Neil Bruère Scholarship: Investigation into severe foetal resorption found at scanning in hoggets, August 2013

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Introduction

Trans-abdominal ultrasound scanning has allowed identification of ewes that are in lamb, ewes that are not in lamb and ewes that are in the process of aborting (Hilson 1997). Ewe hoggets (rising one year old) or maiden ewes seem to be over-represented in the latter cohort often with high numbers of resorbing foeti seen at scanning and also higher empty rates, the annual prevalence of this seems to be variable (West et al. 2004, Howe et al. 2006).

Sheep abortions occur in New Zealand for a number of reasons but most commonly they are due to infectious causes (West et al. 2004). Despite a number of investigations into ewe hogget abortion no single major cause has been identified and often after lengthy investigation no cause at all is found.

It is also possible that a non-infectious cause is causing foetal loss. Wallace et al. (1996) found that very high growth rates of hoggets in early pregnancy, by feeding concentrates, may cause foetal loss. Kenyon et al. (2005) showed in one study that high feeding rates of pasture caused no losses during pregnancy but in another study did show that the high pasture feeding group lost more pregnancies than the medium feeding group. Also Kenyon et al. (2008) and Mulvaney et al. (2010) showed that high growth through high feeding of pasture had no effect on pregnancy loss in hoggets. This effect still remains to be fully proven to cause an effect on pregnancy loss in pasture fed hoggets in New Zealand.

West et al. (2004) did not identify an infectious cause of foetal loss and abortion in maiden ewes but they did rule out all the major known infectious causes of abortion in New Zealand. They discuss that some of the lesions seen on the placentomes are similar to the lesions seen in cattle that have aborted due to Neospora caninum.

As hogget mating is now widely practised in New Zealand sheep systems it stands to reason that it would be very frustrating for a farmer to go to the effort to grow good hoggets only to find at scanning time that a proportion of them are aborting for no apparent reason. There is now a group, Hogget Abortion and Reproductive Disease (HARD), looking at possible causes of hogget pregnancy resorption/abortion in New Zealand but this group is only just starting their investigations so it is still worthwhile for the individual practitioner to investigate cases of apparent hogget pregnancy resorption-abortion in the field. It is also important that practitioners are aware of the potential that no infectious cause will be found and also the expected cost of investigating these cases and the best way to approach each case.

This investigation sets out to try and determine a cause of foetal resorption on a property that has a known history of hogget abortion.
Case history
The property where the resorption occurred is located in Feilding. This is a lease block run by farmers from Dannevirke where they have a larger farm. The hoggets are born in Dannevirke and are taken to Feilding generally in March to be joined with the ram on 1 May.

In 2012 they were scanned in lamb with a scanning percentage of 85%; no abnormalities were noted at scanning. On 25 August, 24 days before the planned start of lambing abortions were observed in the hoggets. Samples were taken from three aborted lambs and sent for analysis at Gribbles Veterinary Laboratory. This analysis found some histological lesions similar to Toxoplasmosis in one lamb and a low titre to Toxoplasmosis in two of the lambs. The end result was inconclusive but it was assumed that abortion from Toxoplasmosis may have played a role in some of the foetal loss.

In 2013 a cohort of hoggets was followed serologically to determine their exposure to toxoplasmosis. 15 ewe hoggets were sampled:
- Prior to vaccination, before moving from Dannevirke to Fielding, 6 March.
- At the time of vaccination on 13 and 14 March.
- At the time of ram joining 1 May. Six weeks after Toxovax vaccination.
- 30 July just before being pregnancy scanned.

No major exposure to Toxoplasmosis was found at any of these blood tests. A small increase due to vaccination was noted at the third blood test.

At pregnancy scanning it was found that a large proportion of the hoggets had resorbing foeti present. Scanning data below:
- 315 Hoggets scanned
- 162 singles
- 31 twins
- 122 dry including 64 resorbing (52%).
- 71% scanning
- 38% dry

A decision was made to apply for funding to investigate the reasons that this was occurring as it was causing large financial losses to the farming system.

Method
Five ewe hoggets that had been identified as carrying resorbing foeti were taken to Massey University post mortem room for euthanasia and necropsy. Samples taken included:
- Serum and whole blood from the hoggets.
- Fixed and fresh tissues from the hogget’s uteri.
- Fixed and fresh tissue from any viable foeti.

Testing
Of the five hoggets euthanised only two had foeti that were able to be examined histologically as the rest were too badly autolysed. Even the foeti that were examined were markedly autolysed and precluded an accurate diagnosis.

No significant abnormalities were detected in the foetal tissues examined.

The diagnosis from the examination of the uterine and placental tissues was:
- Placental necrosis with mineralization.
• Endometritis, neutrophilic and eosinophilic to lymphohistiocytic.
• Myometrial perivasculitis/vasculitis, lymphohistiocytic, multifocal.

Pathologists comments:
• No underlyng cause of the intrauterine foetal death is evident from histological examination.
• Diffuse placental necrosis and involvement of the maternal caruncle is similar to that seen in other cases of foetal loss in maiden ewes.
• Presence of eosinophils in endometrial stroma is unusual.

Fresh placentome was cultured from all five ewes and returned a negative culture from direct culture and a negative culture from a Listeria plate.

Serum from all five ewes was tested for Neospora, Leptospirosis pomona and BVD (bovine viral diarrhoea) antibody. These tests all returned a negative result.

A lamb found dead from a ewe hogget that was scanned as having resorbing foeti was submitted for lab analysis on 19 September. This was necropsied and found to have died from dystocia.

A lamb from a ewe hogget that was scanned as having resorbing foeti was found having freshly aborted and was submitted for laboratory examination on 23 September. Stomach contents revealed no Campylobacter in DCF smear and no Campylobacter isolated on culture. Thoracic fluid was negative for Toxoplasmosis.

A lamb from a ewe hogget scanned as in-lamb was found aborted on the Feilding property. This lamb was submitted for laboratory examination. Histology on the tissues from this lamb showed lesions that were consistent with a protozoal infection. LAT for Toxoplasmosis on thoracic fluid was negative. Also Polymerase Chain Reaction (PCR) and Immunohistochemistry (IHC) were negative for both Toxoplasma and Neospora. A false negative could be due to:
1. Effect of formalin fixation of protozoal DNA.
2. Parasites/lesions can be highly localised in foetal brains.
3. Low level of infection/lesions.

The reason for abortion in this hogget is frustratingly unclear. Despite having lesions consistent with protozoa a definitive diagnosis could not be made.

Discussion
Despite extensive testing a cause of foetal resorption has not been identified in this case. We understood that this may happen before we embarked upon the investigation. What we have done is rule out a lot of other common causes of abortion in New Zealand. The growth rates of the hoggets in this study from tupping in May to weaning in December was 0.069kg per day and 0.069kg per day in 2012 and 2013 respectively. We don’t have data around the growth in early pregnancy so cannot infer any causal effect of weight gain in these hoggets on pregnancy loss.

What is highlighted in this investigation is the need to get good quality samples from the hoggets scanned as carrying resorbing foeti. This may only be achieved by re-scanning some of the ewes identified by the scanner as resorbing and trying to establish which ewes have only just lost the foetus. This will also lead to an increase in cost and is practically difficult. Always get your farmers to ask the scanner to identify any that are resorbing in case a significant number are found and preferably identify those with dead lambs in situ in a different manner from those with evidence of more autolysed lambs.

In this case the quality of the samples was poor as we choose not to re-scan any of the hoggets.

An informal communication with a pathologist has revealed that in 2013 there have been an increase in the number of cases of hogget resorption/abortion that have returned diagnoses, which is not normally the case. What this highlights is that when going into an investigation like this always outline that a diagnosis may not be reached but
there is a chance one may be found, i.e. it is still always worth investigating.

**Conclusions**

- Reasons for high rates of foetal loss in ewe hoggets still remains unclear in New Zealand.
- This investigation did not identify a major cause but did rule out many on this farm in this case.
- The costs of investigation, as outlined in the appendix, are high. When this is compared to the cost of lost lambs it is minimal.
- Further work is required to fully understand what is causing high pregnancy loss rates in some hogget flocks in New Zealand sheep systems.

**Acknowledgements**

Thank you to the farmers for donating the ewe hoggets.

Thank you to Geoff Orbell at NZVP for advice around processing of samples and types of testing to perform.

Thank you to Jo Holter at MSD Animal Health for providing lab testing.

**References**


Mulvaney FJ, Morris ST, Kenyon PR, West DM, Morel PCH. Effect of nutrition around the time of breeding and during pregnancy on yearling liveweight change, pregnancy loss and liveweight and survival of their offspring. *Proceedings of the New Zealand Society of Animal Production* 70, 91-95, 2010


Appendix 1. Plan for investigation and approximate costs

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<th>Materials</th>
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