

**Bayesian latent class analysis to estimate sensitivity and specificity of faecal culture and Paralisa to detect *Mycobacterium avium* subsp. *paratuberculosis* infection in young deer**

Stringer, L.A.<sup>1</sup>, Jones, G.<sup>1</sup>, Jewell, C.P.<sup>2</sup>, Noble, A.D.<sup>3</sup>, Heuer, C.<sup>1</sup>, Wilson, P.R.<sup>1</sup> and Johnson, W.O.<sup>4</sup>,  
<sup>1</sup>Massey University, New Zealand, <sup>2</sup>University of Warwick, United Kingdom, <sup>3</sup>NZ Institute for Plant & Food Research, New Zealand, <sup>4</sup>University of California, Irvine, USA; [lesleystringer@hotmail.com](mailto:lesleystringer@hotmail.com)

This study aimed to estimate the sensitivity and specificity of individual faecal culture (IFC) and an IgG1 serum enzyme-linked immunosorbent assay, the Paralisa™, to identify young (12-24 month old) deer subclinically infected with *Mycobacterium avium* subsp. *paratuberculosis*. The test purpose was 'freedom from infection' sampling for use in a herd classification programme. Individual faecal and serum samples were collected from 20 individual yearling deer from each of 20 herds in the South Island and 18 herds in the North Island of New Zealand, and the candidate tests were applied. The differing infection prevalence between the two islands enabled a two-test two-population Bayesian latent class model to be developed. A zero-inflated random effect logistic model was incorporated to allow zero-infection herd status, as well as capturing variation in within-herd prevalence. Modelling was carried out in WinBUGS, using informative priors sourced from published literature and expert opinion. The estimate of IFC sensitivity was 77% (95% CI: 61-92%) with specificity 99% (95% CI: 98-99.7%), while the Paralisa™ sensitivity estimate was 19% (95% CI: 10-30%), with specificity 94% (95% CI: 93-96%). Estimates were robust to variation of priors and assumptions tested in a sensitivity analysis.