

Questions and Answers: Johne's Disease in Cattle

Q. What is Johne's disease, and what animals can get it?

A. Johne's (pronounced "Yo-nees") disease is an infectious bacterial disease of livestock that primarily affects the intestinal tract. Johne's disease should be considered a herd problem as well as an individual animal problem.

Cattle, sheep, and goats are most commonly affected. The disease has been reported in several species of wild ruminants, both captive and free ranging. In addition, a few reports of isolated cases in non-ruminants (including nonhuman primates) have been reported, but none of the affected species are believed to be sources for Johne's disease in cattle. Some studies have cultured the microbe from, or detected its genetic components in, humans. However, the significance of these findings as they relate to any human disease has yet to be determined.

Q. What causes Johne's disease?

A. Johne's disease is caused by the bacterium *Mycobacterium avium* subspecies *paratuberculosis* and is often referred to by the acronym MAP. MAP is a distant relative of *Mycobacterium bovis* which causes tuberculosis (TB) in humans and animals, but MAP does not cause TB.

MAP bacteria grow and multiply inside the cells of an animal's immune system and are excreted in the feces, and to a lesser extent in milk and saliva. When the microbe is excreted, it can contaminate soil or water. Outside the host animal, the organism multiplies poorly—if at all—but it can survive more than a year in the environment because of its resistance to heat, cold, and drying. The primary cause of the spread of Johne's disease is contact with the feces or saliva of an infected animal.

Q. What are the signs of Johne's disease?

A. Because of the slow, progressive nature of the infection, the signs of Johne's disease may not show up until years after initial infection. When they finally occur, the signs are long-lasting diarrhea and weight loss despite good appetite. Affected cattle do not generally have a fever. Some infected animals appear malnourished and weak; others just have chronic diarrhea. Signs of Johne's can easily be confused with

those of several other diseases. In an infected cow or heifer, noticeable signs commonly start within a few weeks after a stressful event, like calving.

Q. What causes the signs of disease?

A. The bacteria are taken up by specialized cells in the part of the small intestine called the ileum, where nutrients are absorbed from feed. As the body tries to rid itself of these bacteria, the immune response causes a thickening of the intestinal lining, preventing it from functioning normally. This leads to poor absorption of nutrients and eventual diarrhea. As a result, although animals may be feeling and eating well, they begin to lose weight gradually.

Q. Is Johne's disease fatal?

A. Yes, once clinical signs of the disease appear, the animal will not recover and will continue to deteriorate until it dies.

Q. Is there a cure for Johne's disease?

A. No, a cure has not yet been found.

Q. How can I tell if my herd is infected?

A. Some animals may be infected, appear normal, and be culled before they show any clinical signs. In such cases, herd owners may never realize that their herd is infected.

Beyond disease signs like diarrhea and weight loss, producers should pay close attention if herd production is going down or it is not as high as it should be, especially in 3- to 6-year-old cows. In attempting to find the cause of low-herd production, owners should test several ill-appearing animals for Johne's disease.

In other herds, owners who see one or more cows with diarrhea or weight loss should consider Johne's disease as a possible cause. Environmental samples from cattle congregating areas can also be cultured to determine if MAP, the bacteria that causes Johne's, is present on the premises.

Q. How can some cattle be infected with MAP, yet not show signs?

A. Infectious diseases, including Johne's disease, typically pass through four stages. Stage I is initial infection. The animal is infected but not showing signs of disease. It may be shedding small numbers of microbes into the environment that are not detectable by diagnostic tests.

In Stage II, the infection is progressing and the animal still does not show any clinical signs. Nevertheless, the disease-causing organism may be excreted in large numbers—enough to infect other animals nearby. Infection is detectable by fecal culture or DNA probe techniques but not often by blood tests.

In Stage III, a sick animal shows the early signs of disease, and many types of diagnostic tests can detect infection. Animals in Stage IV show obvious clinical disease signs, readily recognizable by the trained observer and detectable by diagnostic tests. It may take 2 or more years for Johne's disease to progress through all of these stages in an individual animal.

A single herd affected by Johne's disease may have animals in each of the four stages of disease. For each animal showing obvious signs of Johne's disease (Stage IV), 5 to 15 times as many animals at various stages of infection may be present but not showing signs.

Q. What are common sources of MAP bacteria?

A. The most common source is feces, or manure. Ingestion of food tainted by manure containing the microbe is the most common way animals become infected. Depending on conditions, the MAP organism can remain alive in the environment for over a year while protected in fresh manure.

MAP typically enters a herd via an infected but healthy-looking animal in Stage I of the disease. As the disease progresses in that animal, the frequency and number of bacteria being excreted into the environment increase. Every day, billions of Johne's microbes may be excreted from an animal in Stage III or IV of the disease.

Another source of infection is milk from infected dams. The likelihood of MAP being excreted in milk from infected females increases as the disease progresses. Studies suggest that 36 percent of cows with Johne's in Stage III and IV could have MAP in their colostrum. In beef herds, where calves remain with their mothers and nurse daily, the chance for transmission of the infection through colostrum and milk is high. MAP bacteria may be excreted directly through the mother's milk, and they can be present on the outside of teats from feces contamination.

Prenatal exposure may be a source of infection for calves. Becoming infected before birth is possible for a fetus if its mother is in the late stages of Johne's disease. Studies have shown that, in dams with Stage III or IV of the disease, 8 to 40 percent of fetuses are infected while still in the womb. The risk of infection for fetuses from mothers in Stages I and II of the disease is, however, low.

Pond water and pastures contaminated with infected feces are other potential sources of infection.

Q. Can humans get Johne's disease?

A. The organism that causes Johne's disease is not currently known to cause disease in humans, but it has been detected in humans with Crohn's disease, as have numerous other bacteria and viruses. The symptoms of Crohn's disease in humans are similar to the signs of Johne's disease in ruminants. However, no definitive evidence is available proving MAP causes Crohn's disease. A few publications have shown MAP to be an opportunistic pathogen in people with compromised immune systems.

Research from the U.S. Department of Agriculture's (USDA) Agricultural Research Service indicates that commercial pasteurization inactivates MAP bacteria in milk. However, some researchers still have concerns about MAP in undercooked meat, unpasteurized milk products, and water as potential sources of exposure. While MAP remains largely an animal health issue, the risk of human exposure through contaminated food sources creates a quality assurance concern in milk and meat products.

Q. Where can I obtain more information on Johne's disease?

A. For more information on Johne's disease, contact:
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