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Studies on *Brucella ovis* infection in deer

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Abstract

Brucella ovis was first identified in the New Zealand farmed deer population in 1996 but little was known about the disease in deer. These experiments were undertaken to investigate the epidemiology, pathophysiology and diagnosis of *B. ovis* infection in deer. In addition, *B. ovis* isolates from commercial rams and stags were strain typed by pulsed-field gel electrophoresis.

Transmission of infection was demonstrated from infected rams to stags grazing in the same paddock, suggesting that the initial source of infection for deer in New Zealand was likely to have been from rams. Transmission between stags did not occur after shifting non-infected stags into paddocks immediately vacated by infected stags, or after grazing non-infected stags in a paddock adjacent to infected stags over a five and a half month period. This suggests that the risk of transmission of *B. ovis* by the environment or indirect deer to deer contact is low. Stags became infected with *B. ovis* after experimental inoculation of the conjunctival, nasal and rectal mucous membranes. Behavioural observations identified that stags in all-male groups interact by mounting, sniffing the prepuce and perineum and spraying fluid from an extruded penis, which are considered high risk for the transmission of *B. ovis*.

It was established that while stags are initially as susceptible to *B. ovis* infection as rams the majority of stags stop shedding *B. ovis* in semen within 11 months of infection, suggesting resolution of infection. In contrast, all rams remained infected with *B. ovis* and shed the organism in semen for at least 21 months.

During the *B. ovis* shedding phase of infection, the majority of stags produced semen that had poor sperm motility and morphology and contained large numbers of leukocytes and cellular debris. However, following cessation of shedding stags produced semen that had good sperm motility and morphology, although leukocytes were still present.

The sensitivity of the commercially available serological tests at detecting infection in deer was 100% during the early stages of the disease but after 60 to 100 days of infection, their sensitivity decreased to 30 to 70%. In contrast, the sensitivity in rams

over a 630-day period was 100%. Detection of lesions of epididymitis by scrotal palpation of stags was an insensitive method of diagnosing infection.

Stags infected with *B. ovis* developed lesions in the epididymes, seminal vesicles and ampullae similar to those reported in rams. In the early stages of the infection, lesions in stags were severe but in more chronic infections the lesions were mild.

Vaginal inoculation of hinds immediately prior to mating resulted in no measurable adverse effects on reproduction, suggesting the disease is of little significance in hinds. Stags that mated vaginally-infected hinds became infected, demonstrating venereal transmission of the organism.

Pulsed-field gel electrophoresis of *B. ovis* isolates revealed the presence of two strain types of *B. ovis* in the New Zealand farmed sheep and deer populations. Cervine isolates from two naturally-occurring cases of *B. ovis* in stags were different strain types. This confirmed that the two cases were unrelated, again highlighting the importance of rams in the epidemiology of this disease in deer.

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