**Clumber Spaniel Litter Analysis for the year 2015**

Clumber Spaniel puppy registrations have been analysed for the past four years. The information on puppies and litters is kindly provided by Jackie Crawford and is taken from her pedigree database.

All of the analysis is based on the date of birth of the puppies and not the date of registration or appearance in the Kennel Club Breed Record Supplement. This means the report is delayed till late the following year to ensure details of all puppies are included.

This year the report is divided into two sections:

* The first focuses on factors such as puppy numbers, Coefficient of Inbreeding, popular sires and repeat matings which can be used to show how breeding decisions can affect progress to preserve the breed and its genetic health.
* The second section, included for the first time this year, examines the extent to which breeders are using the various health screening tests available which could contribute to improving the health of individual dogs in the future.
	1. **Number of puppies and litters**

Clumber Spaniels are currently on the Kennel Club’s Vulnerable Breed List which includes native breeds with less than 300 puppies born each year, indicating that the breed is “declining” or that its “status in the world of dogs has diminished over a number of years”.

In 2015 there were 197 puppies born and registered from 35 litters which gives an average of 5.62 puppies per litter. The split between dogs and bitches born was 109 (55%) dogs and 88 (45%) bitches.

The trend over the past ten years (2006-2015) shows a decrease in both puppies born and litters produced as shown in the two figures below. In each figure the blue line represents the actual numbers of puppies or litters, and the red line represents the trend over this period which shows a clear decline in each over the last ten years.

***Figure 1: Number of puppies born each year Figure 2: Number of litters per year***

The total number of puppies born in the 10 years up to 2015 was 2135 giving an average of 214 puppies per year; and there were 415 litters during this 10 year period (2006-2015), giving an average of 42 litters per year. There have now been two successive years with less than 40 litters and less than 200 puppies born.

However the number of puppies per litter remains fairly constant as can be seen in the next graph.

***Figure 3****:* ***Number of puppies per litter***

The average number of puppies per litter in 2015 was 5.63 which was above the average for the past 10 years which is 5.16 puppies per litter.

The split between the number of dogs and bitches born has changed over the 16 years that this data has been collected. Figure 4 shows the percentage of each sex born per year and the change from a majority of bitches to a majority of dogs can clearly be seen.

***Figure 4 Percentage of dogs and bitches born each year since 2000***

**1.2 Coefficient of Inbreeding**

The Coefficient of Inbreeding (COI) is a measure of the extent of inbreeding. High levels of inbreeding contribute to a loss of genetic diversity and can lead to an increased likelihood of the appearance of either a known inherited disease, or one which has not previously been identified in the breed.

The KC Mate Select website includes guidance which states that “where possible, breeders should produce puppies with an inbreeding coefficient which is at, or below, the annual breed average” “and ideally as low as possible”. Since the first Clumber Spaniel Breed Health Plan was produced in 2014, breeders have been advised that they “should take into the account the resultant COI for any litter and strive to at least be below the current breed average”.

The breed averages published by the KC are based on the puppies born in the previous calendar year. In 2014 the published average was 18.2% based on dogs born in 2013; the following year the published figure was 18.5%; and the figure for dogs born in 2015 had risen to 19.1%.

It is also possible to calculate 5-generation COI and 10-generation COIs and so averages for these were collected, and in addition, the COI was also calculated using the KC Mate Select tool for all litters born in 2014 and in 2015. This last number is referred to as the KC COI. The following table shows a comparison of all the different calculations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 5-Gen COI | 10-Gen COI | KC COI | Average COI published on KC website |
| 2013 | 10.5% | 20.2% |  | 18.2% |
| 2014 | 11.9% | 21.8% | 19.3% | 18.5% |
| 2015 | 12.5% | 21.3% | 19.5% | 19.1% |

On the Kennel Club Mate Select website, in its section on breed averages for COI, it highlights three key measurements for COI which are:

0% which indicates that the offspring have an unrelated sire and dam

12.5% which is the “genetic equivalent” of a mating between a grandfather and granddaughter

25% which is the “genetic equivalent” of a mating between a father and daughter

These three categories have been used to compare matings with puppies born in 2014 and 2015 to assess how the COI is changing. Figure 5 on the following page shows the percentage of matings that fell into the categories separated by these three key measurements.

***Figure 5 Percentage of matings which fall between the three categories of defining COI***

Whilst in 2015 there were still more than a third of matings with a KC COI of more than 25%, the percentage had fallen very slightly and the number below 12.5% had risen very slightly.

**1.3 Popular Sires**

Overuse of popular sires is one of the factors which can lead to a loss of genetic diversity. It can be a particular issue in a numerically small breed and has been highlighted in previous reports.

The 35 litters born in 2015 had been produced by 29 sires. The table below shows the four most prolific sires in the year who together produced 29% of the total puppies born.

|  |  |  |
| --- | --- | --- |
|  | **Total litters** | **Total puppies** |
| BOMBAY GRIFFITHII | 3 | 16 |
| WINTERHOLT BLACK THUNDER | 3 | 14 |
| ABBYFORD BOLD VENTURER  | 2 | 17 |
| TAVIROSH OLD YELLER | 2 | 11 |

The full history of the dogs that had sired a litter in 2015 was analysed and the total number of puppies produced by each over their life up to the end of 2015 was calculated. There were four sires who had each had more than 10 litters and these are listed below.

|  |  |  |
| --- | --- | --- |
| **Sire** | **Total litters** | **Total puppies** |
| WESTERLY GAELS DIAMOND DOGS AT SEDGEHURST | 16 | 100 |
| SEDGEHURST TEMPEST | 16 | 89 |
| TWEEDSMUIR DAMBUSTER | 13 | 64 |
| CLUMBERDALE ROYAL WULFF | 12 | 51 |

The Bateson report published in 2010 included a recommendation that “Over a 5-year period no dog should have more offspring than 5% of the total number of puppies registered for that breed”.

Each Clumber Spaniel Breed Health Plan has advised stud dog owners on the maximum number of puppies each should produce. This has been amended each year according to the number of puppies registered. The 2015 plan stated that “no dog should produce more than 55 puppies in a 5-year period”.

An analysis of the 5-year rolling total number of puppies produced by these four most popular sires is shown below and the years when their 5-year total would have exceeded the 2015 recommendation are highlighted.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | WESTERLY GAELS DIAMOND DOGS AT SEDGEHURST | SEDGEHURST TEMPEST | TWEEDSMUIR DAMBUSTER | CLUMBERDALE ROYAL WULFF |
| Number puppies born each year | 5-year rolling total | Number puppies born each year | 5-year rolling total | Number puppies born each year | 5-year rolling total | Number puppies born each year | 5-year rolling total |
| 2005 |  |  | 14 |  |  |  |  |  |
| 2006 |  |  | 14 |  |  |  |  |  |
| 2007 |  |  | 0 |  |  |  |  |  |
| 2008 | 31 |  | 0 |  |  |  | 5 |  |
| 2009 | 26 |  | 6 | 34 |  |  | 4 |  |
| 2010 | 22 |  | 23 | 43 |  |  | 7 |  |
| 2011 | 8 |  | 5 | 48 | 3 |  | 10 |  |
| 2012 | 0 | 87 | 0 | 48 | 6 |  | 7 | 33 |
| 2013 | 7 | 63 | 12 | 46 | 22 |  | 11 | 39 |
| 2014 | 0 | 37 | 5 | 45 | 26 |  | 5 | 40 |
| 2015 | 6 | 21 | 10 | 42 | 7 | 64 | 2 | 35 |

**1.4 Repeat Matings**

The use of repeat matings is another factor which can lead to a loss of genetic diversity in a breed. In 2015 three matings were repeated for the second time and one mating repeated for the third time.

Looking back over the previous ten years the number of repeat matings has decreased. In four of the past ten years 20% or more were repeat matings; after a decrease the percentage has risen again in 2015 to 11% as can be seen in the figure below.

***Figure 6 Number of repeat matings as a percentage of the total number of matings per year***

***The red line represents the downward trend over the past ten years***

During the past ten years some matings have been repeated three or even four times. The next figure shows the number of second, third or fourth repeats in each year.

***Figure 7 The stacked columns represent the number of repeat matings per year.***

***They are divided into different colours to show the split between second, third and fourth repeats.***

**2 Use of Health Screening**

The Breed Health Plan recommends use of four health screening schemes or tests: BVA/KC schemes for hip scoring and eye tests; and DNA tests for Pyruvate Dehydrogenase Phosphatase Defficiency (PDP1) and Exercise Induced Collapse (EIC).

Clumber breeders who are members of the KC Assured Breeder Scheme are required to have their breeding stock hip scored and DNA tested for EIC. It is also a recommendation for scheme members that their dogs have an annual eye test and a DNA test for PDP1.

Information used in this section was taken from the KC Mate Select web pages and also from the Clumber Spaniel Club’s published lists to determine which dogs that had litters with puppies born in 2015, also had published results for health tests. It should be noted that some imported dogs may have had health tests in another country which do not appear on either list.

**2.1 Hip Scores**

The current Breed Health Plan recommends that current British Veterinary Association advice should be followed which in turn states that “the best chance of producing offspring with good hips is to use only parents with low scores, considering the *median* as the ideal cut-off”. The current published median hip score for Clumber Spaniels is 11.

**Sires**: of the 29 dogs that produced puppies in 2015, four did not have a hip score result published. Three had a hip score of more than 30, and one with a score of 46 had had two litters. There were 19 sires (65%) used with a score of 11 or less

**Dams**: 31 of the 35 dams who had a litter had been hip scored. Of these one had a score above 30 while 16 (46%) of the others had a score below 11.

|  |  |  |
| --- | --- | --- |
|  | Sires | Dams |
| Hip score of 11 or less | 19 (65%) | 16 (46%) |
| Hip score above 11 | 6 (21%) | 15 (43%) |
| No published hip score | 4 (14%) | 4 (11%) |

**2.2 Eye Tests**

The Breed Health Plan states that “All Clumber Spaniels bring bred should hold a current eye certificate”. Of the 29 sires used in 2015, only seven (24%) had a recorded result for an eye test; and similarly seven (20%) out of 35 dams had a recorded eye test result.

|  |  |  |
| --- | --- | --- |
|  | Sires | Dams |
| Recorded eye test | 7 (24%) | 7 (20%) |
| No recorded eye test | 22 (76%) | 28 (80%) |

**1.3 Pyruvate Dehydrogenase Phosphatase Defficiency (PDP1)**

PDP1 is a genetic enzyme deficiency which causes exhaustion after limited exercise which was identified in Clumbers in the late 1970s. A DNA test became available in 2007 and to date no dogs in the UK have been identified as affected by this problem. However the Breed Health Plan continues to recommend that all breeding stock should be DNA tested for PDP1.

The table below shows the number of dogs who had a recorded test result. There was a higher percentage of sires (24%) than dams (8%) without a published result.

|  |  |  |
| --- | --- | --- |
|  | Sires | Dams |
| Clear | 8 (28%) | 7 (20%) |
| Hereditary Clear | 14 (48%) | 25 (71%) |
| No result published | 7 (24%) | 3 (9%) |

**1.4 Exercise Induced Collapse (EIC)**

This is a hereditary disease which manifested itself in 2015 and, as above, the Breed Health Plan recommends that all breeding stock is DNA tested. Further advice about choice of breeding partners is available on the Clumber Spaniel Club website.

DNA testing became available in 2015 and the first test results published are dated August 2015. Therefore results would not have been available when making breeding decisions except for litters born very late in the year and so results are not reported in detail.

However even though some tests may have been done after mating it is worth noting that no ‘affecteds’ had been used and there had been no ‘carriers’ mated to ‘carriers’.

**1.5 Elbow Scores**

Elbow screening is not included in the Breed Health Plan as a requirement or a recommendation, although results are published on the Clumber Spaniel Club website.

Some of the dogs used in 2015 did have a test result recorded. There were 12 sires and 8 dams with a test result and all had a zero score.

**CONCLUSIONS**

1. The number of litters and puppies born shows a decline in the years between 2006 and 2015; and in 2015 both were below the average of the past 10 years.
2. The average number of puppies per litter was above the average for the past 10 years which has remained fairly constant.
3. The average KC COI of all matings in the year had risen slightly to 19.5% which is higher than the KC average published mid-year and suggests that it could increase again when the KC produces its average in 2017.
4. A third (31%) of all matings were, according to the KC definition, the “genetic equivalent” of a mating between a father and daughter.
5. The recommendation to limit the number of puppies per sire was included in the first Breed Health Plan published three years ago. According to the calculation of the 5-year rolling total for the most prolific sires with a litter in 2015, it appears that just one had exceeded the recommended total.
6. The number of repeat matings has declined over the past 10 years.
7. This is the first report which has included an analysis of the uptake of health tests for breeding stock and shows that:
	1. The majority of dogs (86%) and bitches (89%) had been hip scored before mating, however some with scores above the breed average were still being used. The next report will also include analysis of the Estimated Breeding Values for hips.
	2. Only 24% of sires (7 dogs) and 20% of dams (7 dams) had a recorded result for an eye test
	3. A quarter of the dogs (7 or 24%) did not have a published PDP1 DNA test result, but only three dams (3 or 9%) similarly did not have a published result.
	4. The DNA test for EIC only became available in the middle of the year so it is difficult to draw conclusions from the number of dogs tested, although it is worth noting that no dogs with an ‘affected’ result had been used.
	5. Although elbow scoring is not a recommendation some breeders have had their dogs scored before breeding.
8. While it is understood that breeding decisions will take more into account than factors such as the COI of the mating and health test results, the Breed Health Plan includes recommendations about these factors because following them could lead either to improvement in the genetic health of the breed or in the health of individuals dogs.