Epidemiology and production effects of leptospirosis in New Zealand sheep

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Emilie Vallée
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Abstract

Leptospirosis causes clinical disease in sheep and is an important occupational disease in New Zealand. Contact with sheep has been shown to be a significant risk factor for human infection, particularly in meat workers. Up to 97% of New Zealand sheep flocks are seropositive to *Leptospira borgpetersenii* serovar Hardjo (Hardjo) and/or *Leptospira interrogans* serovar Pomona (Pomona), yet vaccination is rare.

The work presented in this thesis investigates the epidemiology and effects on sheep growth and reproduction of Hardjo and Pomona, as well as the effectiveness and the effects on sheep production of a commercial bivalent Hardjo and Pomona vaccine.

A split-herd vaccination trial involved a bivalent Hardjo and Pomona vaccination programme for one third of 2260 ewe lambs on 8 farms starting at one month of age. Repeated blood samples were taken over one (6 farms, mated as hoggets) or two (2 farms, mated as 2-tooths) years for microscopic agglutination testing to assess exposure to Hardjo and Pomona in the unvaccinated group. Weight and pregnancy, docking and weaning data were recorded and compared between vaccinated and unvaccinated, as well as between seropositive and seronegative within the unvaccinated group. Urine samples were collected from a random subsample of both vaccinated and unvaccinated sheep on each farm one to two years after the beginning of the study and the samples were analysed by real-time PCR.

The Hardjo exposure pattern was consistent across seven out of eight farms, with exposure occurring at around 10-15 months. On one farm Hardjo exposure started before weaning. Three farms became positive for Pomona at around 8-15 months. The description of the serological patterns identified a period at risk for sheep exposure to leptospirosis, and also possibly at risk for humans handling sheep.

The overall vaccine effectiveness was 86.3% [63.6-94.8], with the lowest farm level effectiveness 76% [29-92], in spite of a vaccination schedule differing from the manufacturer's recommendations on some farms. Vaccination timing seemed to be crucial in achieving optimum reduction in shedding in urine of vaccinated sheep. These results can be used to inform vaccination best practice guidelines and recommendations.

Comparison of growth performance between sheep seropositive for Hardjo and/or Pomona and seronegative did not allow for definitive conclusions as the results varied between farms and periods in magnitude and direction of difference. The results showed a significant effect of recent Hardjo infection in hoggets on reducing lamb survival from docking to weaning. No other statistically significant difference in reproductive rates was observed for either serovar. No difference in growth or reproduction was observed

between vaccinated and unvaccinated sheep. Hence, vaccination appears unlikely to be cost-effective on most New Zealand sheep farms where exposure patterns would be similar to those observed in this study. However, more data is needed to understand the variability in the results observed between the different study farms. This conclusion also does not account for the possible cost of human infection. Furthermore, the Pomona exposure was possibly not high enough to identify any production effect associated with this serovar, so more data on the effects of Pomona would be needed for robust conclusions.

This likely absence of production effects contrasts with what has been observed in New Zealand farmed deer, where vaccination was shown to improve growth rates and weaning rates.

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List of Publications

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List of Presentation and Posters

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