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Risk factor epidemiological studies of ivermectin resistant *Ostertagia circumcincta* on Western Australian sheep farms

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New Zealand.

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Abstract

This study was designed to investigate the farm level epidemiology of ivermectin resistant *Ostertagia circumcincta* on Western Australian sheep farms. The study involved a postal survey and the results of that survey were used to develop statistical models to identify risk factors associated with ivermectin resistance.

The survey was mailed to farmers in July 2001 who had conducted faecal egg count reduction tests on their properties in 1999 and 2000. The questionnaire contained questions about farm management practices, particularly those pertaining to worm control. Some mail and telephone follow-up was conducted.

The response rate to the survey was 54%. The period prevalence for ivermectin resistance in Western Australia 1999 – 2000 as defined in this study was 38% (95% CI 29%, 46%) and for the period 1999 – 2001 was 44% (95% CI 39%, 58%) as some farms were diagnosed with ivermectin resistance in 2001.

Two main effects models of anthelmintic resistance at the farm level were developed: a logistic regression model for risk factors for a farm having been diagnosed with ivermectin resistant *Ostertagia circumcincta* by 2000, and a Weibull parametric survival model studying the effective life defined as time to onset of resistance, for those farms using ivermectin.

The logistic regression model contained three main effects variables: selling 10% more sheep in 2000 than is the usual policy (OR = 4.00), farm purchased since 1975 (OR = 2.34), and number of winter flock anthelmintic treatments in the previous 5 years (OR = 1.04). A secondary logistic-regression model assessed risk factors for farms selling 10% more sheep than usual in 2000; these farmers appeared less committed to their sheep enterprises than other farmers.

The survival analysis model contained four main effects variables: winter drenching frequency, 0-2 vs. 3+ flock treatments in 5 years (RH 0.52); availability of alternative effective anthelmintic classes on the farm (RH 0.30); always using safe pastures (RH 0.23); and veterinarians as the primary source of worm control advice (RH 0.58).

A major outcome of the study has been to identify that the farmer's management of worm control in the sheep flock has an important influence on whether or not the farm develops anthelmintic (ivermectin) resistance.

Acknowledgements

This thesis has seen the coalescence of two interests of mine: my long-standing, active veterinary interest in matters ovine and of anthelmintic resistance, and the other, latent interest in matters statistical and epidemiological. To bring these interests together was the result of the desire of my wife, Elizabeth, to return to Western Australia to raise our family, from Victoria where I had been pursuing the former interest for many years. To have enabled the coalescence of these two interests of mine I am indebted to her drive.

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on WA sheep farms and to, perhaps (as he himself would say), extract some information that would further our understanding of this emerging disease. I only spent one week in Palmerston North in Nigel's company and briefly met the crew at the EpiCentre during the conduct of this study, but through the wonders of the internet have kept in sufficient contact to see this thesis to completion and for the three of us to collaborate on the two conference presentations and (hopefully) two refereed papers that have resulted.

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This study was granted Human Ethics Approval by the Ethics Committee of Murdoch University, Permit Number 2001/190.

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