Risk factors for recurrent TB infection in New Zealand: an investigation using time dependent covariates in a Cox proportional hazards regression model
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Recurrence of infection with bovine tuberculosis (TB) in cattle and deer herds that have previously tested to a clear status is a problem that has recently become more apparent in New Zealand. Uncontrolled movements from these herds pose a risk to the TB eradication strategy. A retrospective cohort study was conducted to identify herd-level risk factors for TB recurrence. Data were collected from 356 New Zealand cattle and deer herds that met the following criteria: (1) a culture positive case of TB had been identified on or after 1 June 2006 (the ‘first’ TB episode); (2) the herd status had been cleared by testing that was completed by 1 November 2010; and (3) the clear status was not achieved by destocking. A Cox proportional hazards model was developed to quantify factors influencing the outcome. There was a positive relationship between (1) the monthly hazard of recurrence and the number of TB episodes in a herd prior to the first episode (HR 3.2 for two prior episodes, 95% CI 1.2-8.5; HR 86.7 for five prior episodes, 95% CI 13.3-564.9); and (2) the presence of more than one lesioned animal at the first TB episode (HR 2.3: 95% CI 1.2-4.3). The time dependent covariate showed that the monthly hazard of recurrence during the first 2 years after clearance was significantly increased in herds with one or more reactors at the final test (HR 2.8: 95% CI 1.2-6.4), but this effect was not observed more than 2 years after clearance (HR 1.5: 95% CI 0.6-3.6). We conclude that the presence of unresolved infection in a herd is a contributor to further TB breakdowns in the first two years after clearance. The Animal Health Board is reviewing policies to increase the sensitivity of detecting residual infection before clearance and to intensify post clearance testing and movement tracking in herds with risk factors.