Fetal resorption in hoggets – results of an investigation in 2014

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Background

Hogget mating and lambing has become a mainstream production option in New Zealand but despite best practice vaccination and management programmes, outbreaks of intrauterine fetal death occur regularly each year. Thorough investigation reveals an infectious aetiology in some outbreaks, but in many cases, no specific cause is identified. The causes and epidemiology of the syndrome are poorly understood and dealing with outbreaks is frustrating for farmers and veterinarians. It is a particularly vexing problem that basically only seems to be manifested in hoggets. It is also unpredictable and costly – we occasionally see up to 5% of hoggets aborting at scanning and incidences of up to 35–40% have been recorded in other regions. It is a potential hazard for hogget breeding programmes with outbreaks resulting in wastage and significant economic loss.

After many years of relative quiet, our practice has encountered several outbreaks of significant hogget abortion in CHB ewe flocks in recent years and hundreds of cases were recorded in at least five flocks in CHB in the winter of 2013. The hogget intrauterine fetal death syndrome is an ongoing nationwide issue but some of the original cases and original investigations were undertaken in CHB by Vet Services (HB) Ltd.

Investigation protocol

Routine ultrasound scanning of hoggets at about day 90 of gestation provides an opportunity to identify cases of resorption and abortion. As part of a thorough investigation it was proposed that a sample of affected hoggets be euthanased so that uteri with dead foetuses in situ could be collected for bacteriology and histology. Blood samples were also to be collected from hoggets with live foetuses and from other hoggets seen to be aborting.

A major impediment to this proposal was cost. Farmers are reluctant to spend much money investigating a case when they think there is little chance of a definitive diagnosis, especially when hoggets have been fully vaccinated against toxoplasma and campylobacter abortion. Practical reality has shown that aborted hoggets usually get in lamb as two tooth ewes and do not suffer recurrent abortion episodes.

An approach was made to the Central Hawkes Bay Farmers Veterinary Club (CHBFVC) executive for financial assistance for investigating suitable cases in either of the 2014 and 2015 scanning seasons. Additional funds were made available by MSD Animal Health for a contribution towards blood testing. Funding allowed for up to five farms to be investigated in 2014 and 2015.

The cost to participating farmers was the provision of up to three hoggets identified at scanning with dead lambs in situ which were judged to be suitable for providing good quality samples. All other costs were to be met by funding from CHBFVC, MSD Animal Health and pro bono work by Vet Services (HB) Ltd.

Study protocols were finalised for investigations which began in the 2014 scanning season. A standardised colour coding was used to identify aborting hoggets. An agreed level of loss (minimum
10 hoggets observed aborting) established for initiating an investigation, affected clients to be contacted by a veterinarian within 24 hours to allow a decision to made whether or not to proceed. If it was considered necessary to rescan the hoggets (either the whole mob or all drys) to identify the best ewes to sacrifice then the cost of scanning was borne by VSHB. The protocol was discussed with all scanners and all vets likely to be involved in identification of cases or investigations before hogget scanning began in mid-July.

Blood samples were collected as soon as possible and up to three ewes sacrificed per property and these ewes were included in the blood sampled group. Uteri were transported chilled to the Gribbles Veterinary laboratory in Palmerston North.

**Estimated costings per farm:**

- Ten blood samples from hoggets (five aborting, five wet):
  - Toxoplasma antibodies x10 $212.50
  - Neospora ELISA x10 $362.50
  - Lepto pomona antibodies x10 $200.00
- Three hoggets sacrificed for uterine sample $360.00
- Histology and microbiology (three fetuses) $750.00
- Veterinary time sample collection etc. $300.00
- Rescanning of hoggets: $unknown

**Total cost per farm (excl. GST):** $2,185.00

It was agreed that the most important tests were microbiology and histology of the fetus and uterus. These were really ‘non-negotiable’. Sera were be stored for use at a later date if testing for toxoplasmosis, neosporosis and leptospirosis was considered to be required. Thus the cost per farm was expected to be less than $1600 in most cases.

**Case A**

A large and well-run intensive farm in the Porangahau district scanning 3,043 Romney hoggets, all of which had been vaccinated against toxoplasma and campylobacter. Large numbers of hoggets with dead foetuses in utero were noted at scanning on 29 July 2014 and a vet visit was made the same day. The hoggets had been scanned pregnant/non-pregnant (no multiple pregnancies identified) and 905 (29.7%) were diagnosed non-pregnant (DNP) and 98 (10.8%) of the DNP were noted to have aborted. The DNP were rescanned to identify animals suitable for sampling and the protocol was followed from then on.

Collection of uteri was uneventful and removal of the uteri from suspended carcases was simple and straightforward. Samples were packed in plastic bags and surrounded by ice for prompt transport to Gribbles Veterinary.

Uteri were opened at the laboratory and gross findings recorded. Histology was performed on placentomes, ovaries and foetuses. Microbiology tests were done on stomach and lung samples from one lamb from each hogget. Toxoplasma titres from five aborting and five pregnant hoggets were determined along with *L. pomona* titres from three aborted hoggets.
In this case most findings were unremarkable:

- no significant bacterial pathogen was isolated
- toxoplasmosis antibody titres were low or negative and there was no difference between groups;
- Leptospirosis titres were negative;
- histological diagnosis largely confirmed gross findings with severe placental degeneration and necrosis and no significant changes or lesions were seen in fetal tissues.

However, an interesting finding in this case was that two out of three sets of ovaries had 'mild, sub-acute multifocal lymphocytic and suppurative oophoritis'. This finding had not been seen within the laboratory network before.

**Case B**

A hill country farm in the Wallingford district that had been mating hoggets for six years. All hoggets had been vaccinated against campylobacter and toxoplasma. On 8 August 2014, scanning of 574 hoggets revealed an empty rate of 33% and an overall scanning percentage of 81%. Interestingly, this was the highest recorded scanning percentage in six years for hogget mating on this farm. Only a few aborting hoggets were noted at scanning but the manager reported more losses over the few days and after several phone calls it was decided to rescan the pregnant hoggets and begin an investigation.

The second scanning was conducted on 13 August 2014 with approximately 386 hoggets scanned. Another six had either aborted or were in the process of aborting. Three hoggets were sacrificed at which time it was noted that two carcases were grossly jaundiced. Gloves were used for preparation of samples and handling of carcases, advice regarding leptospirosis was offered and the carcases were to be frozen pending laboratory results. Histological examination at Gribbles Veterinary revealed necrosuppurative placentitis and foetal pneumonia consistent with a bacterial cause of abortion. Incidentally, suppurative oophoritis was noted in ovaries from all three hoggets. An interim microbiology report indicated moderate to heavy growth of a gram positive bacilli, most likely Listeria.

A call was made to the manager and a decision made to randomly select half the ewes and immediately treat them with penicillin. Ewes were identified to treatment and control groups with aerosol marks on their backs and treated ewes received consecutive treatments with Depocillin or Intracillin LA (5ml) on 17 August and 19 August. One ewe hogget died at time of penicillin administration, presumably due to inadvertent intravenous administration of product. Both groups were run together until lambing for management convenience.

Final microbiology results confirmed the diagnosis of Listeria infection (most likely *Listeria ivanovii*) in all three cases. No campylobacter or salmonella was isolated and *L. pomona* titres were negative in all three ewes.

All hoggets which were pregnant at the second scanning event were scanned for a third time on 11 September 2014, as close to lambing as possible and numbers of aborted and empty ewes recorded. Two hoggets that had lambed already were not included in the tally.
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<table>
<thead>
<tr>
<th></th>
<th>Treated ewes</th>
<th>Control ewes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total scanned</td>
<td>184</td>
<td>193</td>
</tr>
<tr>
<td>Number empty/aborted</td>
<td>7</td>
<td>13</td>
</tr>
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Two other statistics, Relative Risk (RR) and the Risk Difference (RD), are of greater interest than the p-value because they provide more information about the relative and actual sizes of the difference.

The RR was 1.8 (90% CI 0.8, 3.8) and the RD was 2.9% (90% CI -0.8, 6.7).

The RR tells us that control hoggets were 1.8 times more likely to abort than treated hoggets and the difference in the risk (RD) between the treated and control groups was 2.9%. The p-value chart shows that most of the distribution of the relative risk is to the right of the no effect line. The 1.8 RR estimate is the best and most likely estimate within the distribution of the 90% confidence intervals about that estimate. As you move away from the 1.8 estimate the confidence in the estimate gradually declines.

Multiplying the risk difference (2.9%) by the total number of hoggets in the mob gives an estimate of 11 lambs saved if the treatment had been applied to the whole mob. If we are interested in the confidence in that estimate then we could multiply the 90% confidence limits by the number in the mob. That calculation gives a spread of minus 3.8 to plus 25.46 or more sensibly minus 4 to plus 25 lambs saved.

Treatment seems to have produced a positive effect but the real question for the veterinarian and the farmer is ‘Was the treatment worthwhile?’

Comments

Although Case A was yet another unanswered hogget abortion case, it presented an unusual finding of oophritis of unknown aetiology which is worthy of further investigation in future outbreaks or trial work.
Case B, while seemingly straight forward, does present some interesting issues:

Listeria is a zoonoses so what is the risk to handlers and is this an issue in a line of food producing animals? The farm had not recorded an abortion outbreak before so why did it occur? Listeria abortion is an uncommon diagnosis in our practice area, presumably in part due to more extensive management of pregnant stock in winter and little use of supplements. Circling disease and diarrhoea were not noted as clinical signs in this outbreak.

Is penicillin treatment cost effective and is it useful? Total cost of treatment was approximately $425 or $2.30 per ewe. This would make treatment marginally cost effective if five extra lambs (at say $100) survived as a result of treatment. However it is also worth noting that there was a limited time (just three weeks) in which the treatment effect was measured and a slightly earlier diagnosis and rescanning closer to lambing may have improved the treatment effect. Furthermore, treated ewes ran with untreated ewes through this period, potentially negating some of the possible benefit of treatment if animals faced continued exposure.

The manager remains convinced. Based on what he saw and the statistical explanation, he stated that he would not hesitate to treat all the ewes in future and would not run a control mob again.

From a clinical perspective it is apparent that all hogget abortion cases should not be placed in a ‘too hard’ basket, even if the vaccination history includes protection against toxoplasmosis and Campylobacter infection. Case A presented an unusual finding worthy of follow-up in future outbreaks. In Case B a thorough and prompt investigation was deemed to be well worthwhile. The method for reaching a diagnosis of listeriosis could be simplified in clinical settings. While numbers were small, the benefits of treatment in this case of listeria abortion were apparently worthwhile.

This project will continue in 2015 and maybe beyond. The initial budget was for investigations of fetal loss in hoggets on up to five properties. With ewe pregnancy scanning already underway and good numbers of well vaccinated hoggets being mated this year, potential cases are very likely to occur.
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