Brucella ovis in Deer – Research Results and Research Needs

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Abstract

A pilot study investigated transmission of *B ovis* in young stags. Two of three 9-month-old stags became infected after inoculation. Those stags transmitted infection to four of eight in-contact stags during the rut, but did not transmit infection to 11 in-contact rams. Serology and semen culture were effective in detecting infection.

Further studies are under way to investigate direct and through-fence transmission, deer to ram transmission, and the role that deer behaviour in bachelor groups may play in *B ovis* transmission.

Introduction

In May 1996, *Brucella ovis* infection was identified in a Red deer stag in the South Island. The stag had epididymitis, abnormal semen and was positive to the complement fixation (CF) serological test for *B ovis*. The following year *B. ovis* infections were identified in up to 50 percent of some groups of 18 months old stags sent for slaughter from the same property. Deer from other farms in the South Island were identified as infected mainly from surveillance at meat works (Scott 1998, West *et al* 1998). During 1998 stags from a North Island property were identified as infected with *B ovis* but direct links with affected farms in the South Island have not been established.

Transmission of *B. ovis* between stags and from stags to rams

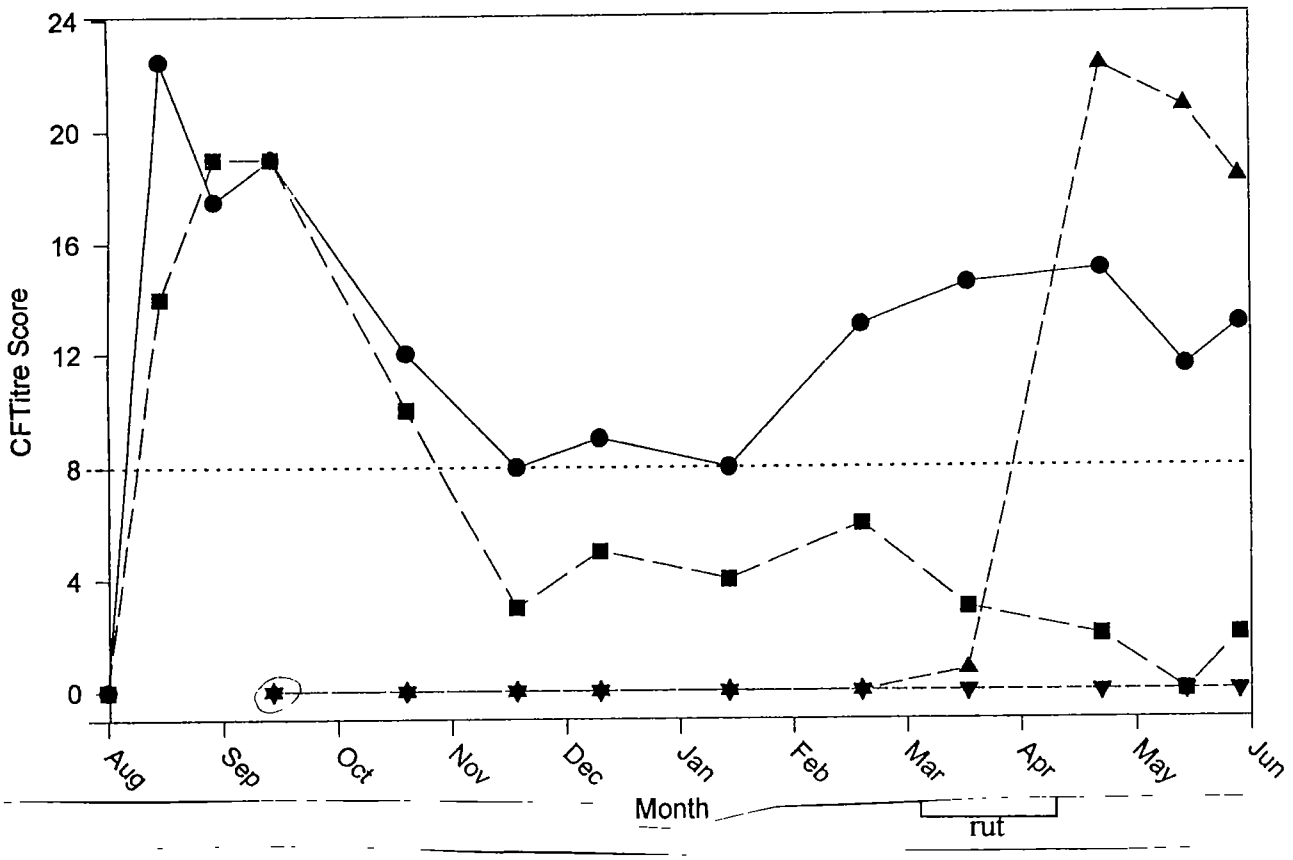
A trial was conducted at Massey University, to examine the spread of *B ovis* infection between stags and from stags to rams. Financial support for the study was received from the Deer Branch (NZVA), the Sheep and Beef Cattle Society (NZVA) and sheep breed societies.

In August 1997, three 9-month-old Red x Wapiti stags were inoculated intravenously with *B ovis*. Between October 1997 and June 1998 these three stags were grazed with 8 control stags of a similar age and 10 one-year-old Perendale rams, which had been confirmed free from *B. ovis* infection before mixing. At monthly intervals the 11 stags and 10 rams were blood sampled for *B. ovis* serology and when infection was suspected, this was confirmed by bacterial culture of a semen sample. Two of the three artificially infected stags became persistently infected with *B ovis* and shed the organism in their semen. They remained positive to the *B. ovis* CF test throughout the trial. The other artificially infected stag did not develop persistent *B. ovis* infection and its CF titre fell below the positive cut-off level 4 months after inoculation.

These results indicate that serology will be useful in the diagnosis and control of *B ovis* in stags.

During April and May 1998, *B ovis* infection was identified in 4 of the 8 in-contact control stags (Figure 1). There was no evidence of *B. ovis* transmission to the rams. The trial demonstrated the rapid transmission of *B ovis* infection between young stags during the rut. This would suggest that sexual activity is important for *B ovis* to spread, although the exact means of transmission could not be determined in that study. Rams grazed in conjunction with *B ovis* – infected stags have a lower risk of becoming infected than stags.

Figure 1: *Mean Brucella ovis complement fixation titre score of two artificially infected stags persistently infected with B ovis, one artificially infected stag that did not develop a persistent infection, four controls stags that became infected with B ovis and four control stags that remained uninfected. A CF titre score of 8 is considered positive (dotted line)*



Trials currently in progress

The rapid spread of *B ovis* infection between stags during the rut has been demonstrated but the means by which it is transmitted from stag to stag is unknown. It may spread by direct physical contact or indirectly through environmental contamination. The current research project will investigate the transmission of *B ovis* from sheep to deer and from deer to deer in a series of trials to answer the following questions:

1. Can deer become infected with *Brucella ovis* by grazing paddocks previously stocked with infected deer?

   Many deer farms have velvetting stags and stud stags held in separate groups. To control the spread of *B ovis* from one group to the other it is important to determine whether the infection can be spread by animals from the uninfected group grazing pasture recently grazed by infected animals. In addition, while eliminating brucellosis

from a farm it may be necessary to establish an infected and a non-infected mob of animals. The management of these groups will be influenced by whether the disease can be transmitted to the uninfected animals by their grazing of pasture previously stocked by infected animals.

To determine if infection can be spread by sequential grazing of infected and non-infected animals a trial will be carried out using two groups of stags; one containing 6 infected and one with 6 uninfected animals. The stags in the infected groups will be artificially infected in January 1999 with *B ovis* and serology and bacteriology of semen samples will be used to confirm their status. The animals in the other group will contain animals identified as being free of the infection.

The two groups will be grazed in small paddocks (0.6 ha) containing one or more wallows. Each week from January 1999 until the trial is completed in June 1999 the two groups will swap paddocks (Figure 2) to maximise the risk of transmission during the rut.

The *B ovis* status of all 12 deer will be monitored on a monthly basis by serology. Animals suspected of having brucellosis will be electroejaculated and the semen obtained cultured for *B ovis*.

Figure 2: *Design of the paddocks in which Trials 1 and 2 will be carried out*

Paddock 1	Paddock 2	Paddock 3
Uninfected stags Stags will be moved to Paddock 3 on a weekly basis	Uninfected stags	Infected stags *(Brucella ovis)* Stags will be moved to Paddock 1 on a weekly basis

2. To prevent the spread of infection is it necessary to separate uninfected deer from infected animals by a paddock? (Can *Brucella ovis* spread from deer to deer through a fence?)

   A group of uninfected stags will be pastured in a paddock adjacent to one containing infected animals so that there is contact through a fence only (Figure 2).

   The trial will be run concurrently with the previous trial and the deer will be monitored by serology on a monthly basis.

3. Are deer in danger of contacting *Brucella ovis* if they are run with infected rams?

   A group of 6 rams artificially infected with *B. ovis* will be run with a mob of 6 uninfected deer to determine how readily *B. ovis* transmits from rams to stags. The rams and stags will be grazed together in one paddock from February 1999 to June 1999. The *B ovis* status of the rams and deer will be monitored on a monthly basis by serology. Rams will be confirmed as shedding the infection in semen by bacteriology carried out on samples obtained by electroejaculation.

4. Is rectal copulation a frequent occurrence between stags?

   Brucella ovis may spread from stag to stag by rectal copulation. Observations will be carried out on the groups of stags in trials 1, 2 and 3 to determine if rectal copulation occurs between stags 14 to 20 months of age. These observation will monitor other interactions between the animals including mounting, wallow use and mutual grooming.

5. How long does *Brucella ovis* survive on grass?

   Semen samples taken from infected stags containing *B ovis* will be held in universal jars outdoors in a variety of situations. Samples for bacteriological culture will be taken daily to determine how long the *B ovis* remains alive. In addition infected semen will be placed on a sward of short grass maintained in a laboratory. Samples will be taken from the sward on a daily basis for bacteriological culture.

6. How attractive is semen (ram or stag) to other animals?

   The response of stags to semen from both rams and tags will be monitored. The semen will be held in open universal bottles placed around a paddock. The interest in the bottles with semen will be compared with the interest expressed in empty (control) bottles.

   In addition semen will be painted on the perineal or prepucial areas of individual animals. The social and sexual activities of stags will be monitored before and after the semen is placed.

   These studies will be carried out during March, April and May 1999.

The effect of *B ovis* infection on the reproductive performance of hinds is unknown. Limited field observations of naturally infected deer herds has not identified *B ovis* as a cause of abortion or reproductive wastage but it appears that infection has largely been confined to stags so the degree of challenge to hinds may not have been high. While this aspect warrants future research it will be more costly than the current proposals.

Investigation of naturally occurring outbreaks of *B ovis* in deer should be an invaluable way of gaining more information about this emerging problem. Veterinarians are urged to make use of the various study grants available so that vital epidemiological information is obtained and reported.

References

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