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Johne's Disease: where do we go from here?

Abstract

Johne's disease was characterized as a significant disease in cattle before the start of the 20th century. The disease causes a chronic wasting away and non-responsive diarrhea, coupled with a long incubation period and difficulty in diagnosis until late in the course of disease. As a result, it has become a costly aggravation to dairy producers over the years. Of even greater concern, however, is the more recent incrimination of the causative agent, *Mycobacterium avium* subspecies *pseudotuberculosis* (MAP), as a possible cause of Crohn's disease in humans. Because MAP is present in milk of cows with advanced Johne's disease, and occasionally survives pasteurization, the dairy industry must work proactively to control this disease and reduce the potential for any associated human health risks.; Dairy Day, 2004, Kansas State University, Manhattan, KS, 2004;

Keywords

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JOHNE'S DISEASE: WHERE DO WE GO FROM HERE?

L. C. Hollis

Summary

Johne's disease was characterized as a significant disease in cattle before the start of the 20th century. The disease causes a chronic wasting away and non-responsive diarrhea, coupled with a long incubation period and difficulty in diagnosis until late in the course of disease. As a result, it has become a costly aggravation to dairy producers over the years. Of even greater concern, however, is the more recent incrimination of the causative agent, *Mycobacterium avium* subspecies *pseudotuberculosis* (MAP), as a possible cause of Crohn's disease in humans. Because MAP is present in milk of cows with advanced Johne's disease, and occasionally survives pasteurization, the dairy industry must work proactively to control this disease and reduce the potential for any associated human health risks.

(Key Words: Johne's Disease, Crohn's Disease.)

History

Johne's disease has been a recognized problem in cattle since at least the 19th century. German veterinarians Johne and Frothingham characterized the disease in 1985 and, since that time, our knowledge of its causative agent, pathogenesis, and epidemiology have expanded gradually. According to the 2002 National Animal Health Monitoring Survey for Dairy (<http://www.aphis.usda.gov/vs/ceah/cnahs.htm>), only 1% of dairy producers had not heard of Johne's disease, 11.4% recognized the name only, 42.3% knew some basics, and 45.3% were fairly knowledgeable about the disease.

Symptoms and Etiology

Johne's disease causes chronic infection of the lower small intestine of ruminants, including dairy and beef cattle; sheep and goats; farm-raised deer, elk and bison; llamas; and wild ruminants (<http://www.johnes.org>). It is caused by a bacterium, *Mycobacterium avium* subspecies *paratuberculosis* (MAP). The disease spreads through manure-contaminated feed, water, or teats; in milk and colostrum of infected cows; and, occasionally, from mother to calf *in utero*. The organism usually infects young animals, but symptoms normally do not manifest themselves until adulthood. The bacterium grows slowly in the small intestine, causing walls to thicken so nutrients cannot be absorbed. Symptoms include weight loss while maintaining appetite; diarrhea; reduced milk production and fertility; and increased susceptibility to stress, parasites, and concurrent disease.

Based on the results of the 1996 National Animal Health Monitoring Survey for Dairy, it was estimated that 3 to 4% of all dairy cattle are infected with MAP, and that 22% of all herds contain at least 1 MAP-infected animal.

Economic losses from Johne's disease are obviously associated with lost milk production (estimated to range from 2 to 19%), but also result from more insidious problems that are more difficult to measure, such as poor reproductive performance, premature culling, increased susceptibility to concurrent disease, and increased replacement animal costs. National losses are estimated to range from \$200 to 250 million per year (<http://www.johnes.org>).

It is known that MAP passes from infected lactating cows into raw milk. It was previously thought that pasteurization completely destroyed MAP. Recent studies, however, have shown that MAP occasionally survives pasteurization temperatures. The live organism was detected in 2.8% of pasteurized milk cartons purchased from stores in California, Minnesota, and Wisconsin.

Because of the similarity in the nature of lesions and symptoms of the two diseases, there has been speculation that MAP is a cause of a human malady known as Crohn's disease. It, too, is characterized by a long incubation period, with disease rarely appearing before puberty, and by wasting away, chronic diarrhea, granulomatous changes in the lower small intestine, and resistance to treatment. Recent diagnostic efforts using polymerase chain reaction (PCR) technology have de-

tected intact DNA of MAP in a small number of patients having Crohn's disease.

The Next Step

Because of the possibility that MAP may some day be confirmed as the causative agent of Crohn's disease, it would benefit the dairy industry to take a very proactive position and move immediately to initially control, and eventually eradicate, Johne's disease in the nation's cow herds. The Kansas Animal Health Department is currently working with USDA-APHIS in a voluntary program to test Kansas dairy and beef herds in an attempt to identify and eliminate Johne's positive animals from Kansas herds and incorporate best-management practices that are known to reduce the potential for introduction of MAP into a herd or transmission of MAP within a herd.