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Epidemiology of BVD in New Zealand dairy herds

A thesis presented in partial fulfilment of the
requirements for the degree of

Doctor of Philosophy

In

Veterinary epidemiology

at Massey University, Manawatu, New Zealand.

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2016

Abstract

The objective of this thesis was to determine the prevalence and incidence of bovine viral diarrhoea (BVD) virus at cow and herd level, define risk factors for new infection and to quantify the impact at cow level of seroconversion during the seasonal breeding programme under the seasonal calving, pasture grazed systems in New Zealand.

A questionnaire and bulk tank milk (BTM) BVD PCR and antibody ELISA test was completed for 402 New Zealand dairy herds, and repeated in the subsequent lactation. North Island herds had a high turnover rate with 67% of virus positive herds clearing infection each lactation and being replaced with newly infected herds, while the larger South Island herds rarely cleared infection naturally (14% per lactation) and maintained a higher prevalence (32% compared to 8.5% for North Island herds). Transmission pathways associated with bulk tank BVD status were purchasing cows, neighbour's stock, and stock movements off-farm. The other factors associated with bulk tank BVD status were herd size, herd BVD vaccination, and herd ownership structure.

In 10 BTM PCR positive herds, all lactating cows ($n=3,793$) were tested for BVD antibody at the start of the seasonal breeding programme (planned start of mating; PSM), and again 125 days later, to identify cows that seroconverted during the observation period. Improved cut-off values were derived for the IDEXX milk antibody ELISA. There were few (3.8%) susceptible lactating cows at PSM in herds with a lactating persistently infected cow (PI), but most of these susceptible cows (82%) seroconverted. This required 4.6 contacts per PI each day. There were more susceptible (31%), and a smaller proportion of susceptible cows seroconverted (32%) in herds without a lactating PI. Seroconversion was associated with 13% longer PSM to conception (3.2 days), 4% lower pregnancy rate, 6% lower conception to AI, and \$11.97 (1.9 times) greater cost of clinical disease. The average cost per transient infection was \$91.08.

These results contributed to voluntary BVD control efforts in New Zealand and will be essential for developing a comprehensive cost-benefit model to estimate the average total cost of BVD, and assessing the benefit of various control strategies.

Keywords: Bovine Viral Diarrhoea; BVD; BVDV; virus; diarrhea; pestivirus; Flaviviridae; veterinary; epidemiology; New Zealand; dairy; prevalence; incidence; herd; cow; reproduction; disease; transient infection; immune suppression; PI; PCR; ELISA; antibody; milk; economic; cost; seasonal; pasture-based; observational study; longitudinal; cross-section; risk factor; risk; probability; proportion; rate; mastitis; lactation; seroconversion; regression; generalised estimating equation; GEE; Hurdle model; accelerated failure time; AFT; questionnaire; survey; sharemilker; cow behaviour; herd management; model.

Acknowledgements

I would like to thank the farmers involved for their time, completing and returning questionnaires, giving permission to test their bulk milk, the use of their facilities and animals, and for following instructions and recording activities and events; New Zealand dairy farmers for funding the study through DairyNZ; The McKenzie legacy trust for additional funding contributions; Eltham District Veterinary Services for financial support, in-kind contributions (particularly Joan Hughes), and the patience and encouragement from other staff members; Livestock Improvement Corporation for in-kind contributions toward the testing costs, particularly Hinrich Voges who provided valuable feedback and advice about diagnostic testing; my supervisors Cord Heuer, Scott McDougall, and Mark Stevenson for their guidance, advice, and feedback. I would also like to acknowledge my family: my wife Kath and my children Sarah, Esther, and Daniel who sacrificed much for this PhD, and my parents Alistair and Heather Weir for their on-going support.

Approval for this research was obtained from the Massey University Animal Ethics Committee.

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