

Johne's Disease

in BEEF and DAIRY herds

Charles L. Stoltenow, DVM, Diplomate ACVPM
Extension Veterinarian

Greg P. Lardy, Ph.D.
Extension Beef Specialist

J.W. Schroeder, Ph.D.
Extension Dairy Specialist

Introduction

Johne's (pronounced "yo knees") disease is a chronic wasting disease in ruminants caused by the bacterium *Mycobacterium avium* subspecies *paratuberculosis*. This bacterium is closely related to the bacterium that causes tuberculosis in cattle and humans. Dr. H.A. Johne, a German veterinarian, first described this disease in 1895; his name is used as the common name for this disease, also known as paratuberculosis.

Johne's disease has historically been thought of as a "dairy" disease, but many beef herds also have Johne's disease present. In both dairy and beef cattle, Johne's is a slowly progressive disease that costs the producer through excessive culling, sub-optimal milk production, decreased fertility and death loss. It is also a possible cause for litigation if knowingly infected breeding stock are sold as non-infected animals.

For every clinical case of Johne's in a herd, you can expect another 15 to 25 animals that are infected with the disease, but do not show any clinical signs. The real problem is subclinical (below the surface). This "iceberg" effect of Johne's can wreck your production system, or at least steal your profits.

Johne's is a slowly progressive disease that costs the producer through excessive culling, sub-optimal milk production, decreased fertility and death loss.

NDSU
Extension Service

North Dakota State University
Fargo, North Dakota 58105

JUNE 2001

No medication or dietary change will result in a long term cure for Johne's.

Animals affected with Johne's disease eventually shed the organism in their manure, with the number of organisms increasing over time.

Due to the long incubation period, producers may not realize the herd is infected with Johne's until years later, if ever.

Clinical Signs

Johne's affected cattle usually exhibit clinical signs between two and five years of age, but animals can be much older (10 to 15 years of age) and much younger (as young as 10 months). Both cows and bulls can be affected. The animals appear unthrifty, are often weak and typically do not have a fever. The bacteria attacks the lining of the intestine and causes a thickening of the intestinal wall. This causes two things to occur: 1) nutrients can't be absorbed through the intestinal wall so the animal starts to lose weight and get thin, and 2) since nutrients and fluids can't be absorbed the animal develops diarrhea. The diarrhea is mild at first, then becomes severe.

The disease will not respond to antibiotics. The bacteria live within the cells of the intestine; antibiotics can't reach the bacteria to kill them. No medication or dietary change will result in a long term cure.

Transmission

Johne's disease is usually transmitted when the animal is very young (up to 30 days of age) and probably within the first 24 hours of life while the gut is "open" to absorb colostral antibodies. Young calves ingest the organism from colostrum of infected cows, contaminated milk, sucking and nursing contaminated udders, or suckling or licking on any other contaminated surface. Johne's can also be transmitted in utero (while the calf is still inside the cow).

Specialized cells in the wall of the intestine take up the bacteria. Normally an invading bacterium would be killed, priming the immune system

to strengthen itself against future invasion. However, some of the organisms which cause Johne's disease are able to survive this process. As time passes, more and more specialized cells are recruited to try to kill the bacteria, causing the intestinal wall to thicken.

Animals affected with Johne's disease eventually shed the organism in their manure, with the number of organisms increasing over time. The Johne's organism can live for up to 12 months in soil or manure.

The bacteria can also be found in the semen of infected bulls. In general, artificial insemination is not believed to pose a large risk for the spread of Johne's in a typical production setting. Since most large AI centers routinely test bulls for Johne's disease, use of semen from these centers should not present a risk for introduction of the disease.

Clinical Course

Animals that are infected early in their lives show no evidence of Johne's disease. The time from initial infection to onset of clinical signs (diarrhea and weight loss) is generally two to five years. This is radically different from other diseases in which the time from infection to time of illness is generally less than 14 days.

After this incubation period, infected animals may begin shedding the Johne's bacteria in manure at very low levels. In most cases, the number of bacteria shed increases with increasing age of the animal. At some point, the animal may develop clinical Johne's disease, with diarrhea and weight loss. Due to the long incubation period,

producers may not realize the herd is infected with Johne's until years later, if ever. Before animals reach the point of chronic diarrhea and weight loss, they may have already been culled for other reasons, including mastitis, poor production, or reproductive failure (the "iceberg" effect).

Diagnosis

The most definitive way to diagnose Johne's in an animal is culturing the feces for the bacteria. The Johne's organism is very slow growing. It may take up to 16 weeks of incubation in the laboratory before a final result can be determined. A negative test (no growth of the organism) does not necessarily mean the animal is not infected. Young animals, even if infected with *M. avium paratuberculosis*, often do not shed or shed very low numbers of the organism. Often the animal will not shed detectable numbers of the Johne's organism until a few months before it develops diarrhea.

A blood test called the Enzyme Linked ImmunoSorbant Assay (ELISA) is available. It is inexpensive and results are relatively quick (a few days). Care must be taken in interpreting ELISA results. At this printing on average the test is only 45 percent sensitive and 98 percent specific. This means that even if the ELISA test is positive, the animal must be evaluated in light of other information such as presence or absence of clinical signs and a follow-up fecal culture. Interpretation of any laboratory test result should be discussed with your herd veterinarian. If you use only an ELISA test to check for Johne's disease, you may cull yourself right out of business.

Prevention

The best way to avoid introducing this disease into your herd is to be as certain as possible that animals brought into the herd are not infected. Many states (including North Dakota) have voluntary Johne's control programs. These programs establish the Johne's status of the participating herds. Ask prospective sellers if they participate in a Johne's control or testing program.

Pre-purchase screening of animals may be of some benefit. However, it is important to understand the limitations of the tests. An ELISA test on an individual animal may not detect every infected animal. It would be better if a herd's Johne's disease status were determined by testing at least 30 animals over the age of two. Only buy from those herds in which all 30 animals test negative. Again, involve your veterinarian in any discussion of laboratory results.

Control

If Johne's is present within a herd, control requires a long-term commitment. The most effective method is a combination of identifying infected animals through systematic testing and management changes. This two-pronged attack centers on removing infected animals to decrease the amount of shedding in the herd and protecting the youngest, most susceptible animals. Voluntary Johne's programs in most states are designed to help producers control Johne's and provide a wealth of expertise to help herd managers.

A negative test (no growth of the organism) does not necessarily mean the animal is not infected.

The best way to avoid introducing this disease into your herd is to be as certain as possible that animals brought into the herd are not infected.

The most effective control method is a combination of identifying infected animals through systematic testing and management changes.

Since there is no effective treatment for an animal already infected, the control program must identify infected cows early so they can be removed from the herd.

For more information on the North Dakota Voluntary Johne's Control Program, contact the office of the State Veterinarian.

Johne's control programs will vary from herd to herd. Involve your veterinarian from the ground floor in your control program. Herd size, geographic location, type of enterprise, number of infected animals, herd management and herd size need to be taken into account. No one program will work for all operations, but there are some control measures that will be universal:

- Use colostrum from cows known to be Johne's negative
- Cull clinical Johne's cows immediately
- Follow the Johne's control program outlined by your state or veterinarian
- Maintain clean calving areas
- Spread manure on non-pasture land
- Limit access to low-lying wet areas
- Do not contaminate feed for young stock with manure.

Conclusion

Control of Johne's disease can only be attained by halting the transmission of *Mycobacterium avium paratuberculosis* within the herd. Since there is no effective treatment for an animal already infected, the control program must identify infected cows early so they can be removed from the herd.

In beef herds, Johne's control relies primarily on testing to identify infected cows. Cull the culture positive cows

and maintain clean calving/nursing pasture areas. Early removal of the calf from the dam is not a viable option for most producers; however, in the case of an extremely valuable calf it may be a wise move. This assumes that no intrauterine transmission has occurred. In general, in a cow that exhibits clinical Johne's disease, up to 50 percent of the time the last calf she had was infected before it was born. These calves should be culled. Do not sell calves from Johne's positive cows as replacement heifers.

In dairy herds, removal of the newborn calf from the cow and moving it to a Johne's free environment and feeding non-infected colostrum, and milk or substitute milk replacer is of primary importance. The goal is to produce a Johne's free calf. This assumes that no intrauterine transmission has occurred. In general, a cow that exhibits clinical Johne's disease, has up to a 50 percent chance that the last calf born to her was infected before birth. These calves should be culled and not sold as replacement heifers.

All farm personnel, the herd veterinarian and others intimately involved in your operation must fully cooperate for your Johne's control program to be a success. For more information on the North Dakota Voluntary Johne's Control Program, contact the office of the State Veterinarian.

This publication may be copied for noncommercial, educational purposes in its entirety with no changes. Requests to use any portion of the document (including text, graphics or photos) should be sent to permission@ndsuext.nodak.edu. Include exactly what is requested for use and how it will be used.

For more information on this and other topics, see: www.ag.ndsu.edu