Brucella ovis in deer

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This paper describes the occurrence and investigation of the first naturally occurring outbreak of *Brucella ovis* in farmed red deer.

Disease history

June 1996:

During routine semen collection from a red stag on a mid-Canterbury deer farm, a flocculent and visually abnormal sample was obtained and sent to Lincoln Animal Health Laboratory. A pure growth of *Brucella ovis* was cultured, indistinguishable from the infective organism in New Zealand sheep. Blood samples taken 2 weeks later from the stag in question and 2 cohorts produced a positive *B. ovis* CCT result, but there was some confusion over which stag.

3/7/96:

Repeat blood samples were collected from the same 3 stags plus 13 in-contact hinds. It was also decided to check the status of 9 mixed-aged rams running on the property.

Sera were tested using:

- *Brucella ovis* : ELISA
- Gel diffusion (GD)
- Complement Fixation Test (CCT)

The stag in question was:

- suspicious on ELISA
- +ve on GD
- +ve on CCT (titre 2/64)

One hind was:

- suspicious on ELISA
- suspicious on GD
- +ve pm CCT (titre 4/64)

The remaining deer and the rams were negative.

24/7/96

Further semen samples were collected from the stag plus 4 cohorts. All were negative to modified Zn screening but on culture the original problem stag once again produced a pure growth of *B. ovis*. At the same time, the original stags were re-bled, along with 43 hinds which had recently been mated to the infected stag, plus 6 further hinds which had been mated off-farm on the property from where the infected stag had been purchased.

Results from sera showed:

Infected stag:

- +ve CCT (titre 3/8) (NB: reducing titre)
- weak +ve GD
- -ve (just below susp.) on ELISA

Previously suspicious hind:

- suspicious CCT (titres /18) (further reduced titre)
- -ve GD
- -ve to ELISA

NB: The infected stag had a normal conception rate in hinds mated only 3 months earlier.

30/7/96

A further sample of hinds from the property was bled. These animals had no known contact with the stag in question. Results produced 1 suspicious result (titre 2/8) in CCT but Bve results to GD and ELISA.

4/9/96

A further 24 blood samples were collected in an attempt to check the status of the calf of the suspicious hind from the 1995 season, and others. Results were negative.

At this stage it was concluded that the stag had arrived onto the property already infected from a breeder in North Canterbury.

19/2/97:

The infected stag and suspicious hind were slaughtered. The infected stag had palpable lesions in the epididymis. It was apparently -ve to CCT from blood collected at the time of slaughter. This may indicate that CCT titres and other tests on sera can decline quite rapidly after infection.

Follow-up tests on the cohort sire stags in the 1997 season using semen, palpation and blood all produced negative results.

Trace back

During the 1996-97 period there were 24 individual episodes of stock movements (1191 animals) leaving the property where the infection was discovered. Another 19 episodes, involving 536 animals of arrival onto the farm.

This gives some indication of how complex trace back and trace forward procedures can become, even in what appeared to be a relatively straightforward and simple disease situation.

Further developments

19/5/97:

Fifty rising-3-year stags from another property were slaughtered and 8 had lesions in the tail of the epididymis. Histology revealed lesions ranging from acute and purulent to chronic with fibrosis. Cultures from a limited number produced *B. ovis.*

22/5/97·

Thirty-four further stags of the above line were slaughtered. Samples were collected.

- 16 had testicular abnormalities
- 11 were *B ovis* culture positive
- 14 had acid fast organisms resembling *Brucella* spp.
- 28 were CCT positive
- 2 suspicious CCT
- 4 negative CCT

The above animals were owned by the farm with the initial infection, but comprised stags bought from other properties in the area close to where the original infected stag was bred. To confuse the issue further, these stags had been off-grazed most of their lives.

23/7/97·

Thirty mixed-age stags that had been sold to Lincoln University for trial work were slaughtered after blood testing. Many were cryptorchids, limiting samples. Three had low CCT positive reactions. No culture positive animals were identified in this group.

7-19/8/97.

In the light of the on-going findings the farmer initially involved with the primary infection made a decision to slaughter all 350 of his mixed-age velvet stags. Sera were collected from all these animals prior to slaughter and are currently held pending the availability of finance to process them. Of the 350 animals approximately six had palpable epididymal lesions but only 1 had a positive *B. ovis* culture result. From these results it appears that the rate of spread and levels of active infection in older stags is lower.

19/8/97:

The final 50 rising-3 year-old stags from the grazing property were slaughtered, resulting in 33 CCT positive and 5 suspicious animals. Initial results reported 19 with palpable lesions of slaughter. On-going testing on the original farm has involved all hinds and repeat semen and blood tests on remaining breeding stags. All are blood test clear.

During the investigation, MAF issued a directive to all deer slaughter plants to closely examine all stag genitalia for evidence of *B. ovis* infection. Subsequent to this investigation 1 new infected farm has been discovered in the Outram region of Otago. Investigations to date are incomplete and any linkages to the Canterbury outbreak are unknown.

Industry significance

Brucella ovis has the potential to be a major problem for both individual farmers and the New Zealand deer industry for the following reasons:

The fertility of expensive stags can be impaired partially or completely. Semen quality is reduced and rendered unsaleable

Herd reproduction rates in infected herds could be reduced.

Reduced industry returns. Infected animals are not suitable for the recovery of edible co-products, eg: testicles and pizzles.

Infected properties may find reduced demand for sire stags.

Potential (unproven) for abortion in hinds. Information to date indicates that the infection is not widespread within New Zealand and with current low prices for velvet we probably have our best and cheapest opportunity to limit the disease and its possible spread.

Recommendations

Because the disease has already demonstrated clear potential to spread rapidly in large mobs of young stags, veterinarians should consider establishing voluntary disease limitation procedures with interested clients.

Disease control recommendations have been developed by Dr Dave West of Massey University, and are contained in an adjacent paper in these Proceedings. They are based on the current sheep accreditation programme. They also assume that the infection behaves in a similar fashion in deer as it does in sheep.

Discussion

We currently believe that *B ovis* infection in deer has resulted from a chance opportunistic spread from an infected ram. This is only theory at this stage, but should it prove true then further new and independent transfers could occur. Once in a herd there is obviously the possibility of very widespread and rapid transfer amongst young stags. The behavioural pattern of spiker or 2-year stags in allowing widespread homosexual activity during the rut and subsequent winter, would obviously facilitate transfer. Older stags 3 years and over have a far greater territorial need and confrontation is the normal reaction to animals entering their "personal space" zone. Only

subservient animals or those weakened by disease or injury are likely to be subjected to homosexual activity, as happens with bulls.

To further investigate the mechanism for spread between deer and sheep, and to monitor the longer term changes in infected animals, Massey University has commenced controlled trial work.

The information to hand currently supports serological testing of deer with cautious confidence. However, insufficient information currently exists to provide reliable specificity and sensitivity data. Care should therefore be taken in interpreting a single positive or suspicious result in a non-lesioned herd. Additional serological tests CFT, GD, ELISA, should be compared, repeat sampling techniques used, and perhaps semen culture used to confirm a single isolated incident.

Investigating this disease has highlighted many of the difficulties in dealing with new diseases in a fully user-pays environment. Unless declared a pest of national significance, funding from government agencies is very limited. Added to this is the complication of the Privacy Act where individuals affected by the disease need not declare themselves to an investigator unless they want to. The need to react quickly to an emerging situation and coordinate the collecting of appropriate samples while funding channels are incompletely established, creates another barrier to logical progress.

Industry must have a clearly focused priority to control the disease before adequate progress can be made, considering the complexities of the extensive trace-forward and trace-back investigations involved, even in a relatively contained situation.

To date this case leaves many questions unexplained, and there is still the real risk that many potentially infected properties remain inadequately examined with another 'roar' and potential disease transfer period almost upon us.

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