

## Some Questions and Answers about Johne's Disease in Cattle

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### What is Johne's disease and what animals get Johne's disease?

Johne's (pronounced "Yo-nees") disease is an infectious bacterial disease primarily affecting the intestinal tract. Johne's disease should be considered a herd problem besides an individual animal problem.

Animals most commonly affected are cattle, sheep and goats. Johne's 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 occurred, but none of these species are believed to be sources for Johne's disease in cattle. Some recent reports claimed to have cultured the microbe from or detected its genetic components in humans. However, the significance of these findings in humans as they relate to any human disease has yet to be determined.

### What causes Johne's disease?

Johne's disease is caused by a bacterium named *Mycobacterium avium subspecies paratuberculosis*. It is a distant relative of the bacterium *Mycobacterium bovis* that causes tuberculosis (TB) in humans and animals, but does not cause TB.

The bacteria grow and multiply inside the immune cells of an animal. When the microbe is excreted in the feces, it can contaminate the soil or water. Outside the animal, the organism does not multiply, but it can survive over a year in the environment because of its resistance to heat, cold and drying. So, the primary source of infection is directly from infected animals.

### What are the signs of disease?

*It must be emphasized that, because of the slowly progressive nature of the infection, signs of Johne's disease may not be seen*

*until years after initial infection. Cattle may be infected for years before they show any signs of disease. When they finally do occur, the signs of Johne's disease are long-lasting diarrhea and weight loss despite a good appetite. Affected cattle do not generally have a fever. Some infected animals appear unthrifty and often weak while others just have chronic diarrhea. The signs of this disease can easily be confused with several other diseases. In the infected cow or heifer, noticeable signs commonly start within a few weeks after a stressful event like calving.*

### What causes the signs of disease?



Specialized cells in the small intestine called the ileum where nutrients are absorbed from the feed take up the

bacteria. 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.

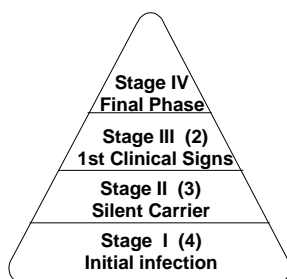
### How can I tell if my herd is infected?

Some animals may be infected, appear normal and be culled before they show any clinical signs. So, some owners may never realize their herd is infected. A hinting complaint in these herds, could be that herd production is going down or is not as high as it should be, especially in three to six-year-old cows. In attempting to find the cause of low herd production, tests for Johne's disease on several poor-doing animals would be advised.

## How do you explain cattle with Johne's disease that do not show signs?

Any infectious disease, including Johne's disease, typically passes through four stages. Stage I is the initial infection: the animal is infected, not showing signs of disease and 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 organism is being excreted in very high numbers, probably enough to infect others nearby or in contact. Infection is detectable by fecal culture techniques but not often by blood tests. In Stage III, the animal is showing the early signs of disease and many diagnostic tests can also detect the infection. Stage IV is the obvious clinical disease and readily recognized by the trained observer and detected by diagnostic tests. One difference between diseases is the time required for a disease to progress through these stages. It may be less than 12 hours as in some forms of calf scours, 1-5 days as in some types of pneumonia, or 2-6+ years as in Johne's disease.

**Figure 1** Stages of Johne's disease progression. For each animal in Stage IV, the hypothetical number of animals in other Stages is shown in parentheses.



In some herds with Johne's disease, animals in all four stages of disease exit. For each animal showing obvious signs of Johne's disease (Stage IV), five to 15 other animals at various stages of infection are not showing signs.

## What are common sources of Johne's disease microbes?

1. *The most common source of infection is feces or manure.* While protected in fresh manure, the organism can remain alive in the environment for over a year, depending on conditions. Ingestion of manure containing the microbe is the most common way animals become infected.

Johne's disease typically enters a herd as an infected, but healthy-looking, animal in Stage I. As the disease progresses in that animal, the frequency and number of bacteria being excreted increase. Every day, billions of Johne's microbes may be excreted from an animal in Stage III or IV of the disease. The infection spreads to herd mates without the owner's knowledge. Eventually the owner may recognize signs of the disease in one or more animals.

2. *Another source of infection is milk from infected dams.* The likelihood of Johne's



bacteria being excreted in milk of infected females increases as the disease progresses. Studies suggest that 36% of Stage III and IV cows could have Johne's microbes 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. These bacteria may be excreted directly through the mother's milk or, it might be present on the outside the teats in contaminated feces.

3. *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 disease. Studies have shown that, in disease Stages III and IV in the dam, 8% to 40% of fetuses were infected from their mothers while still in the womb. Risk for infection of the fetus is low from mothers in disease Stages II and I.

4. *Standing water.* Pond water contaminated with infected feces is another potential source of infection. Other possible, but less likely infection sources, are pastures contaminated with infected feces.

#### **Can humans get Johne's disease?**

This is a very controversial subject. A human illness, Crohn's Disease that in some ways resembles Johne's disease is the subject of much debate. Crohn's disease most commonly affects people 15 to 35 years old and is a chronic intestinal disease that has no established cause or cure.

Regarding an association between Johne's disease in cattle and Crohn's Disease in humans, the evidence to date is not conclusive.

Some researchers have reported finding a high percentage Crohn's patient groups that tested positive for the genetic components (DNA) of *M. avium subs. paratuberculosis* versus a low percentage of positive tests in non-Crohn's patients. Other researchers have found no difference between groups.

Some have cultured *M. avium subs. paratuberculosis* from Crohn's patient specimens while others could not. When inoculated into goats, the microbe isolated from Crohn's patient specimens caused Johne's/Crohn's-like abnormalities in some of those animals.

Further, both DNA and RNA components of *M. avium subs. paratuberculosis* were detected in a child who later developed Crohn's Disease. This was the first reported case of the microbe being found in a person before developing the disease.

Finally, some patients have had their symptoms go into remission for up to four years after being treated with antibiotics. If the treatments result in cures, it could show that some microbe at least partially responsible for the symptoms of Crohn's Disease

Members of the medical community are not in agreement as to the significance of the associations found between the two diseases to date.

So far, no epidemiological studies have been published that examine any connection between contact with animals with Johne's disease and humans who develop Crohn's Disease. No studies have been done to examine any association between beef consumption and Crohn's Disease.

Some of this material has been adapted with the kind permission of M.T. Collins at the Johne's Information Center, at web site <http://www.vetmed.wisc.edu/pbs/johnes/>