AIRBORNE DISPERSION OF LEPTOSPIROSIS IN A MEAT PROCESSING PLANT

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Introduction: Leptospirosis is the most common occupational zoonosis in New Zealand, with the highest incidence observed in meat processing workers and farm workers. New Zealand has a high incidence of human infection relative to other temperate developed countries, and the organism is widespread in livestock. Serological testing has confirmed infection in livestock presenting to abattoirs and in meat workers. The objective of this study was to determine whether leptospires were present in bioaerosols within the abattoir.

Methods: Ambient air samples (n=18) were collected in an abattoir from ovine and bovine processing areas, using a SASS 3100 high volume sampler located adjacent to workers performing exsanguination (halal sticking), pelt removal, evisceration, a splitting saw (bovine only) and boning or meat cutting. Nucleic acid (DNA) in the bioaerosol samples was amplified using multiple displacement amplification (MDA) for metagenomic analysis, but the material was also tested for specific pathogenic species including L. interrogans sv Pomona and L. borreliensis sv Hardjoovis by quantitative PCR. The original (unamplified) DNA samples were also tested.

Result: Leptospires were detected in 11 of the (MDA) samples from both ovine and bovine processing areas at the splitting saw, evisceration, exsanguination and pelt removal. There was no evidence of leptospires in samples taken in the boning or meat cutting areas, or in the five blanks taken. Two of the original DNA samples, both from the ovine pelt removal area, also tested positive for leptospires.

Discussion: This is the first study to show that leptospires can be detected in a bioaerosol within an abattoir, suggesting a possible route of transmission to meat workers. The organism was detected at locations adjacent to slaughter, pelt removal and evisceration, with the strongest evidence near ovine pelt removal. This distribution directly mirrors the pattern of risk shown in serological testing of meat workers.