction²¹.

The German cardiologist Andrea Vollmar has developed procedures and target values to uncover normal, hidden and advanced status of DCM in the Irish Wolfhound²². Her protocol is used throughout Europe and will also be used by the Irish Wolfhound Club of Norway.

Treatment

The purpose of treatment is to reduce load on the heart. Through medication the heart will have a reduced rate, which in turn will increase the contractibility of the heart muscle. Other medication will decrease resistance in the circulatory system and help in blood transport. If fluid is accumulated in the lungs and/or abdomen, the dog must get diuretic medicine to relieve these problems. It is important to know that treatment will have to continue for the rest of the dog's life, and focus is on dog welfare and quality of life. Animals on heart medication must receive regular veterinary follow up.

Prognosis

Early diagnosis and treatment is vital for the dog's prognosis. The prognosis for dogs with dilated cardiomyopathy is generally not good. Most will be euthanized or eventually die of acute heart failure. It is possible to treat the dog with medicines reducing symptoms. This treatment is life-prolonging and does not cure the disease.

Risk of disease

Big and giant breeds, especially Dobermans, Irish Wolfhounds and Great Danes are most commonly affected. Furthermore there is a slight sex bias making males more vulnerable than females. Risk of disease increases with age.

Breed disposition

The following table shows the percentage of diagnosed dogs in some breeds:²³

1. Doberman: 5.8 %
2. Irish Wolfhound: 5.6 %
3. Great Dane: 3.9 %
4. Boxer: 3.4 %
5. Saint Bernard: 2.6 %
6. Newfoundland: 1.3 %

²¹ http://www.petmd.com/dog/conditions/cardiovascular/c_dg_cardiomyopathy_dilated

²² "Echocardiographic measurements in the Irish Wolfhound: reference values for the breed." J Am Anim Hosp Assoc 35(4): 271-7.

²³ http://www.notteroy-dyreklinikk.no/klinikken/index.php?option=com_content&task=view&id=29&Itemid=42

Atrial fibrillation

Atrial fibrillation is the most common of many heart rhythm abnormalities in the Irish Wolfhound. It's also the most serious one. A dog with atrial fibrillation has upper heart chambers that won't contract and expand normally, instead going into fibrillation. This is due to uncontrolled electrical charges in the heart's atria. Atrial fibrillation will often occur in episodes but will later often become permanent. Atrial fibrillation will cause the heart efficiency to reduce. Blood may stagnate in the atrium and lead to blood clots. The normal heart will try to compensate through an increased and often chaotic rhythm. Untreated atrial fibrillation will often lead to death within six months with congestive heart failure, breathing problems and accumulation of fluids in the dog's abdomen. [Per Arne, I am unsure where you have sourced this information but there are many cases of Irish Wolfhounds with a condition called Lone Atrial Fibrillation where they live with the condition for very many years and never go on to develop full-blown heart disease. I think this section may be unduly pessimistic. I had a dog diagnosed with AF at 13 months (at an IW heart screening session) who was euthanized due to heart failure just before his 5th birthday. He never developed the classic IW DCM but his heart did deteriorate and ultimately led to his death but some 4 years after he first developed AF, as with hindsight he showed issues at 10 months which were missed by my vet.]

Atrial fibrillation may be diagnosed through a simple ECG of the dog. Increased heart rhythm and irregular pulse will often be an indicator of atrial fibrillation, but there may also be other factors.

The median age for diagnosed atrial fibrillation is 53 months in males and 66 months in females, but atrial fibrillation may occur both in very young and very old dogs.

The dogs are most likely genetically predisposed for atrial fibrillation. Most likely inheritance is autosomal dominant with a sex-bias as males are more vulnerable than bitches.

Atrial fibrillation will increase the risk of death under anaesthetic.

Bloat

Bloat is a very serious condition which normally affects breeds with a deep chest. The Irish Wolfhound is one of the breeds which are especially vulnerable due to this. Development from the first symptoms to death may happen in a very short time-frame. If symptoms are ignored or not understood, the dog may die within a few hours. If bloat occurs, medical treatment is urgent.

A dog with bloat will have a stomach that rotates around its own axes together with the spleen. The stomach contents are captured like a balloon in the stomach, starting to ferment. The created gas has nowhere to go and will make the stomach expand, putting pressure on all organs in the abdomen and chest. Eventually this will lead to circulatory failure, the dog will go into shock and eventually die a painful death.

Causes

There are many discussions and opinions about the causes of bloat. The direct causes of bloat in the Irish Wolfhound are assumed to be connected to the dog's anatomy, genetic

factors and environmental factors. Often several anatomic and environmental factors will occur simultaneously.

- Big breeds
- Deep chest with lots of space for the stomach
- Weakness in ligaments keeping the stomach in place
- Feeding
- Large portions of food (dogs that only get one meal a day)
- Exercise directly before or after the meal
- Stress [many studies show stress as an important factor in bloat]

Genetic predisposition has not been proved, but recent research at Michigan State University indicates a strong genetic link²⁴. Research on Irish Setters indicate a correlation between depth/width ratio of the chest and risk of bloat. The study shows a significant increased risk when depth is large compared to width. The study also shows a significant increase in risk if one of the parents has had bloat, and occurrences of bloat in a five generation pedigree showed increased risk of bloat²⁵.

The Irish Wolfhound Club of Norway recommends that dogs who have had bloat are not used in breeding. Doubling of lines where the disease is known is strongly discouraged.

Skeletal problems

Skeletal problems have a special position in Norway through the NKK screening program for hip dysplasia (HD) and elbow dysplasia (ED). The screening program gives us access to far more data on these problems than other health problems in the breed. It is known that dogs are genetically predisposed for both HD and ED.

The Club demands Norwegian-owned dogs to be free of both HD and ED if they are to be used in breeding. In most cases breeders are very good at following up these factors, although we sometimes see dogs not being screened, or not being free, used in breeding. A relatively low number of offspring is screened, and it's a problem that the status of foreign-owned breeding stock is normally unknown.

These statistics show the following results over the last ten years. At the time of writing a character-system of A - E is used for HD, whereas ED excludes the character B. A and B are considered free, C is mild dysplasia, D moderate and E severe dysplasia.

²⁴ <http://msutoday.msu.edu/news/2013/targeting-canine-bloat-a-major-killer-of-dogs/>

²⁵ <http://www.ncbi.nlm.nih.gov/pubmed/9527432>

	Tested	A	B	C	D	E
Total # of dogs in population	500					
HD-tested:	184	140	16	6	2	
ED-tested:	174	140	0	24	9	1

Of the 184 dogs that were screened for HD, 88 were screened before the age of two. 76 of the ED-screened dogs were screened before the age of two. Based on the data, we can't see any correlation between age at time of screening and result.

There is no reason to suspect HD to be a problem in the breed. The occurrence is low (around 4%). ED occurred in various degrees in 34 of the 174 screened dogs (around 20%). If the occurrence level is the same within dogs not being screened, we have around 70 dogs with a potential ED-diagnosis in the population. Although these numbers are high, we need to be reminded that most animals will have a mild form of ED.

Other skeletal diseases are also known in the Irish Wolfhound, most prominently spondylosis and OCD (Osteochondritis Dissecans).

The Club has the following breeding recommendations on skeletal disorders:

- Norwegian-owned breeding stock shall be screened and free of ED and HD (Diagnosis A or B)
- Dogs with OCD should not be used in breeding. Avoid doubling on lines where the disorder is known
- Avoid doubling on lines with enostosis?
- Dogs with patella should not be used in breeding [do you mean luxating patellas?]

Portosystemic Shunt

Portosystemic Shunt (PSS) is a serious inherited disease that normally leads to the dog being euthanized. PSS leads to blood not going correctly through the liver. The blood is thus not filtered as it should. The shunt failure may occur because the blood is led straight through the liver (intrahepatic) which is normally the case with Irish Wolfhounds or through blood being sent around the liver (extrahepatic). Since the affected shunts normally go straight through the liver on Irish Wolfhounds, prognosis for a successful operation is not good. As blood isn't filtered through the liver, poisonous material will accumulate in the dog²⁶. [There have been several very successful surgical corrections to puppies diagnosed with PSS in the UK.]

²⁶ <http://www.vet.utk.edu/clinical/sacs/shunt/faq.php>

Irish Wolfhound Breeding Strategy

Portosystemic shunt is assumed to affect 2-4% of all Irish Wolfhound puppies²⁷ and may be diagnosed from the age of six weeks. The disease is inherited with unknown mode of inheritance. The Club demands that all puppies are tested for PSS before leaving the breeder and discourages repeat matings when the disease has occurred.

²⁷ <http://www.ufaw.org.uk/PORTOSYSTEMICSHUNTIRISHWOLFHOUND.php> and http://www.iwfoundation.org/articles_detail.html?item_id=26&year=2005

Occurrence of reproductive problems

The breed club has no complete overview of reproductive problems.

It is likely that there are occurrences of artificial insemination in first-time dams. The main reason for this seems to be easier access to chilled or frozen sperm combined with less resources demanded for artificial insemination than transport of dogs for natural mating. The Club has no numbers on occurrences of artificial insemination.

NKK numbers show around 11% of dogs to be stillborn. In addition, around 5% of puppies die within the first week of their lives. We see no reason to exaggerate the problem. In around two-thirds of all litters, no stillborn puppies or puppies dying within the first week of their lives are recorded. Some extreme instances are increasing the values here.

A study on sperm quality in the Irish Wolfhound²⁸ shows a lower libido and sperm quality in the Irish Wolfhound compared to a reference group. Soft testicles are more common in the Irish Wolfhound than in a reference group.

Description of short and long-term goals

In general, the Club is most concerned with diseases in the breed that lead to premature death in addition to diseases which make it hard for the animals to have good lives. For the Club, it's important to work for reduced occurrences of osteosarcoma, heart diseases, pneumonia and skeletal diseases. The Club will continue full screening of puppies for PSS.

Goals: A basic goal is to map the prevalence of diseases mentioned here, both in occurrences and deaths. Our main goal is to increase breed longevity.

Priorities and strategies to reach goals

1. Establish a health and death register where occurrence of diseases and cause of death is catalogued.
2. Information on the main health issues in the breed.
3. Update and acceptance for ethical guidelines on breeding
4. Stronger emphasis on heart testing before breeding
5. Open breeder conferences

²⁸ <http://www.ncbi.nlm.nih.gov/pubmed/8926724>

Temperament and working ability

Temperament and working ability compared to the breed standard

The FCI breed standard²⁹ states that the Irish Wolfhound shall be "Lambs at home, lions in the chase". The standard does not demand any other temperament or working ability characteristics in the breed. The modern ideal for the breed is often summarised in the phrase "gentle giants". An Irish Wolfhound with a good temperament will be confident, sociable, trustful and friendly.

It seems like there is a tendency towards nervousness and shyness in the breed. These are undesirable traits.

The breed standard and current practices do not require or encourage testing of working abilities in the Irish Wolfhound. The breed may participate in lure coursing, which may be a way to test traits related to the breed's original function.

Description of short and long-term goals

- Reduce occurrence of nervousness and shyness
- Increased participation in lure coursing

Priorities and strategies to reach goals

- Information on the importance of confident dogs and increased usage of temperament as a breeding parameter.
- Increased cooperation with the Norwegian Sighthound Club and Norwegian Greyhound Club in order to achieve inclusion of the Irish Wolfhound Club of Norway in the lure coursing committee and increased participation in lure coursing activities by Irish Wolfhounds.

²⁹ www.fci.be/uploaded_files/160A2001_en.doc

Behaviour

Behaviour problems

In general, very few behaviour issues are seen in the Irish Wolfhound. Separation anxiety is mentioned as a behaviour issue with a genetic component³⁰, but it's not a major issue in the breed.

Description of short and long-term goals

Keep behaviour problems low in the breed.

Priorities and strategies to reach goals

Continued breeding of dogs that don't show behaviour problems.

³⁰ <http://www.manimal.no/separasjonsangst/>

Conformation

Conformation evaluations

The Club bases its evaluation of conformational development on the judge's report from our annual speciality show and international development. No special problems are dominant in these evaluations. Internationally, safeguarding the dogs' movement is emphasized. In general, the dogs get very high scores at dog shows. Of 426 shown dogs in 2012, 363 got Excellent, while 61 got very good. The judges' evaluations, therefore, indicate a generally very high quality of the breed in Norway.

Conformation exaggerations

Certain conformation exaggerations are more prevalent than others and are highlighted as possible threats by both breeders and judges:

- Narrow underjaw
- Extreme angulation behind
- Incorrect underline with lacking length of chest
- Low set dogs not giving enough room underneath
- Big ears
- Light eyes

The Club lacks systematic registration of judges' evaluation. The breed is subject to breed specific judge instructions (BSI) in several countries, including Sweden, when it comes to an incorrect bite caused by narrow underjaws. This will lead to teeth going up into the gum.

Description of short and long-term goals

An important long-term goal is to keep the breed close to the breed standard. It is of special importance to keep the breed's physical size. Short term, the goal is to limit occurrences of deviation from the breed standard.

Priorities and strategies to reach goals

- Registration and categorization of all critiques from shows.
- Hold a judges' seminar to increase knowledge about the breed among judges.
- Information on breed specific judge instructions when these come in effect in Norway.

Summary

Description of short and long-term goals

- Health and death register
- Updated ethical guidelines for breeding
- Open breeders' seminars biannually
- Systematic collection of data
- Continued dissemination of information to Club members
- Increased cooperation with the Irish Wolfhound Club of Sweden and EIWC

Plan for future work in the breed club

For the Club, work on health and breeding must continue to receive high priority. Systematic collection data, health and death registers and open breeder seminars requires extensive work. We believe it is important to put priority on this and implement these measures.

This document is subject to yearly evaluation and will be subject to a complete revision in 2019.