Cysticercus bovis infection in fattened cattle from several farms in the same locality in England

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Reports of significant levels of Cysticercus bovis infection in fattened cattle from several farms in the same locality prompted an investigation into potential sources of the parasite.

Cysticercus bovis is the intermediate (larval) stage of Taenia saginata, the human beef tapeworm. Cattle become infected with bovine cysticercosis by ingesting materials contaminated with tapeworm eggs originating from human faeces. Humans, the definitive host, become infected via consumption of raw or undercooked beef. In people, the adult tapeworm ranges from 5m to 15m in length and whilst infection may occasionally be associated with diarrhoea or abdominal pain, it is usually asymptomatic and is mainly objectionable on aesthetic grounds. The lifecycle of bovine cysticercosis is shown in Fig. 1.

PUBLIC HEALTH MEASURES

Bovine cysticercosis is of economic significance to the beef industry due to the costs of meat inspection and public health control. Infected carcases may be condemned or downgraded, or must be subjected to cold storage at temperatures not exceeding -7°C for up to three weeks to ensure the metacestode stage of the parasite is killed, rendering the carcase safe for human consumption.

THE OUTBREAK

In August 2013, a private veterinary surgeon consulted APHA for assistance in the investigation of high levels of C. bovis infection in batches of cattle submitted for slaughter from a single beef producer client. The abattoir reported that between 70-80% of animals were infected. In November following this outbreak, APHA was made aware of a further four farms in the locality where significant levels of C. bovis infection in fattened cattle were also reported by the same abattoir. The level of infections in some farms was again extremely high; in one batch of 20 animals, 14 were shown to have heavy infections. This resulted in significant disruption and economic loss to both the slaughterhouse, in the requirement to cold store the carcases, and also to the farmer whose end carcase price was much reduced (60% of the anticipated finished price), well below the initial outlay required to purchase store cattle.

EPIDEMIOLOGICAL INVESTIGATIONS

Epidemiological investigations considered many potential sources of infection, including livestock source, feed, bedding, recent flooding in the area and staff sanitary conditions of the affected farms.

One line of enquiry focused on oilseed rape straw which had been harvested from land to which human sewage had been applied two years earlier, but this practice had not been replicated on the other four farms.

COMMON LINK IDENTIFIED

A second line of enquiry revealed that the first farm had sourced feed potatoes from a local merchant. The potatoes were part of a batch imported from continental Europe originally destined for the human food processing chain, but they had been rejected by the food manufacturer reportedly after unknown persons had been found in the transport trailer.

Although the definitive source of contamination with human faeces was not identified, the investigation identified that a common link between all five farms was the feeding of potatoes from the same potato merchant.

CONTROL MEASURES

Advice was given on reducing the ongoing exposure of cattle to potential sources of infection, with particular recommendations based on eliminating environmentally persistent eggs in feed passageways and shared feeder equipment between farms.

CONCLUSION

This incident highlights the importance of animal feed security in the protection of public health, and the value of cross-department cooperation in identifying and controlling such outbreaks of zoonotic disease.

ACKNOWLEDGEMENTS

This investigation was funded by Defra under project FZ2100 (Zoonoses and Veterinary Public Health). The cooperation of the farmers and abattoir with the investigation is very much appreciated.

Fig 1: Lifecycle of bovine cysticercosis

Fig 4: Contaminated potatoes and feeder equipment were identified as a possible source of the outbreak

Fig 2: Beef cattle

The cattle reared by the five farms were typically batch reared store cattle purchased from different sources and reared indoors over a four month period. Occasional cattle were homebred.

Fig 3: Cysticerci in muscle tissue

Fig 2: Beef cattle

Cysticerci in Muscle tissue

Cysticerci are ingested with raw or undercooked beef

Adults grow to ~10 in in length

Proglottids pass in faeces

Gravid proglottid

Cysticerci are released from muscle in stomach

Worms mature and become small intestines

Scource contains four suckers

Bovine cysticercosis

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Fig 1: Lifecycle of bovine cysticercosis reproduced courtesy of ‘This Week in Parasitism’ drawn by © Dickson Despommier