

Epidemiological and economic impacts of hydatid disease in the Australian beef industry

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Hydatid disease is a zoonotic disease caused by the canid intestinal tapeworm *Echinococcus granulosus*. *Hydatid disease* manifests as fluid-filled (hydatid) cysts that develop in the internal organs, mainly the liver and lungs of the intermediate host. Hydatid cysts are commonly identified during post-mortem examination of cattle and result in the organs being either downgraded to pet food or condemned for rendering. The aim of this project was to determine epidemiological and economic impacts of this disease on the Australian beef industry. In doing so, the diagnostic accuracy of routine meat inspection for hepatic hydatid disease was estimated and the burden of hydatid disease in individual cattle was investigated. Apparent and true prevalences of hydatid disease in beef cattle were estimated and risk factors associated with infection investigated. Direct economic losses associated with infection were estimated and the knowledge, attitudes and practices of Australian beef producer explored using an online survey. This paper reports the key findings from several papers published from this project.

Routine post-mortem meat inspection for hepatic hydatid disease had a low sensitivity (24.9%) indicating that prevalence reported by the abattoir was an underestimate. However, a high specificity (98.9%) indicated that truly uninfected livers were generally correctly reported. A higher sensitivity was reported when the burden of disease (number and size of cysts) was higher in individual cattle (Wilson *et al.*, 2019b). The burden of hydatid disease in individually infected cattle had remained unchanged since previous studies. Cattle typically had few and small cysts, but the number and size of cysts increased with age of the animal (Wilson *et al.*, 2019a).

A retrospective study using data collected between 2010 and 2018 on 1,178,329 cattle slaughtered at an eastern Australian abattoir was conducted. Apparent prevalence of hydatid disease using the abattoir data was 8.8% (95% confidence interval [CI] 8.8–8.9%). However, when adjusted for the low sensitivity, true prevalence, was estimated to be 33.0% (95% CI 24.4–44.4%). The identification of infected cattle in almost all sampled regions demonstrated that the geographic distribution of hydatid-infected cattle is wider than previously recognised. Multilevel regression showed that the odds of hydatid disease were highest in eight-tooth cattle (> 42 months) and grass-fed cattle (Wilson *et al.*, 2019a; Wilson *et al.*, 2019c).

The median estimated direct loss to the abattoir between 2011 and 2017 was AU\$655,560 (95% CI AU\$544,366–787,235). This equated to approximately AU\$6.70 (95% CI AU\$5.56–8.05) lost per infected animal. Although likely underestimated, these losses indicate that hydatid disease has a substantial economic impact on the beef industry in eastern Australia (Wilson *et al.*, 2020a).

The online survey demonstrated that knowledge of hydatid disease among beef producers, and their attitudes towards the disease are associated with practices that could influence transmission of *E. granulosus* (Wilson *et al.*, 2020b).

This project has demonstrated that the accuracy of routine meat inspection data should be carefully considered when using abattoir data, and ideally, validated prior to use in epidemiological studies. To determine the economic impact on the Australian beef industry as a whole, further studies to estimate the prevalence and economic losses, including indirect losses, in other beef abattoirs are required. Implementation of practical and cost-effective control programs that could decrease the prevalence, and therefore, the economic impact, of hydatid disease in Australian cattle are required. Improving knowledge and awareness of hydatid disease among beef producers via veterinarians, factsheets and feedback from abattoirs is warranted and would be well received by Australian beef producers. Implementation of control measures would reduce the human health risk of the disease and potentially reduce transmission of the disease to livestock and wildlife.

References

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