



Johne's Disease Q & A for Bovine Producers



Q: What is Johne's disease?

A: Johne's disease (pronounced "yo-knees") is a contagious, chronic and often fatal infection that affects dairy and beef animals as well as other ruminants.

Johne's disease is the name for the clinical signs caused by *Mycobacterium avium* subspecies *paratuberculosis*. The name—Johne's—reflects the name of the German veterinarian who first described the disease in a dairy cow in 1895.

Mycobacterium avium subspecies *paratuberculosis*, commonly referred to as MAP, is a distant relative of *Mycobacterium tuberculosis*, the bacterium that causes tuberculosis in humans, and *Mycobacterium bovis*, the bacterium that causes tuberculosis in cattle. MAP, however, does not cause tuberculosis.

MAP was first reported in the United States in 1908.

Q: How prevalent is Johne's disease in U.S dairy and beef herds?

A: A National Animal Health Monitoring Systems Dairy 2007 study indicates that 68.1 percent of U.S. dairy operations are infected with MAP. Results of the same NAHMS study also suggest that at least one-fourth of U.S. dairy operations may have a relatively high percentage of Johne's-infected cows in their herds. This high infection rate is believed to cost dairy producers dearly due to reduced milk production, early culling and poor conditioning at culling.



Research shows that diagnosis of one clinically infected animal in a herd of 100 lactating dairy cows implies that at least 25 other herdmates are infected.

Johne's disease is less prevalent in the beef industry. Research estimates that eight out of 100 U.S. beef herds may be infected with MAP.

Q: What impact does Johne's disease have on the dairy and beef industries?

A: A National Animal Health Monitoring Systems study found that infected dairy herds experienced an average loss of \$40 per cow in herds with a low Johne's disease clinical cull rate while dairy herds with a high Johne's disease clinical cull rate lost on average of \$227 per cow. This loss was due to reduced milk production, early culling, and poor body condition at culling. Across the U.S. dairy industry, lost productivity due to Johne's disease is estimated at \$200 million to \$250 million annually.



If Johne's disease is left uncontrolled, the infection rate in a dairy herd will increase over time. The number of animals showing clinical disease does not reflect the total number of infected animals. For every dairy animal showing signs, it

is estimated that 10 to 25 others of different ages are also infected. For example, a dairy producer may see one case of clinical disease every few years, then suddenly find 10 percent or more of the herd showing advanced signs of Johne's disease.

A prevalence study conducted in the Georgia beef industry found that 4% of Georgia beef cattle were Johne's disease test positive—at a cost to the Georgia beef industry of \$2.45 million to \$4.9 million each year. If 8% of U.S. beef herds are infected with Johne's disease—as research indicates, then the cost of Johne's disease within the beef industry could reach \$100 million and up.

Don Hansen, DVM, Oregon State University, stated, "Johne's disease has a direct impact on people selling genetics. It is a disease that should not be sold. If you have it and you are selling it, someone will buy a heifer or bull and keep them long enough for it to break with the disease—and infect other animals within the herd."

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

A: Clinical signs in dairy and beef cattle include lowered milk production, diarrhea and weight loss despite a normal appetite. The diarrhea starts sporadically and may eventually become chronic but will not respond to treatment.

Some animals develop a low grade fever and, at later stages of the disease, develop a soft swelling under the jaw (bottle jaw) due to protein loss from the bloodstream into the digestive tract. Animals at this stage of the disease will not live very long—a few weeks at most.

Symptoms typically do not show until an infected animal's second or third year of age. Nevertheless, clinical disease—presence of symptoms—has been observed in animals as young as 6 months and as old as 15 years.

The age at which an animal starts to show clinical signs depends on several factors, including age when exposed, amount of exposure to MAP, genetics and stress related to factors such as calving and moving to new barns.

Q: Can animals carry infections and not show typical symptoms?

A: Some cattle carry “subclinical” infections. While these animals don't show signs of diarrhea or weight loss during their normal productive life, they don't perform as well as expected. In the case of dairy animals, subclinical infections can result in lowered fertility or producing less milk than expected. Subclinically infected beef cows may produce calves with unexplained lower weaning weights or be difficult to breed back.



Q: Is Johne's disease "treatable"?

A: A few studies related to the treatment of Johne's disease indicate that the disease is probably not curable.

While clinical signs can be reduced, treatment in livestock is cost prohibitive, likely requiring large doses of multiple antibiotics administered for a year or longer.

To minimize Johne's disease, producers are encouraged to take steps to prevent and control this incurable disease.

Q: How do animals become infected with MAP?

A: The disease spreads primarily when animals eat or drink feed and water contaminated with MAP.

Infected calves, cows and bulls shed the bacteria in their manure, which then contaminates feed and water.



Feed troughs, hay bunks, water tanks, ponds, stagnant water, maternity pens and group pens can become contaminated directly from an infected animal or indirectly from equipment contaminated by manure.

Although infected animals may spread the disease at any time, the risk of spreading the bacteria increases as they become older or sick.

Q: What cattle are most susceptible to Johne's disease?

A: Dairy and beef animals are most susceptible to the infection during their first year of life. Newborns and young animals can ingest the bacteria on manure-covered teats or via colostrum or milk from infected cows. Unborn calves can also become infected *in utero* if their mothers are infected with MAP.

Animals exposed at an older age or exposed to a very small dose of bacteria at a young age are not likely to develop clinical disease until they are significantly older than two years of age.

While animals develop some resistance with age, individual animals of any age can be infected if enough bacteria remain in the environment, feed or water. No breed of dairy or beef animal is off limits to becoming infected with MAP.



Q: How long can MAP bacteria remain in the environment?

A: MAP is a small rod-shaped bacterium that has a rough waxy cell wall, and this kind of cell wall provides significant resistance to heat, cold, sunlight, drying and common disinfectants. As such, MAP can, and does, live in damp environmental conditions and can survive up to nine (9) months in manure pits and manure slurry, 11 months in soil and 17 months in water. MAP found in soil or water samples can survive—but not grow and multiply—for more than a year after fecal contamination.

Q: How is MAP (Johne’s disease) introduced into a herd?



A: Johne’s disease typically enters a herd when a producer unknowingly purchases an infected, but healthy-looking, animal. The newly purchased animal then quietly spreads the bacteria to other animals. Several years may pass before the owner recognizes signs of the disease in a number of animals.

Q: How does MAP affect a ruminant's body?

A: When an animal is infected with MAP, the bacteria grow slowly in the last part of the small intestine called the ileum. The wall of the ileum contains Peyer's patches that are covered with a layer of M cells. As the M cells circulate in the animal's lumen (the cavity where digested food passes and where nutrients are absorbed), they ingest bacteria (such as MAP) then return to the Peyer's patches. Once delivered to the Peyer's patches, MAP finds an ideal place for growth.



*Top ileum: Inflammatory response to MAP.
Bottom: Thin, pliable, normal intestine.*

Photo source: the late B.J. Jorgensen, Denmark.

Invaded by MAP, an animal's immune system responds, and a series of events leads to visible thickening of the intestines. This thickening prevents nutrient absorption, resulting in the infected animal incurring diarrhea and losing weight despite a healthy appetite.

Although MAP is typically found in an infected animal's small intestine, research also shows that MAP can be found anywhere in an infected animal's body including uterine tissues and mammary tissues.

Q: How can a producer prevent MAP from being introduced into a herd?

A: Because Johne's disease usually enters a herd when healthy but infected animals are introduced to the herd, owners should take precautions against introduction of Johne's disease. Such precautions include keeping a closed herd or requiring replacement animals come from test negative herds. If animals from test negative herds are not available, herd additions should be tested before purchasing.



Q: How can a producer help control Johne's disease?

A: Producers can take measures to help control Johne's disease. Basic prevention and control strategies include:

- Calves should be born in a clean environment.
- Reduce the newborns exposure to manure from adult animals by separation when possible.
- Avoid manure contamination of feed by using feed bunks and not using the same equipment to handle feed and move manure.
- Avoid manure contamination of water sources where animals drink.
- For natural colostrum needs of newborn animals, use colostrum from Johne's negative animals.
- Do not pool colostrum.
- Avoid natural nursing and milk feeding whenever possible. Feed an artificial milk replacer or pasteurized milk instead of raw milk to supply the needs of newborns. Never feed unpasteurized pooled milk or waste milk.
- Thoroughly clean the udder and teats before collection of the colostrum to avoid manure contamination.
- Because MAP can survive up to a year in the environment, pastures that have become contaminated should be tilled or grazed using non-replacement feeder cattle if possible.
- Identify all animals kept for the herd. Identify and remove, or keep separate, all test positive animals.
- Prevent infection from spreading by culling, or separating, offspring of infected mothers as soon as possible.
- If purchasing herd additions, try to buy from low-risk herds. Some herds are enrolled in the Voluntary Bovine Johne's Disease Control Program or an equivalent State program to help identify their herd as low risk.

Ultimately, the goal should be to reduce the exposure to pathogens in the environment by lessening manure contamination of water or feed, restricting access cows have to accumulated or stored manure, and separating sick cows from healthy cows.



To learn more about specific control measures to help prevent and control Johne's disease, contact your veterinarian, your state animal health department or your Designated Johne's Coordinator. Contact information for your State's Johne's disease program is available online at www.johnesdisease.org.

Q: What test regimen is recommended for dairy producers?

A: Johne's disease should be viewed as a herd problem rather than tackled as an individual animal disease. As such, testing should involve the herd and not just a suspect animal.

The dedication of the USDA/Animal and Plant Health Inspection Service/ Veterinary Services toward the prevention and control of Johne's disease has led to increased testing accuracy and cost-effectiveness over the past few years. Discussions with your veterinarian will determine which test is best for your situation. No single test, however, will detect all infected animals.

Testing samples should be submitted to a laboratory approved by the National Veterinary Services Laboratory (NVSL) to perform the specific test.



Frequency of testing and the decisions made based upon the test results will depend on what is practical for your enterprise.

Recommended test regimen for the detection of Johne’s disease in dairy cattle based on herd type and testing purpose.

Testing Purpose	Seedstock-Dairy	Commercial - Dairy
Confirm a clinical diagnosis in a herd with no prior confirmed JD cases	Biopsy specimens, necropsy, bacterial culture or PCR assay – individual animals	Necropsy, bacterial culture or PCR assay – individual animals
Confirm a clinical diagnosis in a herd with prior confirmed JD cases	Biopsy specimens, necropsy, bacterial culture or PCR assay – individual animals	ELISA, bacterial culture or PCR assay – individual animals
Herd classification – infected or not infected*	Bacterial culture of environmental fecal samples	Bacterial culture of environmental fecal samples
Control disease in herd with known infection, high prevalence and clinical disease and owner is concerned	Bacterial culture – individual animals	ELISA
Surveillance (estimation of biological burden)	Not recommended	Bacterial culture of environmental fecal samples
Eradication	Bacterial culture by individual or by pooled fecal samples (5 fecal samples/pool)**	Bacterial culture by individual or by pooled fecal samples (5 fecal samples/pool)**

*For declaring Voluntary Bovine Johne’s Disease Control Program Test Negative Status, use the testing strategies outlined in the Uniform Program Standards for the Voluntary Bovine Johne’s Disease Control Program.

**Pooled samples should be considered only with low prevalence herds. Pooled samples should be collected from individual animals in accordance with the Uniform Program Standards.

¹“Consensus recommendations on diagnostic testing for the detection of paratuberculosis in cattle in the United States,” Michael T. Collins, DVM, PhD, DACVM; Ian A. Gardner, BVSc, MPVM, PhD; Franklyn B. Garry, DVM, MC, DACVIM; Allen J. Roussel, DVM, MC, DACVIM; Scott J. Wells, DVM, PhD, DACVPM; JAVMA, Vol. 229, No. 12, December 15, 2006.

Q: What test regimen is recommended for beef producers?

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Testing samples should be submitted to a laboratory approved by the National Veterinary Services Laboratory (NVSL) to perform the specific test.

Frequency of testing and the decisions made based upon the test results will depend on what is practical for your enterprise.

Recommended test regimen for the detection of Johne’s disease in beef cattle based on herd type and testing purpose

Testing Purpose	Seedstock	Cow-Calf
Confirm a clinical diagnosis in a herd with no prior confirmed JD cases	Biopsy specimens, necropsy, bacterial culture or PCR assay – individual animals	Necropsy, bacterial culture or PCR assay – individual animals
Confirm a clinical diagnosis in a herd with prior confirmed JD cases	Biopsy specimens, necropsy, bacterial culture or PCR assay – individual animals	ELISA, bacterial culture or PCR assay – individual animals
Herd classification – infected or not infected*	Whole-herd testing, target testing or bacterial culture of environmental fecal samples	Whole-herd testing, target testing or bacterial culture of environmental fecal samples
Control disease in herd with known infection, high prevalence and clinical disease and owner is concerned	Bacterial culture – individual animals	ELISA
Surveillance (estimation of biological burden)	Not recommended	Bacterial culture of clinically suspect animals
Eradiation	Bacterial culture – individual animals	Bacterial culture – individual animals

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Q: Why test for Johne’s disease?

A: If one or more animals have been culled from the herd for unresponsive chronic diarrhea, then Johne’s disease could be the culprit. Testing will help

reveal if the herd is infected with MAP. Experts maintain that cows are leaving herds way too fast— before they are sampled for Johne’s disease testing.

Testing for Johne’s disease can help producers:

1. Determine if an animal exhibiting clinical signs is Johne’s disease positive and should be culled.
2. Identify infected animals with suspicious clinical signs early before they further contaminate facilities and lose salvage value.
3. Evaluate the extent of infection in your herd.
4. Monitor progress of control efforts.
5. Know if you are marketing infected or low-risk cattle and, as a result, know if you are helping spread the disease to producers’ herds or helping producers prevent Johne’s disease from entering their herd.
6. Know if you are about to purchase a high-risk or low-risk animal before it’s brought into your herd.

To learn more about specific testing requirements for Johne’s disease, contact your state animal health department or your Designated Johne’s Coordinator. Contact information for your State’s Johne’s disease program is available online at www.johnesdisease.org and click on “State Contacts.”



Q: What other tools are available to learn more about Johne’s disease?

A: The Uniform Program Standards for the Voluntary Bovine Johne’s Disease Control Program (VBJDCP), established by USDA/Animal and

Plant established by USDA/Animal and Plant Health Inspection Services/ Veterinary Services with input from stakeholders, provides minimal national standards for the control of Johne's disease. The Voluntary Bovine Johne's Disease Control Program addresses management, herd testing and herd classification regarding level of risk of Johne's disease on a farm. This document can be obtained online at www.aphis.usda.gov, clicking on "animal health" then "animal diseases" then "Johne's."

To help dairy producers understand Johne's disease and become acquainted with preventive measures, two online courses specifically for dairy producers are available—and are free to producers. One course is in English, and the other dairy producer course is in Spanish. The online courses cover the cause of Johne's disease, how Johne's disease spreads, how to prevent Johne's disease from entering your herd, how to test for Johne's disease and management practices to use to control infections. The course also explains how the VBJDCP works and how producers can participate in the national program. The dairy Johne's disease courses are available at www.vetmedce.org. Once at this web site, click on the "Courses" tab on the left-hand side of the web page and proceed from there.

To help beef producers understand Johne's disease and become acquainted with preventive measures, an online course has been developed specifically for beef producers. Underwritten by a grant from USDA and developed by the University of Wisconsin-Madison School of Veterinary Medicine, the online course for beef producers is similar to the online course for dairy producers but is specific to beef producers. The beef Johne's disease course is available at www.vetmedce.org. Once at this web site, click on the "Courses" tab on the left-hand side of the web page and proceed from there.



To learn more about Johne's disease, prevention, control, testing and how to become a low-risk Johne's disease herd, contact your state animal health department or your Designated Johne's Coordinator. Contact information for your State's Designated Johne's Coordinator is available online at www.johnesdisease.org and click on "State Contacts."

This information is provided by



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