

Hip Dysplasia Stats – What Are They Really Telling Us?

By Sy Guth

Most often when Hip Dysplasia stats are presented to us, they appear in a summary form of the highest nature. For example, breed X average hip scores are such and such. This article is a peak underneath some interesting blankets and what it shows may provide reflection on the focus of the hip dysplasia issues. Please keep in mind we are only dealing with half the equation – only the sire in a mating, not the dam. Also keep in mind we are only looking at one factor - hip dysplasia scores. Hip dysplasia as scored by the BVA (British Veterinary Association), Australia and New Zealand schemes all score hips on a 0 to 53 rating for each hip on Golden Retrievers for a total hip score of 0 to 106. The total score for hips is the combination of both hip scores. The lower the score, the less hip dysplasia is present.

The stats used in this article come from a unique database called Stanfastdata, that contains nearly 500,000 records of UK Golden Retrievers dating back to 1900. It is the result of a labour of love by Eileen Caisley in the UK who spent eight years inputting the initial data which was released on the website www.stanfastdata.co.uk in 2006. Since then Mrs Caisley has continued to update the information as it has become available from The Kennel Club. The hip dysplasia scores are all BVA scores on record with The Kennel Club. The data in this article is from a chart in the database. There are 165 Golden Retriever sires born between 1996 and 2005 showing information relating to the dog's hip scores as well as the mean average of their progeny who have been hip scored through BVA. The data was current as of 14 September 2009.

There is one factor in this database that is of particular significance. Because the ancestry on these dogs is recorded back to 1900, the COI percentages are very accurate. COI is the co-efficient of inbreeding. The higher this figure, the less unique ancestors in a pedigree. The lower the percentage, the more unique ancestors in the pedigree. This is mentioned because of recent TV programs that have raised the question of inbreeding practices. The Golden Retriever has a short history compared to many dogs. It was first "invented" in Scotland by Lord Tweedmouth in the 1860s and was not accepted as an official breed by The Kennel Club until the early 1900s. In the early years there

was a high frequency of close line-breeding. However, the results of the stats I am about to present, may surprise some people as they do not follow the claims made in the TV programs, at least in regards to hip dysplasia in Golden Retrievers.

So let's get on with it. The following are base stats on the 165 dogs: **Fig 1**

Fig 1								
# Progeny	Mean Score	0-5	6-10	11-20	21-30	31-40	41-50	51+
4145	14.75	40	1787	1665	303	170	87	93
		0.97%	43.11%	40.17%	7.31%	4.10%	2.10%	2.24%

This chart tells us that from the 165 dogs there are 4,145 progeny that have been scored by BVA for hip dysplasia. The total mean average score for the 4,145 progeny is 14.75 average total hip score (that number is the total of the scores for each of the two hips). The breakdown for the progeny is given in bands using total hip scores. For example, those progeny that scored between total 0 and total 5 numbered 40. The related percentage is below the number.

This is the type of statistic one normally sees and the conclusion might be drawn that the breed is doing well given that in the mid 1990s the average was around 20. In fact, the current published chart by BVA for Golden Retrievers shows a total of 31,233 dogs scored with a range of 0 to 106 and a mean average of 18. However, what has concerned me for a long time has been the assumptions made in regards to hip dysplasia scores. Some of those assumptions and /or statements infer that parents with low hip scores will result in low scoring off-spring. Conversely, parents with high hip scores will result in high scoring off-spring. This is the "heredity" hypothesis that has dominated the dog world for decades. Breeders and vets assume that the hip score of the parents will be the predominate factor in how the puppy's hip scores turn out. However, these assumptions do not hold up to the statistics for these 4,145 off-spring. And the reason for this lies partly in what

Dr Malcolm Willis, renown expert in hip dysplasia statistics, had to say to us as far back as the mid 1990s. Around 1996 he held that in terms of Golden Retrievers, 30% of HD was hereditary and 70% was environmental. Environmental takes in nutrition, exercise, injuries, and any other factors outside of heredity. Around 2000, he revised his estimates to 40% hereditary and 60% environmental. This would indicate that the greater percentage of HD issues are NOT hereditary and can be affected by nutrition and other environmental factors.

We'll break down the statistics into three groups – the highest /lowest hip scores of the sires; the highest / lowest mean average scores of the progeny; and the highest / lowest COI % of the sires.

This first group of information tells us that out of 165 dogs, only 4 have hip scores between 0 and 5. Yet not one of these dogs has a mean average close to their own hip score. And surprisingly, one of the dogs has a mean average of 19.5 from 66 scored progeny. **Fig 2**

This next group of stats tells us that of the 165 dogs, only 7 have total hip scores above 20. And again, the statistics surprise us in that of these 7 "high scoring parents", only 1 dog has a mean average over 20 and

Fig 2

Dogs with lowest hip scores												
COI 106%	Hips	Total Hip Score	# Progeny	Mean Score	Range of scores	0-5	6-10	11-20	21-30	31-40	41-50	51+
12.7%	3/2	5	66	19.5	6-67	0	21	23	10	4	4	4
14.1%	3/2	5	40	10.5	6-34	0	26	13	0	1	0	0
11.2%	3/2	5	14	13.2	6-34	0	9	3	0	2	0	0
13.4%	3/2	5	11	13.7	9-26	0	4	6	1	0	0	0

Fig 3

Dogs with highest hip scores												
COI 106%	Hips	Total Hip Score	# Progeny	Mean Score	Range of scores	0-5	6-10	11-20	21-30	31-40	41-50	51+
12.1%	11/10	21	42	13.5	6-59	0	19	21	0	0	1	1
5.4%	12/9	21	36	13.8	4-32	1	11	19	4	0	1	0
14.0%	15/6	21	55	14.2	6-77	0	31	16	3	2	2	1
7.3%	15/9	24	13	15.3	6-41	0	5	5	2	0	1	0
14.9%	13/12	25	27	15.1	6-72	0	13	11	0	1	1	1
11.3%	7/18	25	17	22.6	7-52	0	3	6	3	3	1	1
15.5%	8/20	28	16	11.7	3-33	2	8	4	1	1	0	0

Fig 4

Dogs with highest mean averages					
COI 10G%	HIPS	TOTAL HIP SCORE	# PROGENY	MEAN AVG OF PROGENY	PROGENY SCORE RANGE
9.1%	3/4	7	57	20	6-52
10.2%	6/6	12	15	20	3-43
26.0%			18	20.4	6-80
10.7%	7/9	16	14	21	6-52
12.2%	3/6	9	12	21.7	8-45
10.4%	6/5	11	43	21.7	10-63
15.9%	4/5	9	37	22.2	9-70
11.0%	4/5	9	23	22.4	6-88
11.3%	7/18	25	17	22.6	7-52
7.8%	7/5	12	11	23.6	9-50
7.6%	3/3	6	16	23.8	7-72
14.8%	6/5	11	18	24.4	8-80
12.7%	5/6	11	13	25.8	8-73
12.8%	5/7	12	22	27.3	6-67
14.6%	7/7	14	16	28.7	6-72
10.2%	13/7	20	12	32.4	9-81

the rest are 15 and below. Keep in mind the progeny are from multiple dams, not just one. **Fig 3**

The next group of stats are the highs and lows of the mean average scores for progeny from our 165 dogs. 16 dogs have mean averages for their progeny above 20. And again we can be surprised that only 1 of these dog's own hip scores are above 20. **Fig 4**

There are 21 dogs with progeny mean average scores of 10 or lower. Yet only half of these dogs have hip scores of 10 or below themselves. **Fig 5**

Fig 6

Total 47 dogs with under 10% COI - 10g								
# progeny	mean avg	0-5	6-10	11-20	21-30	31-40	41-50	51+
1160	15.10	17	464	483	92	48	28	28
		0.41%	11.19%	11.65%	2.22%	1.16%	0.68%	0.68%
		11.60%			4.74%			

Fig 7

Total 101 dogs with between 11% and 19% COI - 10g								
# progeny	mean avg	0-5	6-10	11-20	21-30	31-40	41-50	51+
2687	14.65	21	1183	1070	193	110	51	59
		0.51%	28.54%	25.81%	4.66%	2.65%	1.23%	1.42%
		29.05%			9.96%			

Fig 8

Total 17 dogs with over 20% COI - 10g								
# progeny	mean avg	0-5	6-10	11-20	21-30	31-40	41-50	51+
298	14.37	2	140	112	18	12	8	6
		0.05%	3.38%	2.70%	0.43%	0.29%	0.19%	0.14%
		3.43%			1.05%			

Fig 5

Dogs with lowest mean averages					
COI 10G%	HIPS	TOTAL HIP SCORE	# PROGENY	MEAN AVG OF PROGENY	PROGENY SCORE RANGE
11.2%	7/4	11	10	7.7	4-11
18.0%	3/3	6	11	9.2	5-17
18.6%	3/4	7	13	9.3	7-14
16.3%	5/6	11	17	9.3	6-12
14.7%	3/5	8	35	9.5	0-29
26.3%	6/6	12	10	9.6	5-19
18.1%	5/7	12	19	9.6	6-19
12.8%	5/3	8	10	9.7	6-16
15.1%	7/4	11	26	9.7	0-18
11.8%	3/4	7	28	9.8	6-22
21.5%	4/4	8	14	10.1	8-14
8.8%	12/8	20	14	10.1	7-20
13.1%	A		11	10.3	6-34
8.1%	8/5	12	14	10.4	4-28
14.1%	3/2	5	40	10.5	6-34
18.6%	4/7	11	11	10.5	7-24
3.7%	7/13	20	10	10.6	5-26
8.3%	3/5	8	21	10.7	6-33
16.3%	6/3	9	16	10.8	6-25
20.0%	4/5	9	10	10.8	8-13
15.9%	8/6	14	16	10.8	6-22

Lastly let's look at the COI percentage for the first 10 generations. Remember that the lower the COI, the more unique ancestors in the 2,046 ancestors that make up a 10 generation pedigree. We are only noting the sire's COI in terms of the progeny. Contrary to what one would expect, the dogs with a COI under 10% have the highest mean average HD score for their progeny. On the other hand, the dogs with COI over 20% have the lowest mean average HD score for their progeny! What this set of statistics tells us is that line-breeding or in-breeding does not correspond to the assumption that it has an adverse affect on Golden Retrievers in regards to hip dysplasia. It actually tells us that a sire with higher COI (more inbreeding) is likely to produce progeny with lower HD scores! Also of interest in this set of data is that of the 165 sires, only 11 can boast of not having produced any progeny with scores 20 or above. That means that 93.34% of the 165 sires have produced a "high HD scoring" puppy! That alone is food for thought. **Figs 6, 7, 8**

So in conclusion, I would hope that as we appear to get closer to more regulations regarding what we might or might not be allowed to breed from in regards to health screening and regulations that we don't throw out the baby with the bathwater. It is clear from these statistics that assumptions and general beliefs do not always hold up in view of the actual data when broken down into relative areas. In our example of the 4,145 progeny from these UK Golden Retriever sires over a 10 year period, the dogs with high hip scores did not have mean score averages the same or higher than their own. COI over 20% did not result in off-spring with higher instances of hip dysplasia, in fact, the reverse was true. So let us be very careful going forward that we base any regulations on the right data and facts and not let assumptions and generalities wash us away down the wrong stream. And just perhaps, we should be giving more attention to nutrition in puppies during their first 18 months in regards to hip dysplasia issues than heredity.

Ms Sy Guth is the author of the book, *How To Make A Puppy! A Practical Guide for Dog Breeders With 100+ Illustrations, 2008*