

Beef Measles and Beef Quality

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Bovine measles, or cysticercosis, is a parasitic infestation of cattle caused by *Taenia saginata*. This parasitic infection of cattle leads to the condemnation of carcasses from the food chain and the loss of millions of dollars each year to the cattle producer.

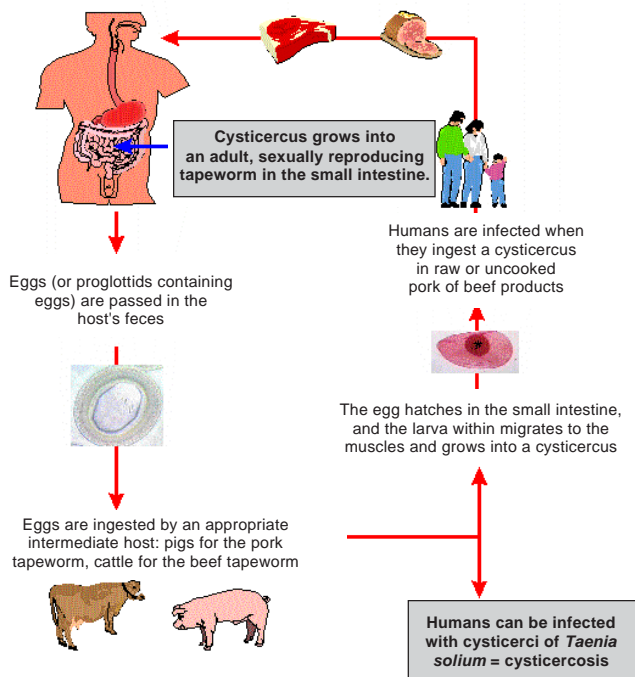
The life cycle of *Taenia saginata* starts with an infected human depositing an egg sac called a proglottid on the ground or onto the feed (Fig. 1). A proglottid is a segment of a tapeworm containing both male and female reproductive organs. Each proglottid can con-

tain up to 100,000 infective eggs, and an infected human can shed between six to eight proglottides a day.

When these eggs find their way into cattle feed and are ingested by cattle, they migrate as larvae to various areas within the animal. Muscles of the cheek, heart, shoulder, tongue, and the diaphragm are common places for the larvae to form infective cysts (Fig. 2).

When these animals pass through the inspection process at the slaughter plant, inspectors can see these cysts, and the carcass is side railed. Freezing infected carcasses for 2 to 3 weeks is the standard mechanism to kill the cysts.

If the meat somehow gets through the inspection process and is improperly prepared, the cyst, assuming it is still viable, infects the human, and a mature tapeworm develops in the person's intestines. The cycle is now complete. The human is the starting and finishing



(Parasites and Parasitological Resources)

Fig. 1. Life cycle of *Taenia saginata*.

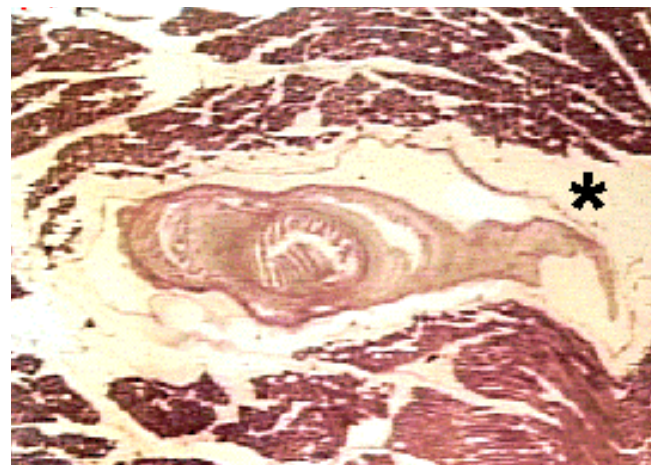


Fig. 2. Infected beef or pork shows cysts such as these.

point for the cycle with the ruminant being the intermediate host.

The infection rate in the United States is low, with about 56 people being infected out of 100,000. However, in third world countries the infection rate can go as high as 45 percent.

The Food Safety Inspection Service has estimated the infection rate in cattle to be about .02 head per thousand animals. Annual worldwide losses from beef measles are estimated to range from \$17 million to \$2 billion a year. It is reported that only 38.3 percent of infected slaughter cattle were detected during the basic inspection process and that 56.7 percent of the inspected animals were found not to have any cysts at the established sites of infection.

Testing

Testing for beef measles is multifaceted. Testing and screening at slaughter is still based on visualizing the cysts in the most common portions of the anatomy. Live cysts are needed to accurately identify the exact organism. This has led to current practice that if one cyst is found then the carcass is side-railed.

Other assays and testing procedures are being evaluated to enhance these diagnoses of beef measles before and after slaughter. DNA probes and serum antibody levels seem to be the most likely alternatives to testing.

Risk Factors

- Allowing cattle to drink from streams carrying effluent from sewage plants.
- Feeding cattle on pastures treated with sewage sludge.
- Direct contamination of feed stuffs by fecal contamination from infected employees.
- Birds could play a role in spreading measles.
- Fly populations can play a role in the spread of Taenia eggs.

Recommendations

- Educate employees and provide proper restroom facilities.
- Control fly and bird populations.
- Know the source of animals.
- Obtain slaughter data.
- Know source of feedstuffs.
- Use treated water sources for animals.
- Avoid use of effluent water.

Bovine beef measles is a beef quality issue. The fact that cysticercosis infects beef cattle to a higher degree in the Pacific Northwest directly impacts food safety. Once a break of beef measles begins in a feedlot, it is often months before it can be terminated. The best avenue to the control of cysticercosis is prevention through heightened awareness, an HACCP orientation, and developing a pathogen reduction system in by-products used for cattle feeding programs.



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