Extrathoracic (ectopic) thymus in Wiltshire lambs

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Introduction

A sheep farmer client first contacted the practice in mid-September 2014 regarding sheep with swollen upper necks. This presentation will detail the investigations undertaken on the property before a diagnosis was eventually made.

Farm history

The history at the initial consult revealed a flock of sixty Wiltshire sheep, based on fifteen breeding ewes. About half of the current lamb crop was noticeably affected, with prominent swelling of the subcutaneous tissues under the jaw. A few two-tooths were also noticed with similar swellings (Figure 1).

No cattle were grazed on the property, maintenance fertiliser was applied annually (though this was missed last year), and barberry hedges enclosed the paddocks.

When questioned closely, the owner recalled some swellings had been seen in 2013, and others over the last three years, coinciding with the presence of a new ram from the Hawkes Bay during this period. He was eventually culled, after being used for three years. A new ram was scheduled for purchase for the next autumn.

The pasture was predominantly rye grass, with winter fodder in the form of chicory, plantain and clover. Standard animal health treatments included routine vaccination with 5-in-1 against clostridial disease, along with a pre-lamb booster, and later clostridial vaccination of the lambs. All lambs and adult sheep had been drenched with an abamectin/cloantel combination (Genesis Ultra Oral Hi-Mineral) three weeks previously. A post drenching faecal sample submitted for a faecal egg count was negative for both strongyles and nematodirus.

Lambing performance 2014

During the 2014 lambing five lambs died out of 29 births, whereas in the spring of 2013 no losses at birth occurred. The deaths were mostly still born. A lambing percentage of 147% resulted which was much lower than normal.

Clinical examination of two affected lambs

Two affected lambs were presented at the clinic in late September for full history taking, physical examination and blood testing. At that stage the intention was to rule out other signs of a parasite burden and consider the possibility of spring eczema, liver or kidney disease.

The lambs were both well-grown, six-week-old lambs; one ewe and one ram, weighing 20kg with normal rectal temperatures. No abnormalities were noted except for moderate subcutaneous swellings under the jaw, with mild swelling extending down the front of the neck in the ram. Mild bilateral conjunctivitis was seen in both.
Blood samples taken from both lambs were submitted for routine sick ruminant panels. The panel revealed normal haematology and biochemistry levels except for increased concentrations of creatinine phosphokinase (CPK) in both lambs at 1,421 and 8,402 IU/L (reference range 45–230). Serum selenium concentrations (mean 935nmol/L, adequate >140) and serum inorganic iodine concentrations (mean 45µg/L, adequate >45) were all within the normal range.

**Diagnosis**

The owner wished to have the lambs butchered before Christmas and wanted an assurance that the meat was fit for human consumption, given the otherwise apparently healthy nature of the affected sheep. At this point the offer was made to either resample affected lambs again or sacrifice at least one lamb for a post mortem examination to try to define the cause.

The client elected to euthanase and post mortem the two worst affected lambs. Both had firm, pale, gland-like, textured masses of varying size on both sides of the larynx, stretching down parallel with the trachea and oesophagus. The masses were grossly similar to thymus tissue recovered from the thorax. A wide range of tissue samples were collected, fixed and sent for histopathological examination. This confirmed the tissue was thymus (Figure 2) and a diagnosis of ectopic hyperplastic thymus was made. All other tissues were normal, allowing the differentials of thyroid hyperplasia (goitre related to iodine deficiency) and caseous lymphadenitis (CLA) to be ruled out.

**Discussion**

Ectopic thymus tissue has been reported before in 30 of 48 Sabi lambs in Zimbabwe (Kock and Ndikuwera 1989) and in 20 of 25 Anglo-Nubian/Toggenburg cross goat kids in England. The initial diagnosis in the goat kids was goitre. When this was unresponsive to iodine supplements, necropsy revealed ectopic thymus in the neck.

Normal thymic descent is from the mandible to the thorax during embryology. Nests of thymic tissue may be found anywhere along the path of descent from the angle of the mandible to the mediastinum. Cervical thymic anomalies may occur as a consequence of an arrest in descent during embryonic growth, a sequestration of thymic tissue during descent or a failure of involution.

The thymus provides an inductive environment for development of T cells from hematopoietic progenitor cells and is most active in the neonatal and prepubescent periods before atrophying and being replaced by fat.

The thymus normally regresses by four months of age. In the Sabi lambs described above the lambs were normal by two months of age.

The client contacted the breeder of the Hawkes Bay ram, who had owned that flock for the last 20 years. The breeder had not noticed any neck or jaw swellings in lambs at their property. The breeder admitted culling heavily, so individuals may not survive long enough to see all traits. Based on all the relevant breeding records, the client was confident the affected sheep were as close to purebred Wiltshires as are found in New Zealand.
Having confirmed the diagnosis with the client we spoke about the origin of other rams used in previous years. The first ram used on the property was bought from South Auckland 11 years ago. Then a ram from the Waikato was used, and finally the Hawkes Bay ram.

Future management of the remaining lambs was then discussed, and the client’s intention was to cull the affected lambs rather than sell them for breeding. A fitness-for-slaughter certificate sent with the lambs and liaising with the meat premises duty veterinarian prior to inspection should assist the process, as opposed to risking carcass condemnation.

A courtesy call a few weeks later to check how the remaining lambs were, noted there was no change, and an 18-month-old had also developed a similar swelling. Ensuing discussion by the client’s family ended with a decision to cull out all progeny from the last three years. A month later the client called to say two lambs had died during the past week but this was thought to be due to Foxglove poisoning. At this time the thymic swellings on some of the affected lambs had actually reduced in size.

This condition has not been described in New Zealand before and was likely to have a genetic basis. In this case it was possibly via a recessive gene in previous rams used in this flock. As migration down the neck from the mandible to the thorax is the usual route of the thymus during embryological development, it would appear significant amounts of thymic tissue stalled in the jaw and cranial neck region in this flock of Wiltshires. While unsightly and possibly interfering with chewing, there are no other untoward effects, and if the sheep can be kept long enough the thymic tissue should undergo atrophy.

*Figure 1. Affected sheep*
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Figure 2. Histology of affected sheep

References

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