



JOHNE'S DISEASE – DAIRY

A cooperative effort of the National Institute for Animal Agriculture, USDA, APHIS, Veterinary Services, in association with the National Johne's Working Group & United States Animal Health Association

Ingraham Dairy Farm— Education Key to Combatting Johne's Disease

Beth Ingraham and her husband, Tim, didn't know much about Johne's disease when it was first detected in their herd, but they did know it was something they did not want in their herd of registered Jerseys. Within a year of participating in the Johne's Disease Control Demonstration Project, the Ingrahams reduced the Johne's disease prevalence in half. By the end of the study, they had virtually eliminated Johne's disease from the herd.

"We culled real heavily at first. Anything testing positive was culled" Beth says. "We wanted to get rid of it as fast as possible. It is a terrible disease."

The Ingrahams operate a certified organic dairy in Ionia County, Michigan. Keeping their herd of 100 registered Jerseys healthy and productive, without compromising their organic status, is very important to the owners.

The Ingraham's first encounter with Johne's disease was in 2002 when they were having some overall herd health issues and their veterinarian Dr. Tony Ellis suspected Johne's disease. When the test came back positive the Ingrahams set in motion a series of management changes to eliminate any further spread of the disease.

"We really didn't know much about Johne's," Beth says. "We have learned

so much being involved in this project. Who knew that a small speck of manure could have such an effect on herd health."

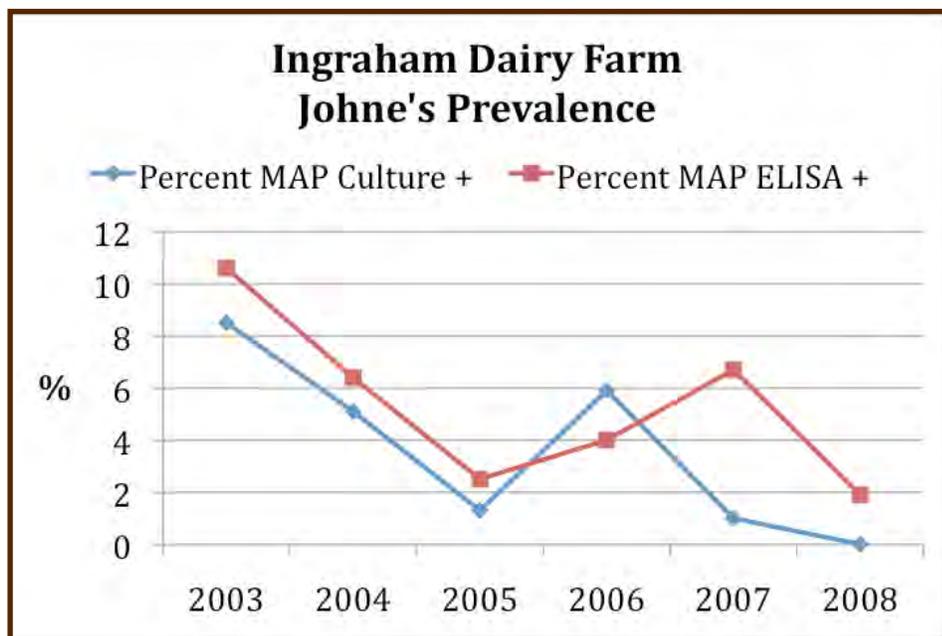
In 2003 the Ingraham herd prevalence was greater than 10 percent. At that time, there were multiple areas on the farm at high risk for Johne's disease transmission. The maternity pen was overcrowded and also housed sick animals.

Because the Ingraham herd was kept on pasture for the majority of the year, the calves were often left to nurse the dam for up to a week. Calves were fed unpasteurized whole milk and housed in a pen adjacent to

the maternity pen with direct fence line contact with adult cows. Adding to the management risk factors was the fact the herd had been assembled from multiple sources in 1995.

The Ingrahams have made a number of changes since their first encounter with Johne's disease. The first step was testing all animals to determine the prevalence of the disease. Then they focused on the calves, separating them from the dams within 6 to 10 hours. They also put in place management practices that keep the manure cleaned up and out of the traffic flow of cows and machinery.

"We have become very diligent
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Johne's Disease 101: Helping You See What's Happening Inside & Out

Johne's disease experts agree that the more you know about Johne's disease, the better you can prevent and/or control the disease. Thus, here's the start of "Johne's Disease 101" presented in a question-and-answer format.

Q: What is Johne's disease and what causes it?

A: Johne's (pronounced "Yoh-nees") disease is a contagious fatal gastrointestinal disease that was first clearly described in a dairy cow in 1895.

Another name for Johne's disease is paratuberculosis.

Johne's disease is caused by a *Mycobacterium avium* ss. *Paratuberculosis*, a bacterium that is frequently abbreviated to "MAP.")

Q: What are the clinical signs of Johne's disease in dairy animals?

A: A dairy animal will typically exhibit only two clinical signs of Johne's disease: rapid weight loss and diarrhea. That said, cows infected with MAP will often have lower milk production and can be less fertile.

While almost all animals are infected when they are extremely young—in the first months of life, signs of disease usually do not appear until the animals are adults. Then, despite continuing to eat well, older infected animals showing clinical signs become emaciated and weak.

It is not understood what causes a clinically normal animal that has been infected by MAP for months or years to suddenly become sick from the infection.

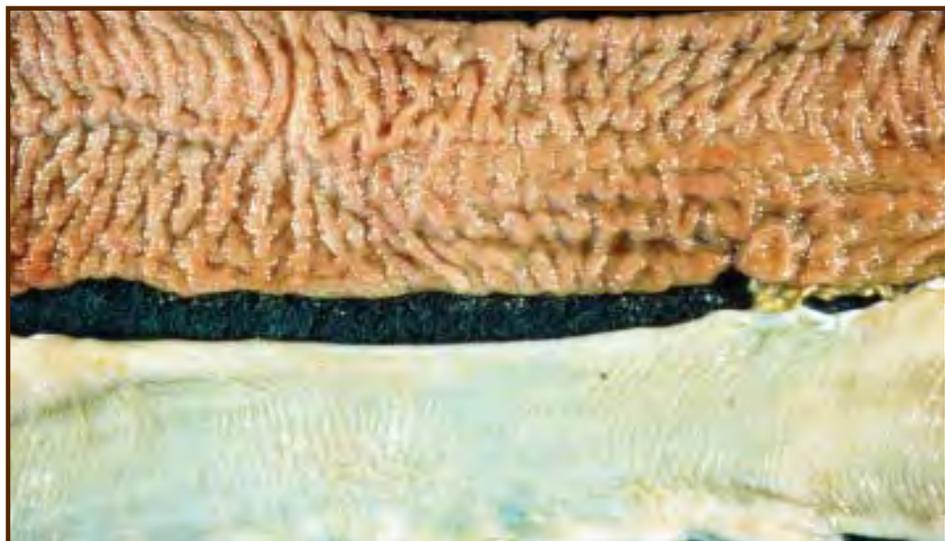
Q: What is happening inside an animal infected with MAP?

A: When an animal becomes infected with MAP, the bacteria grow slowly in the last part of the small intestine called the ileum.

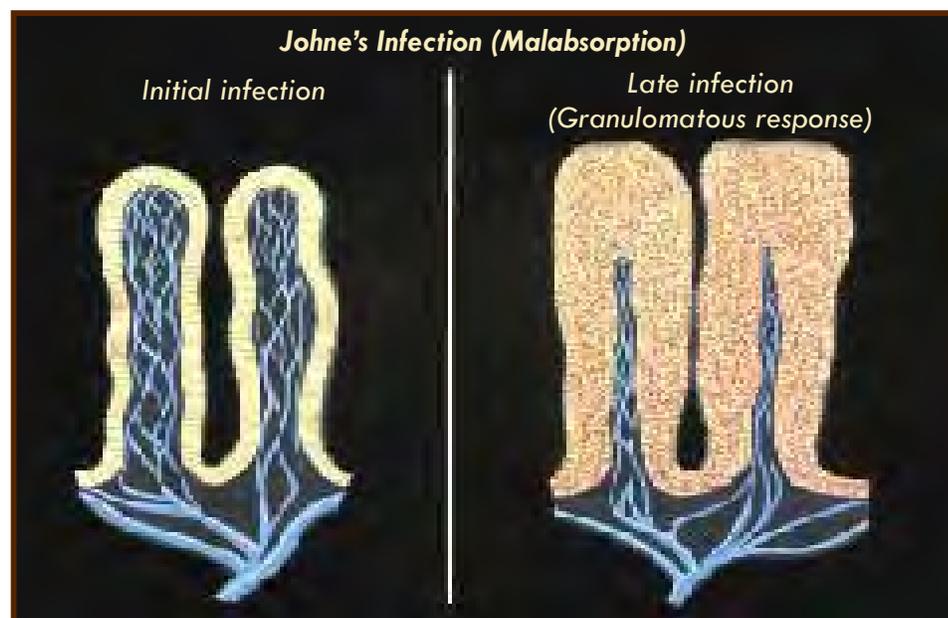
The internal wall of the ileum contains Peyer's patches that are covered with a layer of M cells. As the M cells are exposed to the food and nutrients passing through the ileum, they ingest bacteria, including MAP. Once absorbed into the Peyer's patches, MAP finds an ideal place for growth.

At some point, the MAP that have been lying quiet within cells of the ileum start to replicate and take over more and more of the tissue. The animal's immune system responds to all these organisms with what is called granulomatous inflammation.

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*Top ileum: Inflammatory response to MAP. Bottom: Thin, pliable, normal intestine.
Photo source: The late B.J.Jorgensen, Denmark.*



This inflammation thickens the intestinal wall, preventing it from functioning normally. As a result, along with other factors, the infected animal cannot absorb the nutrition it needs and thus begins to lose body condition, milk production drops off and diarrhea may occur. In effect, an animal with Johne's disease is starving in spite of having a good appetite and eating well.

Since the signs of Johne's disease are similar to those for several other diseases, laboratory tests are needed to confirm a diagnosis.

"If a case of Johne's disease occurs, it is very likely that other infected animals—those that may still appear healthy—are in the herd," states Dr. Elisabeth Patton, chairman of the U.S. Animal Health Association Johne's Disease Committee. "I would highly suggest that a Johne's disease testing program be implemented."

Q: How is Johne's disease transmitted?

A: Infected animals shed large numbers of bacteria in their feces, leading to contamination of feed and water sources.

Dr. Bob Whitlock, University of Pennsylvania and former co-chair of the National Johne's Working Group for 12 years, stresses that the single most significant hazard of maintenance and spread of infection are the subclinical animals—those that have the bacterium but have yet to exhibit clinical signs. As infected animals progress through the disease, shedding of the bacterium increases.

Researchers have found that only five percent of animals progress to the critical stages of the disease—waste away despite a normal appetite—where producers might just say "Hey, she must have Johne's disease." By then, numerous animals in the herd have been infected and may not be reaching their genetic potential, which have a negative influence on a producer's bottom line.

The most common method of infection is fecal-oral: animals, particularly calves under the age of

three months ingest the bacteria via manure-contaminated udders, milk, water or feed. If there's fecal material around anywhere, the opportunity for the organism's presence is there—and it's a risk.

Researchers have found that it takes only a tiny bit of contaminated feces to infect herd mates and newborn and young calves. In fact, a calf can become infected from simply sucking on a contaminated teat.

Although *MAP* can replicate only when it is in animals, the bacterium can survive in contaminated soil or water for more than a year. *MAP* is an extremely hardy bacterium and is resistant to heat, cold and drying. One Agricultural Research Service/USDA study shows that *MAP* survives well in biofilms present on livestock watering trough materials.

Q: Can Johne's disease be cured with antibiotics?

A: No.

In the few studies that attempted to treat Johne's disease with antibiotics, symptoms appeared to subside but animals relapsed after therapy was halted.

As with other mycobacterial infections—such as human tuberculosis, multiple antibiotics must be injected or given orally daily for months. For most animals, this is cost-prohibitive as well as infeasible. For more detailed information visit <http://www.johnes.org/antimicro/index.html>.

Q: How can you prevent your animals from getting Johne's disease?

A: Because Johne's disease usually enters a herd when healthy but infected animals are introduced to a herd, the most effective way to help prevent your animals from getting Johne's disease is to not introduce the bacteria to your herd. Thus, it is wise to purchase animals only from a source herd that has tested negative for Johne's disease.

Second best is to purchase animals only from producers who

have tested for Johne's disease, know the level of Johne's disease in his or her herd—or are confident via testing that Johne's disease is not a problem—and follow good infection control practices. In this situation you would be wise to only purchase test-negative animals from test-negative dams.

If animals from test-negative herds are not available, herd additions should be tested before purchasing. Remember that Johne's disease is a herd problem, and that knowing the test-status of numerous adults in the source herd will give you a much better sense of the risk of purchasing an infected animal than the one test result you might get on the one animal you wish to buy.

Evaluating a source herd is not always easy but keeping the infection out of your herd is much less cost and trouble than controlling it once it gets in.

Q: Where can you go for additional information about Johne's disease?

A: Your veterinarian and state Designated Johne's Coordinator (DJC) are great sources of information. The contact information for the state DJC is available online at www.johnesdisease.org and/or is contained in this newsletter. Call today and start learning more about how to prevent and control Johne's disease.

To learn more about Johne's disease prevention and control, please contact your state Designated Johne's Coordinator. A list of state DJCs is available online at www.johnesdisease.org.

about manure," Beth says.

The management changes and heavy culling are paying off for the Ingrahams. They hope to reach a point where they can list their cattle as Johne's disease test-negative, and in turn command a higher price for the replacement animals they routinely sell.

What They Learned

The Ingraham Dairy Farm is a small organic Jersey farm that began experiencing problems with Johne's disease soon after being assembled from multiple sources.

Management practices that increased the risk of disease transmission included a common calving area where sick cows were often housed too. Calves were left with their mother in this calving area for multiple days; and once removed, they were fed unpasteurized whole milk. Both of these practices significantly increased the risk of Johne's disease transmission.

Additionally, weaned calves were housed in pens that had fence line contact with adult cows. Because control of Johne's disease at this dairy was a high priority, significant management changes were made. Management of the maternity pen was changed. It is used for calving cows only, and time spent in the pen is minimized.

Calves are removed from the cow immediately, and following colostrum, all calves are fed milk from Johne's disease test-negative dams. Also, all test positive cows are put on a "do not breed" list and eventually culled. Because of facility limitations, housing of weaned calves in contact with adult cows has not been addressed.

However, by changing management practices focusing on preweaned calves, the prevalence of Johne's disease has dropped significantly over time allowing the owners to move toward their goal of being Johne's disease free.

Reprinted from the Michigan Johne's Disease Control Program booklet available online at www.johnesdisease.org or at <http://cvm.msu.edu/alumni-friends/continuing-education/extension/johnes-disease-1/JDSummary%20v3.pdf>

Lessons Learned by Other Michigan Demo Herds

Buning Dairy Farm, Falmouth, Mich.

- ✓ Purchasing animals increases risk of Johne's disease entering an operation.
- ✓ Cleanliness in the maternity pen is crucial for decreasing Johne's disease transmission.
- ✓ Housing susceptible calves near maternity pens or other adult cow housing can lead to MAP contamination of the heifer environment and transmission of Johne's disease.
- ✓ Feeding waste feed to non-replacement cattle is a cost-effective use of this valuable resource.

Brock Dairy Farm, Menominee County, Mich.

- ✓ Management of the calving area, colostrum and milk fed to calves to control Johne's disease can also help reduce other neonatal calf diseases.
- ✓ Standing surface water can serve as a source of MAP transmission to young cattle.

MSU Dairy Cattle Teaching and Research Center

- ✓ Complete disease elimination is difficult despite aggressive control programs.
- ✓ Relying on a test and cull strategy can certainly help reduce Johne's disease prevalence, but is unlikely to lead to its elimination.
- ✓ Continuous evaluation and refinement of the Johne's disease control plan is necessary.

