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Dr Lisa Butler BVSc on Hip and Elbow scoring for the National Groodle Association

Hip and Elbow Scoring

Introduction

As breeders you play a very important role in the future health and wellbeing of the puppies that you produce. A responsible breeder aims to produce a litter that betters the breed in body, health and temperament.

One of the ways that we ensure improvement of body issues is with the use of pre-breeding health testing.

This article deals with the use of hip and elbow scoring.

Hip and Elbow Dysplasia

Hip dysplasia and Elbow dysplasia is defined as a growth abnormality of the hip or elbow respectively which result in joint pain and early onset arthritis.

They are multifactorial diseases which means that they have genetic or hereditary components but also have a number of other causative factors such as nutrition, body weight and exercise that may play a role in the development of the condition.

This is important to note because it is not possible to quickly eradicate a disease that is not entirely hereditary by simply selecting out the individuals that carry the adverse genetic information. However, by careful selection we will reduce the incidence of the disease over time. A way to think about these diseases is that they are genetic in origin and an affected individual will become worse if the other factors (nutrition, body weight and exercise) are not managed.

Groodles as a breed have a high incidence of hip and elbow dysplasia but may not show the clinical signs of pain and arthritis until after they have reached breeding age (often over 2 years of age) which makes pre-breeding health testing very important.

Elbow dysplasia

Canine elbow dysplasia is a condition involving multiple developmental abnormalities of the elbow joint. The elbow joint is a complex joint made up of 3 bones (radius, ulna, and humerus). If the 3 bones do not fit together perfectly it results in abnormal weight distribution across the joint causing pain, lameness, and the development of arthritis.

Elbow dysplasia is a disease that encompasses several conditions grouped together - fragmented coronoid process (FCP), osteochondrosis (OCD), joint incongruity, and cartilage anomaly and ununited anconeal process (UAP).

These primary lesions occur early in life before the puppy is skeletally mature. For this reason, we can screen dogs from 1 year of age radiographically.

To do this a single flexed lateral elbow view is submitted for reading by a veterinary radiologist. It is important to note that there is the possibility of false negative results as the disease is not always easy to pick from the single radiograph that is submitted (if dog presents to the vet with elbow pain we take at least 3 views and at times require a CT scan to diagnose problems with the elbow) and the readings are subjective meaning that false positive results can occur too. So some dogs that are good to breed with may be rejected based on this test, and some that should not be bred with are passed.

If you disagree with the result received there are pathways available to have the radiograph re-screened, and further imaging available if needed.

Requirements for testing:

- The dog must be at least 12 months of age
- The dog must be microchipped
- The radiographs must be taken under general anaesthesia
- The radiographs are submitted to a licensed veterinary radiologist where the elbows are graded, and the results are returned to you and your veterinarian.

Explanation of Elbow Grades

There are **no** grades for a radiographically normal elbow. The only grades involved are for abnormal elbows with radiographic changes associated with secondary joint disease.

Grade I Elbow Dysplasia: Minimal bone change along anconeal process of ulna

Grade II Elbow Dysplasia: Additional bone proliferation along anconeal process and subchondral bone changes

Grade III Elbow Dysplasia: Well developed degenerative joint disease with bone proliferation along anconeal process being greater than 5mm.

It is only acceptable to breed from dogs with a grade of 0 for both elbows.

Hip Dysplasia

Canine hip dysplasia is the most common inherited orthopaedic disease of dogs with heritability between 25-80% depending on the breed of dog.

If a parent dog has hip dysplasia then that dog's puppies are at a greater risk of developing hip dysplasia.

The other factors that can increase the incidence of hip dysplasia are:

Nutrition

Research has shown that feeding the following diets have an effect of the development of the hip joint

- a diet that has too much or too little calcium or other minerals
- feeding high-calorie food resulting in rapid weight gain and ad-lib feeding (as much as the pup wants)

Body condition score

Research has also shown that additional weight puts additional forces on the joints and contributes to the development of arthritis.

Exercise

There is research that shows that extreme exercise in very young puppies 1-6 months of age can influence the development of the hip joint.

So as a breeder you can influence the development of hip dysplasia in your puppies by:

1. feeding a breed or size-specific commercial balanced dog food that is formulated for puppies, while aiming for a lean body score,
2. giving a puppy adequate exercise and socialisation
3. using hip dysplasia screening to select parents that have hips equal to or better than the breed average.

Hip scoring schemes

There are two hip scoring schemes available to you in Australia which test for slightly different criteria.

The ANKC hip scoring has been the traditional method of hip scoring in Australia and is weighted towards the secondary joint changes associated with hip dysplasia, while PennHIP® assess hip laxity and therefore predicts the development of hip dysplasia well before radiographic change is present. We will now discuss these individually.

ANKC Hip scoring

This scheme requires a single ventrodorsal extended radiograph of the hips to be taken while under a general anaesthetic.

This radiograph is then sent off to an ANCK registered radiologist who will grade each of the hips on nine different criteria.

These include

- the angle the hip makes (the Norberg Angle)
- how well the ball sits within the socket ("subluxation")
- the shape of the socket
- the shapes of the head and neck of the femur

For each of these points, each hip is scored from 0 to 6, with 0 being perfect, and 6 being such severe damage that the joint is non-functional except for the acetabular ridge which is scored out of 5.

At the end, they add up all the scores and send them in as a Left and a Right Hip score for the dog.

Requirements for testing:

- The dog must be at least 12 months of age
- The dog must be microchipped
- The radiographs must be taken under general anaesthesia
- The radiographs are submitted to a licensed veterinary radiologist where the elbows are graded, and the results are returned to you and your veterinarian.

Interpreting results

When you receive a hip score for a dog first examine the total hip score and compare this with the breed average score [all of this information is recorded on the hip report].The lower the score the better the hips.

Currently, we recommend using dogs whose total hip score is lower than the breed average score. In an ideal world we would only breed with dogs whose hips score less than 10 as scores greater than 10 would be an indication of instability or secondary change associated with hip dysplasia.

Some breeds have high 'average' scores (>10) – for these we recommend using dogs with scores less than 10 but accept that the current gene pool may not permit this to be rigidly applied. In these cases we recommend application of the breed average score principle.

Secondly examine total score for each hip. Where the individual hip score are dissimilar, we recommend against using a dog with an individual hip score that is greater than half of the breed average score. Ie if one hip receives a score of 6 or greater then it is not recommended to breed with the dog.

Example Examination Results

Hip Joint	Right	Left	Hips Comment
Norberg Angle	1	1	
Subluxation	1	1	
Cranial acetabular edge	1	1	
Dorsal acetabular edge	0	0	
Cranial effect acetabular rim	0	0	
Acetabular fossa	0	0	
Caudal acetabular edge	0	0	
Femoral head/neck exostosis	0	0	Current 5 year breed average for the Groodle is 10.38 and median is 8.00 based on 136 results.
Femoral head re-contouring	0	0	
Total	3	3	Total score 6

For this dog the total hip score is less than the breed average and each hip has a score less than 6 which means it has passed the hip score.

The limitations for this testing is that secondary joint changes associated with hip dysplasia may not be fully evident at 12 months of age, and often not before 24 months of age.

Also the results are poorly repeatable and very subjective. Studies have shown that there is a high level of variability when the same radiograph is scored by different veterinary radiologists.

PennHIP®

The PennHIP® is the most accurate hip screening method available and identifies dogs that are susceptible to hip dysplasia from 4 months of age.

It is based on the principal that hip laxity – the distance that the femoral head (ball) can be displaced/distracted from the acetabula (hip socket) – can be correlated to the development of hip dysplasia.

In simple terms, hip laxity refers to the degree of 'looseness' of the hip ball in the hip socket when the dog's muscles are completely relaxed as occurs with normal movement of walking, running and jumping. Joint laxity cannot be accurately assessed on the extended hip view alone – it may be subtle or absent.

Three radiographic views are taken while the dog is under general anaesthetic:

1.The hip extended view

As per the ANKC hip scoring this view is used to look for the secondary changes of osteoarthritis

2.The compression view

This view is used to determine the goodness of fit of the femoral heads into the acetabula and shows the position of the hips when weight-bearing.

The femurs are positioned in a neutral weight-bearing position and the femoral heads are pushed fully into the sockets.

3.The distraction view

This view obtains quantitative measurements of hip joint laxity and shows the position of the hips when the dog's muscles are completely relaxed.

Again the hips are position in a neutral weight-bearing position and a special positioning device is used to apply a harmless force to cause the hips to displace laterally.

The three radiographs above are all from the same dog, yet the hips in each view look very different.

Requirements for testing:

- The dog must be at least 4 months of age
- The dog must be microchipped
- The 3 radiographs must be taken under general anaesthesia
- The radiographs are submitted to Antech Imaging Services. It is mandatory that films taken for PennHIP® evaluation are submitted so that an accurate database of the incidence of hip dysplasia is available for each breed.

Interpreting the results

The PennHIP® report will give you two results:
1. **Distraction Index (DI)**

The Di is a measure of hip laxity – the inherent distance the ball (femoral head) can be displaced (distracted) from the hip socket which is expressed as a number between 0 and 1.

A DI near zero indicates little joint laxity (very tight hips), and a DI closer to 1.0 indicates a high degree of laxity (very loose hips). Dogs with tighter hips are less likely to develop hip dysplasia than those with looser hips.

What does the DI score mean?

DI <0.3 : There is no risk of hip dysplasia or arthritis. Breeding is recommended. A dog not considered for breeding is unlikely to ever have hip problems (except via accident) or require management.

DI 0.3 -0.7 : There is a mild to moderate risk of hip dysplasia. Any dog with any risk (DI > 0.3) should be carefully considered for breeding. Dogs with this score are at risk of arthritis. Discussion with a veterinarian regarding preventative management is strongly recommended.

DI >0.7 : Arthritis is inevitable. The resultant clinical consequence for the individual is difficult to predict. Discussion with a veterinarian regarding preventative management is strongly recommended.

How do I use the DI score?

Each hip will be given a distraction index, and the dog is assigned the higher of the two hips as it's DI. As well as using the above indices as indicators of likelihood of developing hip dysplasia, we also compare that number with the breed average and ideally breed only with those dogs equal to or less than the breed average.

2. Osteoarthritis Assessment

The report will describe the presence of absence of osteoarthritis. If arthritis is detected, this a confirmation of the presence of hip dysplasia and the dog should not be bred from

Example Examination Results:
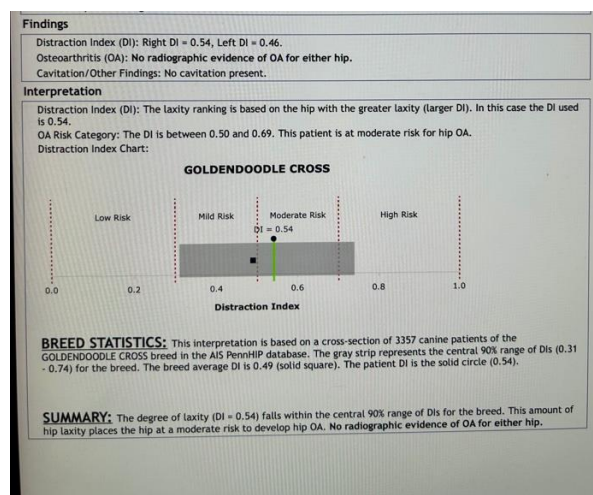
In this case:

- There is no radiographic evidence of osteoarthritis in either hip
- The DI is 0.54 which places the dog at a moderate risk to develop hip dysplasia
- The breed average DI score for Groodles is 0.49. As this is above the breed average this dog would not be recommended to breed from.

Can anything be done to treat dysplasia once it develops?

Sadly, this is a degenerative condition that cannot be cured. However, certain primary lesions can be managed surgically (for elbows - using bone screws to reattach ununited bones, and removing bone chips from inside joints, and for hips – femoral head ostectomy or total hip replacements). The mainstay of treatment is medical, with reduction in body weight, exercise control, and pain relief being the main treatment options.

The PennHIP® report will provide recommendations for treatment options for hip osteoarthrtitis if it is diagnosed as shown below:

INTERPRETATION AND RECOMMENDATIONS: No OA/Mild Risk: Low risk to develop radiographic evidence of hip OA early in life, however OA may manifest after 6 years of age or later. Risk of OA increases as DI, age, body weight, and activity level increase. OA susceptibility is breed specific, larger breeds being more susceptible. **Recommendations:** Evidence-based strategies to lower the risk of dogs developing hip OA or to treat those having OA fall into 5 modalities.* For detailed information, consult these documents.* Use any or all of these modalities as needed:
1) For acute or chronic pain prescribe NSAID PO short or long term. Amantadine can be added if response is marginal or if a neuropathic component to the pain is suspected.
2) Optimize body weight, keep lean, at BCS = 5/9.
3) Prescribe therapeutic exercise at intensities that do not precipitate lameness.
4) Administer polysulfated glycosaminoglycans IM or SQ, so-called DMOAD.
5) Feed an EPA-rich prescription diet preventatively for dogs at risk for OA or therapeutically for dogs already showing radiographic signs of OA.
At the present time there is inadequate evidence to confidently recommend any of the many other remedies to prevent or treat OA. Studies are in progress. Consider repeating radiographs at periodic intervals to determine the rate of OA progression and adjust treatment accordingly. Older dogs may show clinical signs such as chronic pain, reluctance to go stairs or jump onto the bed, and stiffness particularly after resting. It is unlikely that end-stage hip disease will develop for dogs at this risk level so surgical therapy for the pain of hip OA would rarely be indicated.
Breeding Recommendations: Please consult the PennHIP Manual.

* From WSAVA Global Pain Council Guidelines and the 2015 AAHA/AAFP Pain Management Guidelines

References

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