



THE KENNEL CLUB
DOG HEALTH

Breed Health and Conservation Plan

Irish Water Spaniel Evidence Base

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INTRODUCTION

The Kennel Club launched a new resource for breed clubs and individual breeders – the Breed Health and Conservation Plans (BHCP) project – in September 2016. The purpose of the project is to ensure that all health concerns for a breed are identified through evidence-based criteria, and that breeders are provided with useful information and resources to support them in making balanced breeding decisions that make health a priority.

The Breed Health and Conservation Plans take a complete view of breed health with consideration to the following issues: known inherited conditions, complex conditions (i.e. those involving many genes and environmental effects such as nutrition or exercise levels, for example hip dysplasia), conformational concerns and population genetics.

Sources of evidence and data have been collated into an evidence base which gives clear indications of the most significant health conditions in each breed, in terms of prevalence and impact. Once the evidence base document has been produced it is discussed with the relevant Breed Health Co-ordinator and breed health committee or representatives if applicable. Priorities are agreed based on this data and incorporated into a list of actions between the Kennel Club and the breed to tackle these health concerns. These actions are then monitored and reviewed on a regular basis.

DEMOGRAPHICS

The number of Irish Water Spaniels registered by year of birth between 1980 and 2018 are shown in Figure 1. The trend of registrations over year of birth (1980-2018) was -0.25 per year (with a 95% confidence interval of 0.51 to -1.01), reflecting the very slight decrease in registration trend during this time. Worldwide, approximately 350 puppies of the breed are born each year, with only six countries regularly producing at least one litter per year.

[Put simply, 95% confidence intervals (C.I.s) indicate that we are 95% confident that the true estimate of a parameter lies between the lower and upper number stated.]

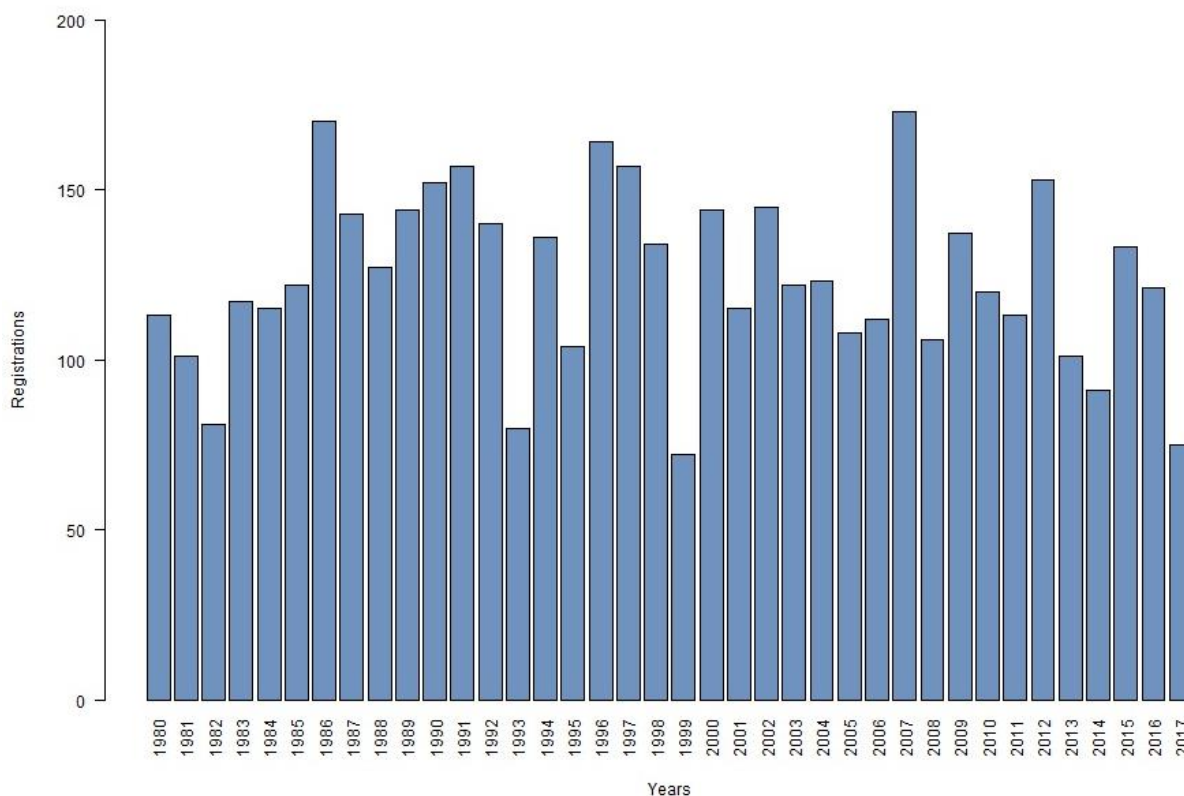


Figure 1: Number of registrations of Irish Water Spaniels per year of birth, 1980 - 2018

BREED HEALTH CO-ORDINATOR ANNUAL HEALTH REPORT

Breed Health Co-ordinators (BHCs) are volunteers nominated by their breed to act as a vital conduit between the Kennel Club and the breed clubs with all matters relating to health.

The BHC's Annual Health Report 2017 yielded the following response to 'please list and rank the three health and welfare conditions that the breed considers to be currently the most important to deal with in your breed':

1. Cancer
2. Epilepsy
3. Auto-immune/ immune mediated

In terms of what the breed has done in the last year to help tackle these listed health and welfare concerns it was noted that the breed had sent epilepsy samples to the Animal Health Trust as part of the Give a Dog a Genome project.

The BHC's Annual Health Report 2018 report gave the same top three health and welfare concerns, with the breed having undertaken cancer research, and participated in the AHT's Give a Dog a Genome project.

BREED CLUB HEALTH ACTIVITIES

The Irish Water Spaniel has a dedicated health committee/ group/ council with each breed club having their own health representatives. Health information is currently available on the Irish Water Spaniel Association website:

<https://www.irishwaterspaniels.org.uk/breedhealth>, with the Sporting Irish Water Spaniel club's health information currently under review.

BREED SPECIFIC HEALTH SURVEYS

Kennel Club Purebred and Pedigree Dog Health Surveys Results

The Kennel Club Purebred and Pedigree Dog Health Surveys were launched in 2004 and 2014 respectively for all of the recognised breeds at the time, to establish common breed-specific and breed-wide conditions.

2004 Morbidity results: Health information was collected for 151 live Irish Water Spaniel of which 88 (58%) were healthy and 63 (42%) had at least one reported health condition. The top categories of diagnosis were dermatologic (19.2%, 20 of 104 reported conditions), reproductive (11.5%, 12 of 104 reported conditions), urologic (11.5%, 12 of 104 reported conditions), and neurologic (9.6%, 10 out of 104 conditions). The most frequently reported specific condition were hairloss/ alopecia (10 reported), seizures/ idiopathic epilepsy/ fits (8 reports), and bladder infection/ cystitis (7 reports).

2004 Mortality results: In total 95 deaths were reported. The median age at death for Irish Water Spaniels was 9 years and 4 months (min = 7 months, max = 17 years and 2 months). The most frequently reported causes of death by organ system or category were cancer (55.8%, 53 of 95 deaths), old age (10.5%, 10 of 95 deaths including age combinations), other - unspecified (5.3%, 5 of 95 deaths), behaviour (3.2%, 3 of 95 deaths) and endocrine (3.2%, 3 of 95 deaths). The most frequently reported specific causes of death were cancer unspecified (9 reports), and lymphoma (9 reports), followed by old age (6 reports).

2014 Morbidity results: Health information was collected for 49 live Irish Water Spaniels, of which 23 (46.9%) had reported no conditions and 26 (53.1%) reported affected by at least one condition. The most frequently reported specific conditions were skin cancer/ tumour (9.62% proportion, 5 cases), lipoma (7.89% proportion, 4 cases), colitis (5.77%, 3 cases), and entropion (5.77%, 3 cases).

2014 Mortality results: In total 8 deaths were reported. The range of death for Irish Water Spaniels was one to 12 years. Seven of these dogs died from cancer, none of which were reported to affect the same area/ system. One dog died from renal dysplasia.

Irish Water Spaniel Club of America (IWSCA) Health Survey 2001

A total of 238 responses were received from an owner questionnaire, of which 214 were dogs originating from America, 16 Canada, 6 Europe and 2 from Australia/ New Zealand. The top three most frequently reported conditions in the survey by organ system/ category are shown in Table 1 below.

Table 1: Top three health concerns per organ system/ category reported in the 2001 IWSCA health survey

Condition	Number Reported	Percentage
Eyes		
Conjunctivitis	33	7.86%
Cataracts	12	2.71%
Other/ unspecified	12	2.71%
Ears		
Ear infections/ otitis	77	17.42%
Other/ unspecified	29	6.56%
Musculoskeletal		
Hip dysplasia	35	7.92%
Arthritis	32	7.24%
Other/ unspecified	11	2.49%
Dental		
Dropped incisors	55	12.44%
Calculus	39	8.82%
Gastrointestinal		
Other/ unspecified	11	2.49%
Bloat/ gastric dilatation volvulus (GDV)	6	1.13%
Oesophageal	6	1.13%
Skin		
Coat patterning	120	27.15%
Allergies	49	11.09%
Hair loss	47	10.63%
Bladder/ kidney		
Cystitis	37	8.37%
Urinary tract problems	9	2.04%
Incontinence	8	1.81%
Endocrine		
Thyroid problems	42	9.50%
Pancreatitis	2	0.84%
Lymphosarcoma	1	0.42%
Neurological		
Seizures	30	6.79%
Epilepsy	15	3.39%
Other/ unspecified	6	1.13%
Cardiac		
Heart murmurs	11	2.49%
Other/ unspecified	1	0.42%
Reproductive		
Infertility (female)	37	8.37%
Still births	36	
Irregular heat cycles	24	5.43%
Cytorchidism	24	5.43%
Behaviour		

Shyness	37	8.37%
Aggression	21	4.75%
Other/ unspecified	10	4.20%
Others		
Adverse drug reactions	32	7.24%
Tumours	52	11.76%

Further analysis was undertaken regarding any associations between dermatitis, allergic reactions and coat loss. Dogs affected by an allergy were found to have a five-times increased chance of developing dermatitis compared to those unaffected. Similarly, dogs with allergies were 2.28 times more likely to be affected by coat patterning.

Investigation was also taken to assess any relationship between endocrine problems and adverse drug reactions. An odds ratio of 3 was established for dogs with thyroid conditions, implying they are at a greater risk of going on to develop drug reactions. Dogs that were reportedly shy also had a ten times higher odds of demonstrating aggression, compared to their counterparts that had not portrayed shy behaviour.

Mortality was also investigated within this study, based on reports from 365 deceased dogs. The most common cause of death was cancer (n=36), hip dysplasia (n=26), shyness (n=16), seizures (n=15) and hypothyroidism (n=11).

2008 IWSCA Lifespan Study

A summary of 76 deaths of international dogs was produced based on information provided between 1995-2005. The median age at death for all causes of death in UK dogs was 9 years. The top five most common causes of death are shown in Table 2 below.

Table 2: Causes of death established in the 2008 Lifespan Study

Cause of Death	Total (%)
Cancer	35 (46%)
Cardiac	8 (11%)
Unknown	5 (7%)
Old age	3 (4%)
Stroke	3 (4%)

The most common cancer type was lymphoma (4 cases), followed by three cases for brain cancers, melanomas, and liver cancers, respectively.

More than 150 reports were also submitted to the UK Sporting Irish Water Spaniel Club, with the median age at death being 8.33 years. Again, cancers were the most common cause of death, accounting for 39 (24.4%) of deaths. This was followed by old age (n=25, 15.6%), accidental (n=13, 8.1%), and GDV/ bloat (n=13, 8.1%).

IWSCA 2010 International Health Survey

A further survey was launched in 2010, and received responses for 819 dogs, of which 215 were from the UK, and 27% of these were reported to be unaffected by any condition. The top conditions for the breed were: tumours, idiopathic alopecia/ hair loss, cystitis, chronic ear infections/ otitis, seizures, GDV/ bloat, infectious disease, food allergies, entropion and hip dysplasia. The graph (Figure 2) below gives a comparison of these conditions in comparison to those reported by owners of dogs originating from North America. Interestingly, there were no cases of autoimmune haemolytic anaemia or GDV in the American population.

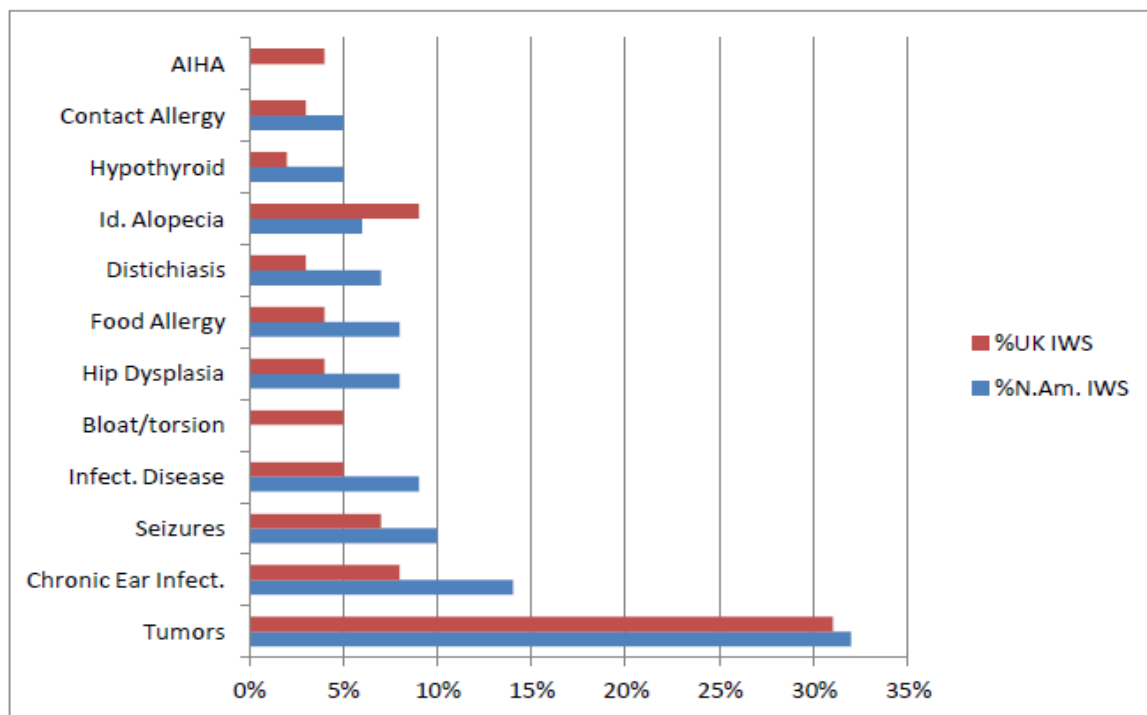


Figure 2: A graph to show the causes of death for UK Irish Water Spaniels from the 2010 health survey compared to deaths in North America.

Mortality data was also collected, and represented 405 deceased dogs, of which 125 originated from the UK. The causes of death for UK dogs and the age at which death occurred are shown in Figure 3 and 4 below.

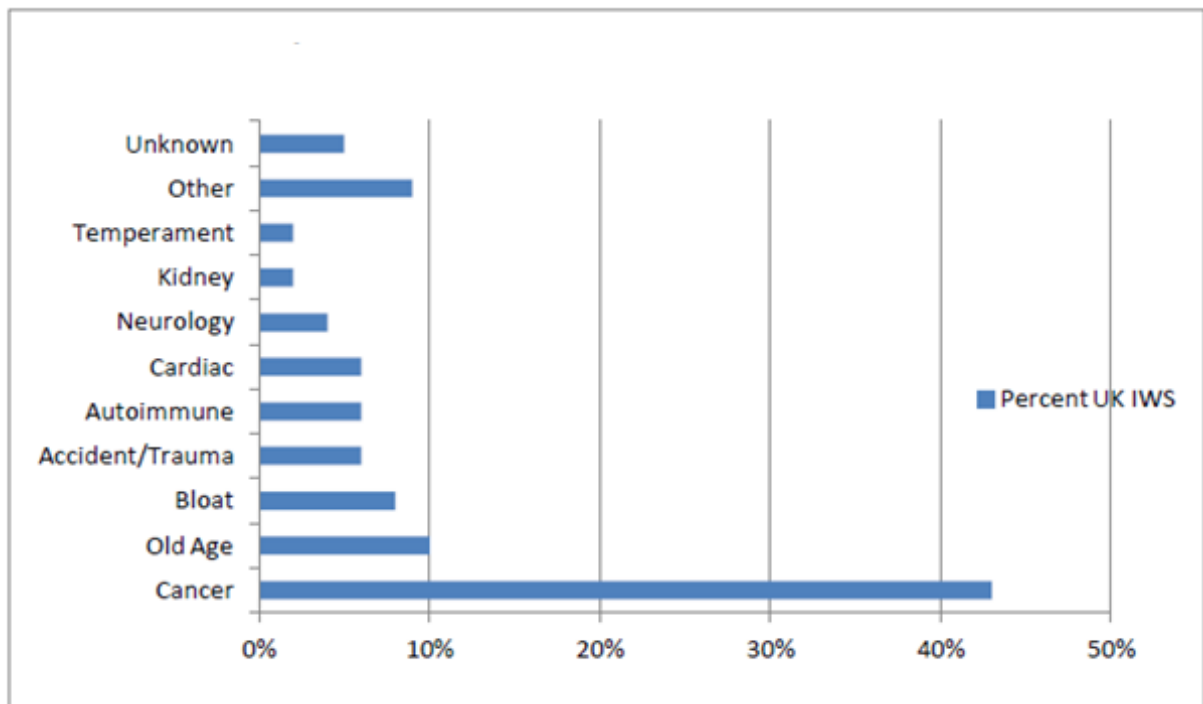


Figure 3: A graph to show the causes of death for UK Irish Water Spaniels from the 2010 health survey

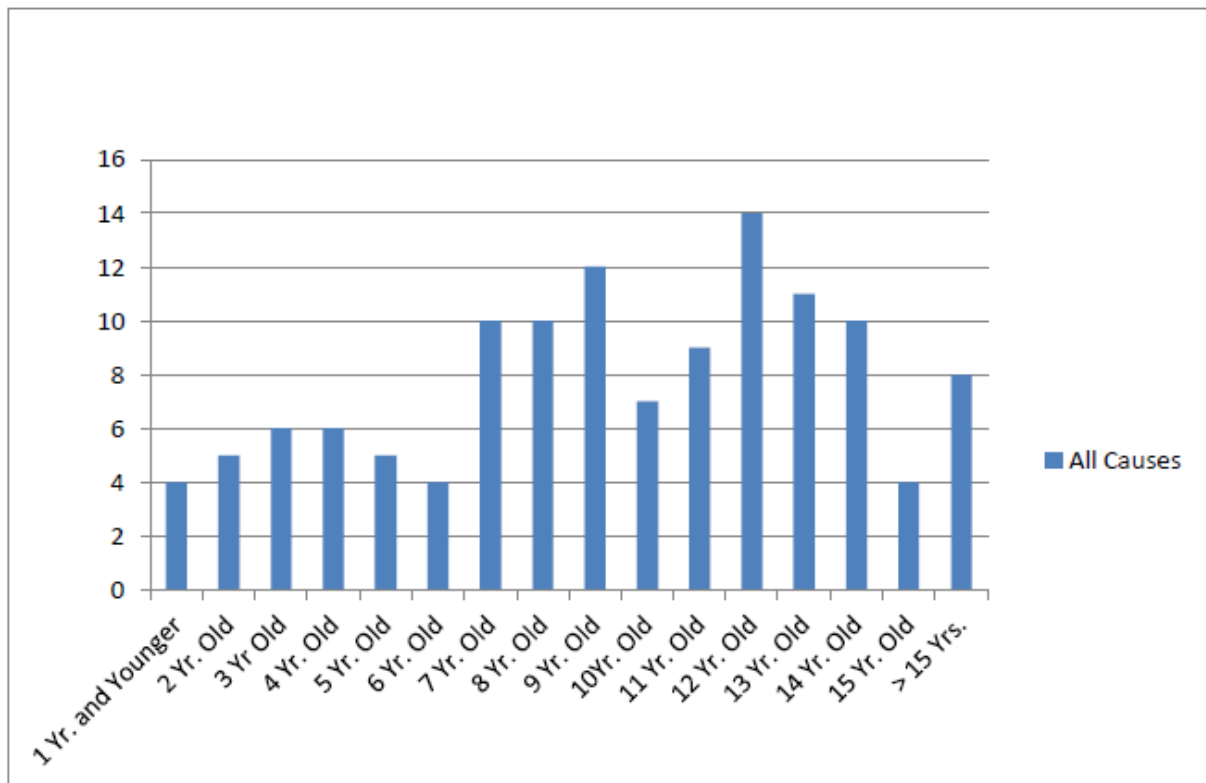


Figure 4: A graph to show the ages of death for UK Irish Water Spaniels from the 2010 health survey

Age at death for females versus males was analysed, finding that the average age at death for females was 9.45 years, and males 9.25 years (of all dogs in the survey).

Deaths due to cancer were investigated, with the death rate in UK females being 39.7% and males 46.8%. The most common cancers of all dogs included in the survey were: mast cell (n=39), lymphoma (n=27), squamous cell (n=11), osteosarcoma (n=8) and haemangiosarcoma (n=7).

Ongoing Reporting Survey

An on-going survey is available on the Irish Water Spaniel Association’s website to study common health and welfare concerns in the breed over the length of a dog’s lifetime. This can be found through the following link:

www.irishwaterspaniels.org.uk/breedhealth

UK LITERATURE REVIEW

The literature review lays out the current scientific knowledge relating to the health of the breed. We have attempted to refer primarily to research which has been published in peer-reviewed scientific journals. We have also incorporated literature that includes dogs residing within the UK primarily, and literature that was released

relatively recently to try to reflect current publications and research relating to the breed.

Hypotrichosis/ alopecia: A survey between the Royal Veterinary College (RVC) and the Irish Water Spaniel Association received responses totalling 216 members, representing 146 dogs (Cerundolo et al, 2000). Of these dogs, 64 were noted not to be affected by a cutaneous (skin) disorder, 41 with coat abnormalities and 27 with various forms of skin lesions. A group of 20 dogs affected by hair loss were selected from this survey and examined to establish potential causative factors for disease. Hair loss was seen to affect the rump (17 cases), neck ventrally and laterally (12 cases), thighs (14 cases) and trunk (11 cases). In bitches hair loss was reported to be synchronised with the oestrous cycles, with visible changes occurring 6 – 8 weeks following the first cycle. With regard to males, the dogs were more commonly seen to be affected later in life (5 – 6 years of age). However, the authors noted that further research into sexual hormones is needed to identify whether these have a significant impact on hair loss. In all cases, the season seemed to make no difference to rate of hair loss, and the severity of loss progressed with age. Pyoderma also affected 10 of the individuals. A diet of fish and corn was introduced to 16 of these dogs, with an improvement seen in 10 individuals.

INSURANCE DATA

There are some important limitations to consider for insurance data:

- Accuracy of diagnosis varies between disorders depending on the ease of clinical diagnosis, clinical acumen of the veterinarian and facilities available at the veterinary practice.
- Younger animals tend to be overrepresented in the UK insured population.
- Only clinical events that are not excluded and where the cost exceeds the deductible excess are included

UK Agria data

Insurance data were available for Irish Water Spaniels insured with Agria UK (Table 3). 'Exposures' are equivalent to one full policy year; between July 2016 and June 2017 there were 57 free exposures, 50 full exposures and 112 claims, between July 2017 and June 2018 these figures were 56, 58 and 55 respectively.

Full policies are available to dogs of any age. Free policies are available to breeders of Kennel Club registered puppies and cover starts from the time the puppy is collected by the new owner; cover under free policies lasts for five weeks from this time. It is possible that one dog could have more than one settlement for a condition within the 12-month period shown.

Table 3: Top 10 conditions and number of settlements for each condition between 1st July 2017 and 31st June 2018 for Irish Water Spaniels insured on full policies with Agria UK

Condition	Number of settlements
Skin (cutaneous) disorder (unspecified)	9
Otitis externa	8
Hypersensitivity (allergic) skin disorder (unspecified)	6
Aortic valve stenosis	6
Mast cell tumour (site unspecified)	2
Lipoma (site unspecified)	2
Neoplasm - gastric (stomach)	2
Alopecia/hair coat abnormality	2
Hamartoma	1
Gastroenteritis	1

BREED WATCH

As a category one breed judges' health monitoring forms are not mandatory at championship show level to identify any visible points of concern affecting dogs in the show ring. No optional forms relating to concerns in the breed have been received to date.

ASSURED BREEDER SCHEME

The breed have recently added the following as requirements under the Assured Breeder Scheme. Therefore breeders must complete these tests on all breeding stock prior to mating.

- Hip testing under the British Veterinary Association (BVA)/ Kennel Club (KC) Hip Dysplasia Scheme
- Elbow testing under the BVA/ KC Elbow Dysplasia Scheme

A recommendation for eye testing under the BVA/ KC/ International Sheepdog Society (ISDS) has also recently been added for the breed.

BREED CLUB BREEDING RECOMMENDATIONS

There are not currently any Breed Club breeding recommendations listed under the Kennel Club's Assured Breeder Scheme for the breed.

DNA TEST RESULTS

There are currently no DNA tests available for the Irish Water Spaniel. DNA test results are only recorded for official Kennel Club DNA Testing Schemes which

involve collaboration between the Kennel Club, the breed clubs and the DNA testing facilities.

CANINE HEALTH SCHEMES AND ESTIMATED BREEDING VALUES

All of the BVA/KC Canine Health Schemes are open to dogs of any breed with a summary given of dogs tested to date below.

Estimated breeding values (EBVs) are currently only available for breeds with large numbers of dogs with hip and elbow scores for the respective EBV.

HIPS

To date, (16/10/2019) 861 Irish Water Spaniels have been hip scored as part of the BVA/KC Hip Dysplasia Scheme, of which 686 were in the 15 years to 2019. The 15 and five year median hip score were both 11 (range 0 – 91).

ELBOWS

A total of 271 Irish Water Spaniels have participated in the BVA/KC Elbow Dysplasia Scheme since its launch in 1998. Table 4 below gives the percentage of dogs of the breed and their degree of elbow dysplasia tested in the past 15 years.

Table 4: Elbow grades of Irish Water Spaniels graded under the BVA/KC Elbow Dysplasia Scheme

Elbow Grade	Number Graded (%)
0	194 (78.5%)
1	37 (15.0%)
2	15 (6.1%)
3	1 (0.4%)
Total	247

EYES

The Irish Water Spaniel is not currently on the 'Known Inherited Ocular Diseases' list (previously Schedule A) under the BVA/KC/International Sheep Dog Society (ISDS) Eye Scheme. KIOD lists the known inherited eye conditions in the breeds where there is enough scientific information to show that the condition is inherited in the breed, often including the actual mode of inheritance and in some cases even a DNA test.

Sixteen eye scheme results have been recorded for the breed, of which all were unaffected for any eye condition.

However, the BVA still records the results of dogs of other breeds which have participated in the scheme. The results of Eye Scheme examinations compiled into the annual sightings report for the breed since 2012 are shown in Table 5.

Table 5: Reports on Irish Water Spaniel which have participated in the BVA/KC/ISDS Eye Scheme since 2012

Year	Number seen	Comments
2012	23 adults	1 – entropion 1 – PPSC cataract
2013	35 adults	1 – PPM 4 – PPSC cataract 1 – other cataract 3 - distichiasis
2014	20 adults	3 – distichiasis 1 – PPM 1 – other cataract
2015	22 adults	1 – PPM 2 – other cataract
2016	26 adults	5 – distichiasis 2 – PPM 1 – PHPV 1 – other cataract
2017	21 adults	3 – distichiasis 1 – PPM 1 – PPSC cataract 1 – Post cataract
2018	29 adults	No comments

AMERICAN COLLEGE OF VETERINARY OPHTHALMOLOGISTS (ACVO)

Results of examinations through ACVO are shown in Table 6 below. Between 2015 and 2019, 45 Irish Water Spaniel were examined, of which 51.1% (23 of 45 dogs) were found to be unaffected by any eye condition. Whilst it is important to note that these data represent dogs in America, the organisation tend to examine a higher number of dogs than that in the UK, and therefore can be a valuable source of information.

Table 6: ACVO examination results for Irish Water Spaniels, 1991 - 2019

Disease Category/Name	Percentage of Dogs Affected	
	1991-2014 (n=189)	2015-2019 (n=45)
Globe		
Microphthalmia	0.0%	2.2%
Eyelids		
Ectopic cilia	1.1%	0.0%
Macropalpebral fissure	6.3%	0.0%
Entropion	5.3%	24.4%
Ectropion	0.5%	2.2%
Distichiasis	11.1%	6.7%
Cornea		
Corneal pannus	3.7%	0.0%
Pigmentary keratitis	14.3%	17.8%
Uvea		
Persistent pupillary membranes (lens pigment foci/no strands)	0.0%	2.2%
Lens		
Cataract (significant)	14.3%	0.0%
Retina		
Retinal dysplasia (folds)	0.0%	2.2%
Generalised progressive retinal atrophy	1.6%	0.0%
Optic Nerve		
Micropapilla	0.0%	2.2%

Adapted from: <https://www.ofa.org/diseases/eye-certification/blue-book>

REPORTED CAESAREAN SECTIONS

When breeders register a litter of puppies, they are asked to indicate whether the litter was delivered (in whole or in part) by caesarean section. In addition, veterinary surgeons are asked to report caesarean sections they perform on Kennel Club registered bitches. The consent of the Kennel Club registered dog owner releases the veterinary surgeon from the professional obligation to maintain confidentiality (vide the Kennel Club General Code of Ethics (2)).

There are some caveats to the associated data;

- It is doubtful that all caesarean sections are reported, so the number reported each year may not represent the true proportion of caesarean sections undertaken in each breed.
- These data do not indicate whether the caesarean sections were emergency or elective.

The number of litters registered per year for the Irish Water Spaniels and the number and percentage of reported caesarean sections in the breed for the past 10 years are shown in Table 7.

Table 7: Number and percentage of litters of Irish Water Spaniels registered per year and number of caesarean sections reported per year, 2008 to 2018.

Year	Number of Litters Registered	Number of C-sections	Percentage of C-sections	Percentage of C-sections out of all KC registered litters (all breeds)
2008	15	0	0.00%	0.05%
2009	17	0	0.00%	0.15%
2010	18	0	0.00%	0.35%
2011	13	1	7.69%	1.64%
2012	17	1	5.88%	8.69%
2013	18	1	5.56%	9.96%
2014	8	0	0.00%	10.63%
2015	19	1	5.26%	11.68%
2016	15	0	0.00%	13.89%
2017	12	0	0.00%	15.00%
2018	17	2	11.76%	17.21%

GENETIC DIVERSITY MEASURES

The effective population size is the number of breeding animals in an idealised, hypothetical population that would be expected to show the same rate of loss of genetic diversity (rate of inbreeding) as the population in question; it can be thought of as the size of the 'gene pool' of the breed. In the population analysis undertaken by the Kennel Club in 2015, an estimated effective population size of 71.0 was reported (estimated using the rate of inbreeding over the period 1980-2014).

The rate of inbreeding has increased gradually (with some fluctuation over time) and is below an effective population size of 100 (inbreeding rate of 0.50% per generation) which results in the rate of loss of genetic diversity in a breed/population increasing dramatically (Food & Agriculture Organisation of the United Nations, "Monitoring animal genetic resources and criteria for prioritization of breeds", 1992).

Annual mean observed inbreeding coefficient (showing loss of genetic diversity) and mean expected inbreeding coefficient (from simulated 'random mating') over the period 1980-2014 are shown in Figure 2. The rate of inbreeding has been increasing, although may have begun to reduce a little since 2005. For full

interpretation see Lewis et al, 2015

<https://cgejournal.biomedcentral.com/articles/10.1186/s40575-015-0027-4>.

The current annual breed average inbreeding coefficient is 5.4%. However, analysis undertaken by a privately owned database holder in the UK on pedigree analysis, with this stretching back to the 1800s, has established an estimated average of 25.0%. DNA analysis by whole genome sequencing established an inbreeding coefficient of 32.3%, and using SNPs (single nucleotide polymorphisms) 26.7% (Dreger et al, 2016) – although it is worth noting that whole genome sequencing will often produce higher estimates. A coefficient of 25.0% is equivalent to that of a first degree mating, e.g. mother to son.

Breeding from dogs with such high inbreeding coefficients increases the risk of inheritance of any known or unknown conditions in the breed, and also increases the risk of arising complex conditions such as cancers, reduced fertility and autoimmune diseases.

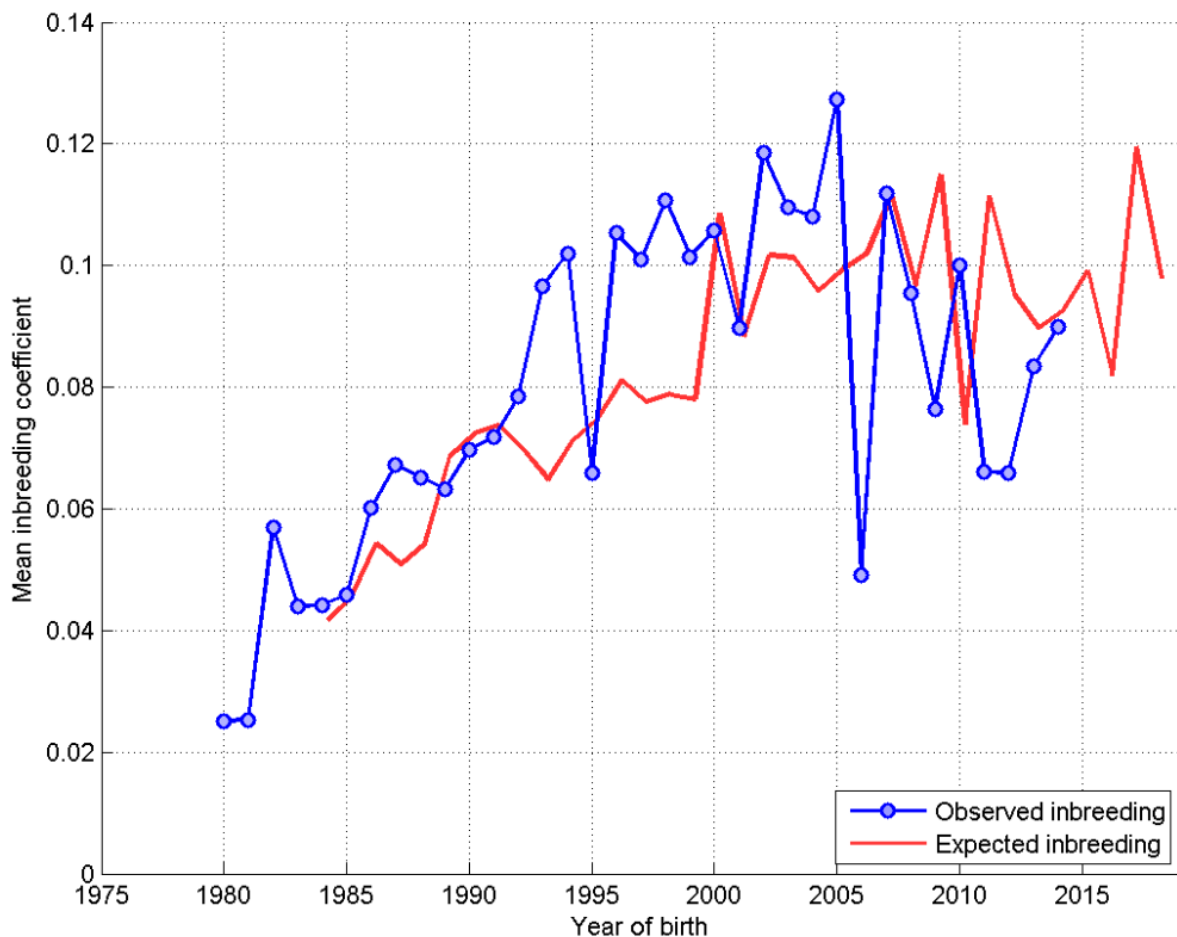


Figure 5: Annual mean observed and expected inbreeding coefficients

Below is a histogram ('tally' distribution) of number of progeny per sire and dam over each of seven 5-year blocks (Figure 6). A longer 'tail' on the distribution of progeny per sire is indicative of 'popular sires' (few sires with a very large number of offspring, known to be a major contributor to a high rate of inbreeding). It appears that the extensive use of popular dogs as sires has eased a little (the 'tail' of the blue distribution shortening in Figure 6), although this could also reflect the declining registrations during this time frame, and is still relatively high.

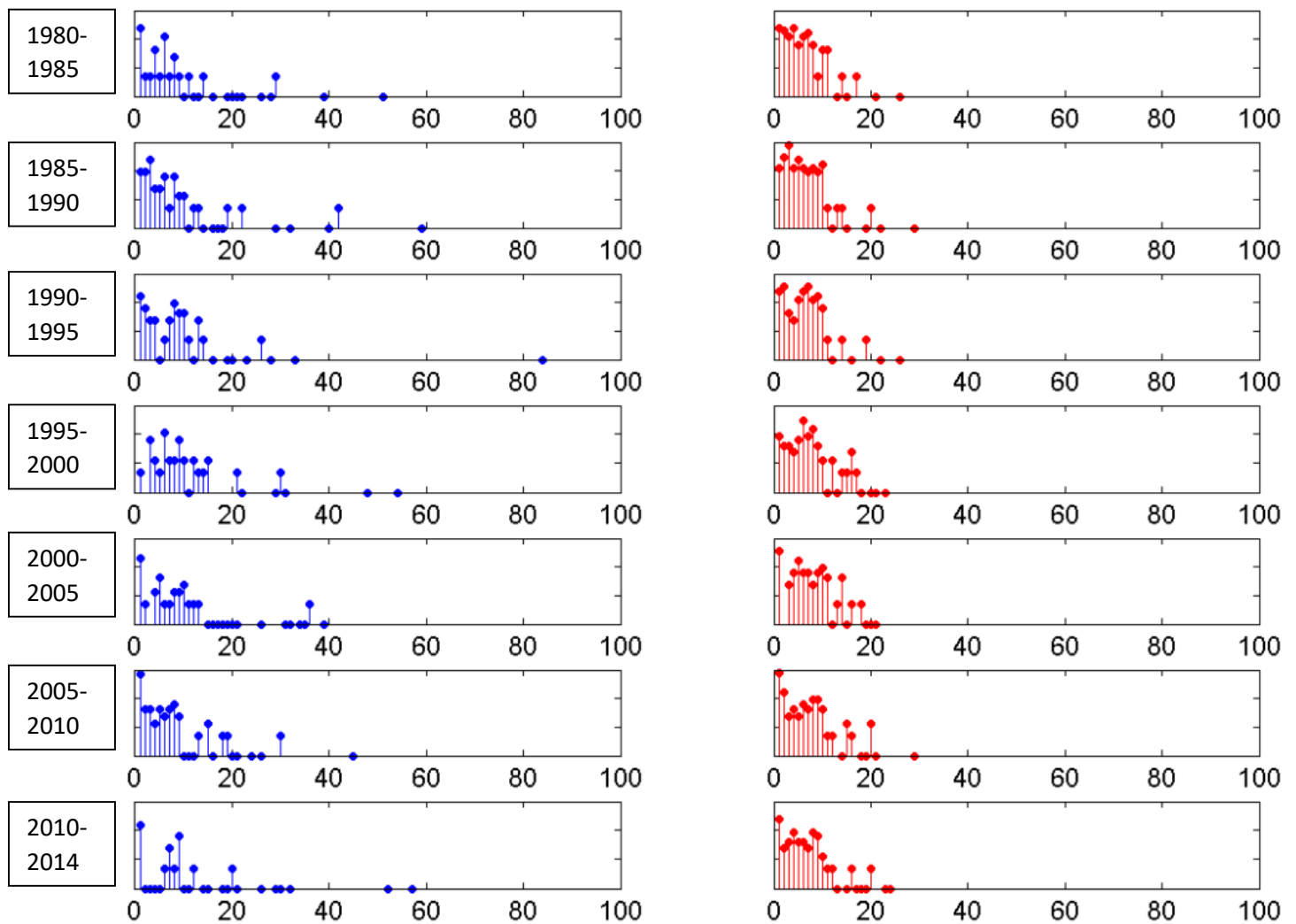


Figure 6: Distribution of progeny per sire (blue) and per dam (red) over 5-year blocks (1980-4 top, 2010-14 bottom). Vertical axis is a logarithmic scale.

CURRENT RESEARCH

The breed have been encouraging owners to complete a cancer survey which is being run by the University of Nottingham, investigating any breed-specific predispositions to cancers.

PRIORITIES

A meeting was held with Irish Water Spaniel breed club representatives on 9th December 2019 to discuss the evidence base of the BHCP and agree the priority issues for the health of the breed. The group agreed from the information provided and their own experience that the priority for the Irish Water Spaniel were:

- Genetic diversity (conservation genetics)
- Cancer
- Epilepsy

ACTION PLAN

The following actions were decided between the breed clubs and the Kennel Club to tackle the priorities agreed (see previous page).

Breed club actions include:

- Reviewing the health information given on the club health websites and ensuring the messaging is mirrored
- The breed clubs to consider incorporating recommendations regarding popular sires in their code of ethics to minimise losing genetic diversity, with the Kennel Club to support in appropriate measures
- The breed clubs to continue to encourage eye testing, particularly in older dogs
- The breed clubs to attempt to increase the breed population to stabilise loss of genetic diversity
- The breed clubs to endeavour to minimise further inbreeding within the breed, and provide guidance to breeders on the importance of avoiding close breeding

Kennel Club actions include:

- To incorporate the link for the breed's ongoing reporting survey on the Breed Information Centre
- The Kennel Club to investigate whether EBVs can be implemented for the breed
- The Kennel Club to amend the average age for the breed on the Breed Information Centre, following evidence that the true age is an average of nine years
- The Kennel Club to investigate the possibility of adding a caveat to the Mateselect website for the breed and encourage owners to investigate data obtainable from the breed clubs
- The Kennel Club to investigate how best to incorporate guidelines into the breed's code of ethics with regard to the use of popular sires and what constitutes a popular sire
- The Kennel Club to develop information on the importance of considering the level of inbreeding and genetic health prior to breeding
- The Kennel Club to raise awareness of the breed through social media
- The Kennel Club to investigate whether the incorporation of SNP data from Embark and MyDogDNA is feasible

- The Kennel Club to investigate the process for Board approval for breed outcrossing, to improve genetic diversity for the Irish Water Spaniel
- The Kennel Club to review progress with the breed in 2025

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