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Risk factors for bovine tuberculosis in New Zealand cattle farms and their relationship with possum control strategies

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Abstract

This paper reports the investigation of farm-level risk factors for confirmed bovine tuberculosis (TB), based on a retrospective cohort study of a population of cattle in the lower North Island of New Zealand. Data were obtained from the TB testing surveillance programme operational in this area since the mid-1970s and comprised 190,665 cattle-years at risk from July 1980 to June 2004 (inclusive). A mixed-effects Poisson regression model was used to investigate the influence of farm-level covariates on the number of cattle confirmed with TB throughout the study period. This model was interpreted in context of depopulation strategies for the wildlife reservoir for TB, the brushtail possum *Trichosurus vulpecula*, that were applied in this area. The model showed that, despite intensification of possum control strategies over time, proximity to forest parks (a principal possum habitat in this area) remained a significant predictor of the number of confirmed cases of TB detected per farm per year. Our analyses showed a significant, three-fold increase in TB risk in dairy cattle relative to beef conditional on the size of local possum habitat, and confirmed the positive influence of cattle population size and the presence of previous infection status as a determinant of the number of confirmed TB cases per farm per year.

Keywords

Mycobacterium bovis; Cattle farm; Brushtail possum; Epidemiology

Figures and tables from this article:

Fig. 1. Map showing the location and features of the Featherston area, in the lower North Island of New Zealand. Shading represents forested areas. The thick lines represent rivers and creeks. Thin lines represent lake boundaries.

The filled circle shows the location of the township of Featherston.

Figure options

Fig. 2. Tuberculosis in the population of cattle in the Featherston area of New Zealand, July 1980 to June 2004. Surface plots showing the predicted (average) number of confirmed cases of bovine TB as a function of distance from the forest parks (FOREST.KM) and the proportion of forested area per extended farm area (%FOREST) for a typical dairy farm with 100 cattle: (a) July 1980 to June 1986, (b) July 1986 to June 1992, (c) July 1992 to June 1998, and (d) July 1998 to June 2004.

Figure options

Table 1. Tuberculosis in the population of cattle in the Featherston area of New Zealand, July 1980 to June 2004

Farm-level and animal-level incidence rates for TB (and their 95% confidence intervals) stratified by time period and farm production type. IR: incidence rate; CI: confidence interval.

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Table 2. Risk factors for bovine TB in the Featherston area of New Zealand, July 1980 to June 2004

Point estimates and standard errors of the regression coefficients in a mixed-effects Poisson regression model of factors influencing the risk of confirmed cases of TB on cattle farms. R^2 = 0.48. The variance (S.D.) of the random-effects 'Year' and 'Farm' were 0.372 (0.610) and 0.012 (0.110), respectively. *n*: Cattle-years at risk; SE: standard error; RR: risk ratio; CI: confidence interval; *P*: Wald's *P*-value; Ref.: reference category.

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