



Johne's Disease

Bulk milk testing: Frequently Asked Questions

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What is Johne's disease?

Johne's disease (JD), also known as *paratuberculosis*, is a contagious, chronic and debilitating cattle disease for which there is no cure. JD is caused by bacteria (*Mycobacterium avium* subspecies *paratuberculosis* or MAP). Clinically affected cattle show weight loss, diarrhea and a soft swelling may occur under the jaw ("bottle jaw"). While not all animals demonstrate clinical signs, those that do will eventually die from the disease since there is no effective treatment. Signs usually develop in animals older than two years. JD has a very long incubation period; animals become infected months or years before showing clinical signs. A recent Ontario study found sub-clinically infected MAP antibody-positive cows produce less milk and are much more likely to be culled than MAP antibody negative cows. The annual herd cost of JD is estimated at C\$40 per cow in a 78-cow Ontario dairy herd. Purchase of infected cattle is the primary risk factor for introducing MAP in disease-free herds.

How does the IDEXX MAP Ab ELISA work?

Once infected, and often before clinical signs, animals will produce antibodies against MAP, which can be detected using enzyme-linked immunosorbent assays (ELISA). The IDEXX MAP Ab ELISA detects antibodies against MAP in milk, including bulk tank milk. The test compares concentration of antibodies in test milk samples with the same antibodies in a known positive control sample. Since there is no clearance of MAP infection, once cows start producing antibodies against MAP, they tend to produce antibodies over their remaining lifetime, although the amount of antibody produced can vary.

How will my results appear?

Based on results of bulk tank milk testing, herds will be classified as "low-risk," "moderate-risk" or "high-risk" herds. You will also be provided with the Sample to Positive percentage (S/P), which compares the concentration of antibodies in your bulk tank milk with the concentration of antibodies in the known positive control, described above. Herds with a S/P% lower than 3% will be classified as low-risk herds, whereas those with S/P% higher than 3% and lower than 10.5% will be considered as moderate-risk herds. Herds with a S/P% equal or greater than 10.5% will be regarded as "high-risk" herds.

What do my results mean?

As the concentration of antibodies against MAP in bulk tank milk increases, so does the probability of MAP-infected cows being in the milking herd. However, the test is not perfect, and there are circumstances where it may fail to correctly classify each herd. The bulk tank milk MAP ELISA test has

low sensitivity. It can give negative results even in some herds with MAP-infected animals. One reason for this is the "dilution effect," where milk from infected cows is diluted with milk from uninfected cows. Further, infected cows tend to produce less milk than their healthy counterparts. As such, milk from positive cows may represent an even smaller fraction of total milk produced on the farm. Under these circumstances, bulk milk ELISA fails to detect very small quantities of antibodies that might be present in bulk tank milk. Additionally, bulk tank milk testing excludes young stock and dry cows, which may have been infected by MAP but do not contribute to the bulk tank. Finally, MAP has a very long incubation period. Some animals, although infected, will only start producing detectable amounts of antibody months or years after infection. All this means a bulk tank low-risk herd is not necessarily disease free. Conversely, it is generally accepted bulk tank milk MAP ELISA has a high specificity; most herds that do not have infected cows will test negative. Herds that are classified as high-risk are very likely to have at least one MAP-positive cow in the milking herd.

As a rule, low-risk herds are those where all milking cows would be MAP-negative on a blood test. Based on the literature, it is estimated 70.5% of farms with a negative milking herd will be classified as low-risk using bulk milk assays. Moderate-risk herds have at least one milking cow testing positive for MAP in a whole-herd screening, but with less than 10% of infected cows in the milking herd. High-risk herds are those where more than 10% of the milking herd testing positive for MAP. It is estimated 76% of herds with infected cows will be classified as moderate or high-risk. Of note, our test has a high sensitivity to detect herds with more than 10% of infected cows (86% sensitivity). As MAP is relatively common in Ontario, it is very unlikely herds that test high-risk will be free of MAP.

What do I do now?

Low-risk herds, particularly those with no history of MAP, should develop or continue to implement biosecurity protocols to keep MAP out of the herd. Moderate-risk herds, particularly those with a recent history of MAP infection (< 5 years), should confirm the herd disease status by individual animal testing. There are many options, including blood or milk antibody testing, as well as fecal culture and/or PCR. Fecal culturing is still considered the definitive diagnostic test for MAP, but it's expensive, labour intensive and results could take months to return.



Remember...

Once your results are available, you should consult your herd veterinarian and review the test results in the context of your herd biosecurity protocols and disease control strategies

There are alternatives to fecal culturing, such as using molecular tools. Pooling samples from groups of animals, or environmental sample testing, are also options. Environmental fecal samples can be submitted to a lab for culturing and/or qPCR. This involves taking samples from several strategic sites around the farm, and screening for MAP. This is relatively cost-effective and non-invasive, but like bulk tank milk testing, will not identify individual animals with JD.

High-risk herds or herds where MAP has been confirmed, should initiate a JD control strategy. JD usually enters a herd when healthy, but infected animals are introduced. An infected cow can shed billions of organisms into the environment before showing any clinical signs of JD. Calves can also become infected while in the uterus of infected cows, or by drinking MAP-contaminated milk and colostrum, and even by ingesting manure that has contaminated feed or from their dam's udder. Cattle are most susceptible to MAP in their first year. With respect to biosecurity protocols, there are several recommendations that should be adopted in the calving area to prevent calf exposure to MAP. A [Risk Assessment Management Plan](#)¹ was developed to assist farmers and veterinarians to identify transmission routes and plan control strategies. To initiate a JD control program, a veterinarian will make recommendations about protocols to be adopted based on risk assessment results. A list of best management practices to reduce MAP in the herd or prevent introduction of infected animals can be found [here](#)².

Eliminating JD from a herd requires a long-term commitment, generally at least five years. Limiting animal purchases, adopting biosecurity protocols and frequent testing will constitute the backbone of eradication programs.

Where do I obtain more information about JD?

Further information about Johne's can be found at: [Ontario's Johne's Education and Management Assistance Program](#)⁴ (including whiteboard videos) [Ontario Johne's Control Program](#)⁵ [Canadian Johne's Disease Initiative](#)⁶ [Johne's Information Center – University of Wisconsin](#)⁷

Producers and veterinarians can also [contact](#)⁸ the Dairy at Guelph team to participate in ongoing studies, as well as request further information on bulk tank milk testing.

Disclaimer

The content of this FAQ document was current at the time of preparation (Feb. 2, 2022) and is believed to represent the best information about the presence of Mycobacterium avium subspecies paratuberculosis in dairy herds. Neither Dairy Farmers of Ontario or University of Guelph, nor any of their funding partners or content providers shall be held liable for any improper or incorrect use of information described and/or contained herein, and assumes no responsibility for any direct, indirect incidental, special, exemplary, or consequential damages anyone incurs from use of this information.

Take home messages

- Clinically affected cattle are generally older and show diarrhea, weight loss and death.
- The IDEXX MAP Ab ELISA is not perfect and can fail to detect some herds with MAP-infected animals.
- Low-risk herds should resume their normal activities while focusing on preventing introduction of MAP-infected cattle purchased from other herds.
- Confirm herd disease status of high-risk herds, or those with a history of MAP infection.
- Contact your vet to initiate a JD control program. Avoid buying cattle from unknown sources and adopt strict hygiene protocols in calving area.

Weblinks

- ¹Johne's Risk Assessment Management Plan (<http://www.johnes.ca/forms.htm>)
- ²Canadian Johne's Disease Initiative List of Best Management Practices (https://www.dairyproducer.com/wp-content/uploads/2017/03/CJDI_DairyBrochure_EN_Summer09.pdf)
- ³OMAFRA's List of Frequently Asked Questions (<http://www.omafra.gov.on.ca/english/food/inspection/ahw/ah-a-regs-faq.htm>)
- ⁴Ontario's Johne's Education and Management Assistance Program (<http://www.johnes.ca/>)
- ⁵Ontario Johne's Control Program (<http://www.omafra.gov.on.ca/english/livestock/dairy/facts/johnesting.htm>)
- ⁶Canadian Johne's Disease Initiative (<https://animalhealth.ca/cahc-activities/johnes-disease/>)
- ⁷Johne's Information Center – University of Wisconsin (<https://johnes.org/dairy/epidemiology/>)
- ⁸Dairy at Guelph (<https://dairyatguelph.ca/contact/>)

References

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 Your test results are strictly confidential and will be provided to you via DFO correspondence. DFO takes the privacy of producer information seriously. For this reason, only aggregate test results will be made public. That said, you should be aware, under the Animal Health Act, JD is "periodically notifiable" to the Office of the Chief Veterinarian for Ontario (OCVO). The lab will share an annual report containing all bulk milk test results with OMAFRA veterinarians who monitor the disease on a yearly basis for disease trends in the province. More information about this can be found [here](#)³.