

# Feral pig hunting: a risk factor for human brucellosis in north-west NSW?

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**Abstract:** A multi-agency investigation followed the notification of four locally acquired human brucellosis cases in north-west NSW. Feral pig hunting within a geographically discrete region was identified as the likely exposure with *Brucella suis* the suspected cause. To test whether feral pigs in the region were infected with *Brucella*, serological testing was performed on trapped feral pigs and testicular abscesses from condemned carcasses bound for export were cultured. Although no *Brucella* species were identified in the feral pigs tested in NSW, *Leptospira* species were. Strengthening of human surveillance and ongoing collaboration between animal and human health agencies is required to confirm that *Brucella suis* causes brucellosis in humans and feral pigs in north-west NSW.

Feral pigs are known reservoirs for brucellosis in Queensland and overseas.<sup>1-3</sup> In 1990, Hone estimated that there could be 13.5 million feral pigs (with 95% confidence intervals of 3.5–23.5 million) inhabiting about 38% of Australia.<sup>4</sup> There is increasing human contact with feral pigs in Australia, as meat from hunted feral pigs is exported to Europe for human consumption.<sup>5</sup>

Of the species of *Brucella* bacteria that commonly cause human disease only *B. suis* is locally acquired in Australia, with feral pigs being the confirmed reservoir in Queensland but not NSW. *B. melitensis* does not occur in Australia and the country was declared free from *B. abortus* in 1989

following the National Brucellosis and Tuberculosis Eradication Campaign.<sup>6</sup>

Although rare in Australia, brucellosis is the most common zoonosis worldwide and is an illness that can be acquired through travel.<sup>7,8</sup> Unfortunately, serological tests by which most human diagnoses are made cannot distinguish between *Brucella* species and therefore it is difficult to determine the relative contribution of locally acquired *B. suis* and overseas acquired species.

This article reports the findings of the human and animal health investigation that followed the notification of four human brucellosis cases and which aimed to identify *B. suis* in feral pigs in rural north-west NSW.

## Public health investigation and findings

Between December 2006 and September 2009, four men who met the clinical and laboratory case definition for brucellosis were notified to Hunter New England Population Health. All described regular recreational or occupational feral pig hunting prior to the onset of their symptoms. They reported hunting close to Moree, which is located approximately 120 km from the Queensland border, with one also hunting around the Queensland border. All described butchering carcasses without using personal protective equipment. None of their hunting companions reported similar illness and none reported overseas travel or consumption of unpasteurised dairy products from countries in which *Brucella* is endemic in the 3 months prior to the onset of their illness.

All cases were diagnosed by serology which was conducted using the standard agglutination test (SAT). Only one case had blood cultured, more than 5 months after the onset of his illness, and *Brucella* was not detected. Therefore, the *Brucella* species causing the case's illness was not confirmed. All cases were symptomatic at presentation and their symptoms included fever, sweats, abdominal pain, vomiting and loin and back pain. They were treated with doxycycline and rifampicin for the recommended period and recovered. Table 1 summarises the demographic, clinical, laboratory and hunting location details of the four cases.

## Animal health investigation and findings

Blood sampling of trapped feral pigs in the region where human cases had occurred was arranged through the

Table 1. Characteristics of four men from NSW diagnosed with brucellosis between 2006 and 2009

Case no.	Age (years)	Year of diagnosis	SAT titre on diagnosis <sup>A</sup>	Blood culture	Time from symptom onset to diagnosis (weeks)	Hunting area
1	64	2009	1280	Not performed	7	Moree area
2	29	2008	320	Not performed	3	Moree to Queensland border
3	41	2008	320	<i>Brucella</i> not detected	26	Moree area
4	31	2006	1280	Not performed	5	Moree area

<sup>A</sup>A four-fold rise in titre in paired sera indicates brucellosis, whereas a single titre equal to or greater than 160 suggests active infection or repeated exposure to *Brucella* species.

NSW Department of Industry and Investment (I & I NSW) with the cooperation of the North West Livestock Health and Pest Authority. Samples from over 200 pigs on 31 separate trapping occasions from different locations were submitted for serology. None of these samples were positive for *Brucella* serology, whereas 20 were positive for *Leptospira*, 17 for *Leptospira interrogans* serovar pomona and three for *Leptospira borgpetersenii* serovar tarassovi; both these serovars are pathogenic to humans.

In a separate investigation, Australian Quarantine Inspection Service (AQIS) officers arranged for the culture of testicular abscesses that had resulted in feral pig carcasses bound for export being condemned. Testicular abscesses in the absence of injury are a good indicator of brucellosis in feral pigs. While several testicular samples sourced from feral pigs from southern Queensland identified *B. suis*, those sourced from northern NSW did not. However, it is not unusual for old abscesses caused by brucellosis to have no viable bacteria.

## Discussion

Human brucellosis and leptospirosis are notifiable by pathology laboratories under the NSW *Public Health Act 1991*. Human brucellosis surveillance needs to differentiate local from overseas acquired cases, as local acquisition has implications for Australia's animal health.<sup>9</sup> If locally acquired *B. abortus* or *B. melitensis* were detected, this would affect Australia's brucellosis-free status. If locally acquired *B. suis* is identified, I & I NSW should be notified so that the source, presumably feral pigs, can be investigated and targeted for eradication, reducing the risk to humans.

Animal surveillance for *B. abortus* is ongoing and is reported in Animal Health Australia's National Animal Health Information System. Despite extensive testing, *B. abortus* has not been detected in recent years.<sup>10</sup>

While *B. suis* was not identified in the four men or the feral pigs tested in NSW, pigs are able to cross the border from

Queensland where the disease is known to occur and could have been the source of infection. The presence of potentially zoonotic *Leptospira* infection in feral pigs from north-west NSW was confirmed by this investigation. Therefore, this collaboration between human and animal health agencies allowed for an improved understanding of the epizootology of local feral pigs and the potential risk to humans, and identified a novel surveillance mechanism (sampling condemned export carcasses) for monitoring the health of feral pigs in a defined catchment area.

## Conclusion

Although human brucellosis and leptospirosis are rare, feral pig hunting is likely to be a risk factor for locally acquired disease in north-west NSW. We propose that the surveillance of human brucellosis be strengthened by: investigating and reporting for cases, the likely place of disease acquisition (Australian state/s or overseas) and participation in feral pig hunting activities (for locally acquired cases); and by encouraging speciation of *Brucella* through blood culture. In addition, an ongoing collaboration with animal health colleagues is required to confirm *B. suis* infection in NSW feral pigs and subsequent transmission to feral pig hunters.

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