Hypothyroidism in the Chow Chow

Some years ago (1997) the Chow Breed Council booked a speaker who was well known to many Chowists of the time to deliver a seminar on hypothyroidism, the subject matter was of particular interest to me at the time as I had recently encountered the problem in one of my own dogs. It came as no surprise to hear the speaker Lynda Ross suggest that chows were (in her personal experience) prone to hormone imbalance. This tends to show up either as a missing or reduced enzyme that affects the ability of the adrenal gland to enlarge to meet the production demand for cortisol. Alternatively the mechanisms that control growth hormones fail resulting in excessive skin folds on the head and neck, excessive coats, poor exercise tolerance and narrowed wind pipes. I also recall that on several occasions when operating on chow chows the surgeon has commented on the narrowness of the airways and having to use tubing that would normally be used on a cat.

Lynda felt that chows were more likely to be prone to hormone deficiency because of the characteristics that make a chow a chow. For instance to create a black tongue involves the excitation of a melanin stimulating factor but no inhibiting factor. The active thyroid hormone (ATH) affects every cell in the body, thus when selecting for a particular characteristic a number of genes need to operate together to produce the desired effect.

A good example of this phenomena is the experiment to breed tame foxes by selecting just for tameness which produced many other physiological changes that were not predicted such as floppy ears, distinctive white marking on the face and trunk, shorter legs and tails, curly tails, and over and under bites Trut (1999). The fox experiment does indeed suggest that changing one aspect by selection will impact on the overall genetic makeup of the animal, in the case of the chow we are selecting for a hormone imbalance in the first place. To produce the profuse/heavy coat and black tongue characteristic of the chow chow it is necessary to manipulate the endocrine system.

The endocrine system is made up of various glands including the pituitary, thyroid and adrenal glands, testes and ovaries. It is not surprising to find that hormone imbalance can cause abortion and infertility as well as coat, skin, behavioural changes and neurological disturbances (Brookes 2002). Hypothyroidism refers to lowered levels of thyroid hormones as opposed to hyperthyroidism that refers to increased levels of thyroid hormones; the latter is more commonly found in cats and is rare in dogs.

The main cause of hypothyroidism in dogs is autoimmune thyroiditis which accounts for approximately 90% of cases. Autoimmune thyroiditis is where the immune system attacks the thyroid gland, a strong hereditary link in humans has been established, e.g., where there is a family history of autoimmune thyroiditis, and/or other autoimmune diseases such as vitiligo (loss of pigment), pernicious anaemia, Addison's disease, type 1 diabetes and premature ovarian failure. Less common causes in humans include side-effects to some

medications, infection, failure of the pituitary gland to produce TSH, and congenital hypothyroidism (Patient UK).

The most common clinical signs of hypothyroidism in dogs are:-

- Skin abnormality
- Hair loss particularly around the neck and on the tail
- Skin infections, skin may be scaly and smelly with excessively oily coat and frequent ear infections
- Brittle dry coats where outer hair breaks easily leaving only the short soft undercoat
- Lethargy or listlessness
- Anaemia
- Weight gain or difficulty in reducing weight
- Thickening of soft tissues particularly around the head and face area, often creates more skin folds and a 'sad expression'
- Intolerance of cold, and/or hypothermia
- Slowed heart rate or abnormal rhythms
- In extreme cases paralysis of facial muscles, head tilt, bizarre eye movements and disruption to balance.
- General weakness in limbs producing a 'drunken gait'
- Corneal dystrophy (white spots or blister on eye surface) in more extreme cases blistering may be severe and painful requiring surgical intervention
- Coma (rare)
- Abnormal season cycles
- Decreased libido

Not surprisingly there are also behavioural changes associated with hypothyroidism, particularly sudden onset changes in temperament. Why hypothyroidism affects behaviour is not clear, however, levels of circulating cortisol are found to be elevated both in hypothyroidism and when experiencing a constant state of stress or anxiety Dodds (2007).

Common behaviour changes associated with hypothyroidism: -

- Unprovoked aggression
- Seizures
- Disorientation
- Moodiness
- Depression
- Hyperactivity/hypo-attentiveness
- Fearfulness
- Compulsivity
- Irritability

Jean Dodds, an authority on thyroid disorders suggests that there is a strong genetic predisposition for hypothyroidism but that environmental factors also play a part increasing the likelihood that the condition will develop. It is now possible to carry out genetic screening of healthy animals prior to breeding to evaluate levels of anti-thyroid antibodies in the blood indicating the potential to develop clinical symptoms of hypothyroidism or autoimmune diseases later in life and to pass the antibodies

to the puppies in the colostral milk. The ideal time for genetic screening is between 10-14 months for males and during the first anestrus period (12 weeks after the onset of the first heat) in females (Dodds 2007).

Whilst Lynda's experiences found breeds with profuse/heavy coats were more prone to hypothyroidism, this has not been substantiated by other studies which on balance found the condition more likely to occur in specific breeds some of which were smooth coated. However, it cannot be ignored that chow characteristics involve manipulation of the endocrine system and as demonstrated by the fox experiment by changing one observable aspect of the animal other aspects of the animals genetic makeup may also be affected.

Hypothyroidism is not easy to diagnose with certainty as other disorders such as Addison's have similar symptoms. There is a comprehensive series of tests that measure levels of T4, free T4, T3, free T3 and TSH circulating in the blood. It is also possible to test for heritable autoimmune thyroiditis which is thought to underlie 80% of all cases of canine hypothyroidism the dog should be tested for elevated levels of Thyroglobulin Autoantibodism (TgAA).

Levels of circulating thyroid hormones vary for a number of reasons but it is accepted that normal healthy dogs less than 15 – 18 months of age should have thyroid baseline levels in the upper ½ - 1/3 of the adult normal ranges. When screening breeding stock the optimum levels should be at the midpoint of laboratory normal ranges, **lower levels may indicate the early stages of autoimmune thyroiditis.** Levels vary between breeds; healthy sighthounds (ex racing greyhounds) tend to fall just below the laboratory reference ranges whereas levels in giant breeds tend to fall between the mid and lower ranges. Healthy geriatric dogs tend to have levels close to or just below the midrange (ANTECH DIAGNOSTICS 2005). Levels of T4 & free T4 were also found to be considerably lower while levels of TSH increased in dogs in a peak training state (racing sled dogs, racing greyhounds etc).

It is necessary to rule out other disorders before starting treatment e.g., addison's disease or demodex mange that present with similar symptoms. A full blood screening for T4, free T4, T3, free T3, and TSH is necessary to be confident in the diagnosis, treatment is normally for life usually beginning with giving the dog tablets containing T4 twice daily although this may drop to once daily as the condition becomes controlled. Blood tests should be taken regularly to ensure the correct dose is being given, whilst the medication is fairly safe if given too high a dose over an extended period may lead to increased thirst, weight loss and behaviour changes.

Breeders have long complained that the chow is not particularly easy to breed, seasons are either irregular or bitches simply fail to conceive, skin and coat problems are not uncommon however veterinary surgeons seem slow to test for thyroid function preferring to administer flea treatments and steroids for coat problems on a hit and miss basis. Steroids and some antibiotics reduce thyroid function and compound the problem. Neutering may help in

some cases but neutered females are more likely to go on to develop hypothyroidism than entire bitches. Treatment may bring entire bitches back into a normal heat cycle and increase the likelihood that they will produce puppies but there is also the risk that the puppies will inherit the predisposition for the condition. As the condition does not usually manifest before the animal reaches 4 years or later they are likely to have sired or whelped one or more litters before the condition is diagnosed thus passing the predisposition on to their offspring. Where there has been a history of allergy or immune related disorders in a particular breed line it would be advisable to screen for autoimmune thyroiditis.

Whilst the condition is easily treated with excellent results Dodds argues that affected animals or animals that are predisposed to develop autoimmune thyroiditis should not be breed from as there is a known hereditable component which will be passed on to any offspring. At the same time there is more likely to be problems with fertility (small sized litters) which increase the potential for whelping difficulties. The stress of pregnancy, whelping and rearing puppies may increase the likelihood that in bitches with a predisposition for the condition will actually develop it.

In conclusion, if your dog is exhibiting any of the listed symptoms it is always worth asking for the vet to perform a full thyroid screen. Bearing in mind that 'normal' levels vary between different breeds, it may well be that Chow Chows with their heavy coats and blue tongues do not function well when thyroid levels are in the low normal range or below. Whether there is a breed predisposition for autoimmune thyroiditis is not clear, both Ross and Dodds suggest that stress and environmental factors e.g., vaccination, chemicals, foodstuffs etc place additional stress on the endocrine system which along with the pressures placed on it by our desire for coats and black tongues may struggle to meet the demands placed upon it.

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