



Johne's Disease
Q & A
for Sheep Owners

The National Johne's Education Initiative recognizes Dr. Elisabeth Patton and Dr. Gretchen May with the Wisconsin Department of Agriculture, Trade and Consumer Protection and Dr. Elizabeth Manning with the University of Wisconsin-Madison Johne's Information Center for their contributions to this piece. Some photos have been provided by the Johne's Information Center, University of Wisconsin-Madison, <http://johnes.org>.

Q: *What is Johne's disease?*

A: Johne's ("YO-knees") disease is a fatal gastrointestinal disease of sheep and other ruminants (including goats, cattle, elk, deer and bison) caused by the bacterium *Mycobacterium avium* subspecies *paratuberculosis* (MAP). Also known as paratuberculosis, this infection is contagious and can spread in your flock.

The MAP organism is most commonly passed in the manure of infected adult animals. Lambs typically become infected when they swallow water, milk or feed that has been contaminated by manure from infected animals. Most owners are taken by surprise when the infection is diagnosed, and learn too late that the infection has taken hold in multiple animals in a flock.

Due to lack of testing and reporting, it is not known how widespread Johne's disease is in sheep in the United States. The infection has been confirmed, however, in many flocks and sheep breeds throughout the country, and it is a problem in most other sheep-rearing countries.

The costs of this infection are due to increased culling and reduced production—limited weight gain and poor fleece growth and quality. Flocks that do not address the infection may lose up to 10% of adult sheep each year.

There is no cure for Johne's disease. A vaccine that is available in other countries is not approved for use in sheep in the United States.

Prevention is the key to control.



Q: *How do I know if my flock has Johne's disease?*

A: A sheep that appears perfectly healthy may be infected with *MAP*. Most sheep become infected in the first few months of life and remain free of clinical illness until months or years later. Unfortunately, an infected sheep sheds *MAP* before it is visibly sick.

When sheep finally do become ill, the symptoms are vague and similar to other ailments: rapid weight loss and, in some cases, diarrhea (scouring). Despite continuing to eat well, infected sheep soon become emaciated and weak.

Since the signs of Johne's disease are similar to those for several other diseases—parasitism, dental disease and caseous lymphadenitis (CLA), laboratory tests are needed to confirm a diagnosis.

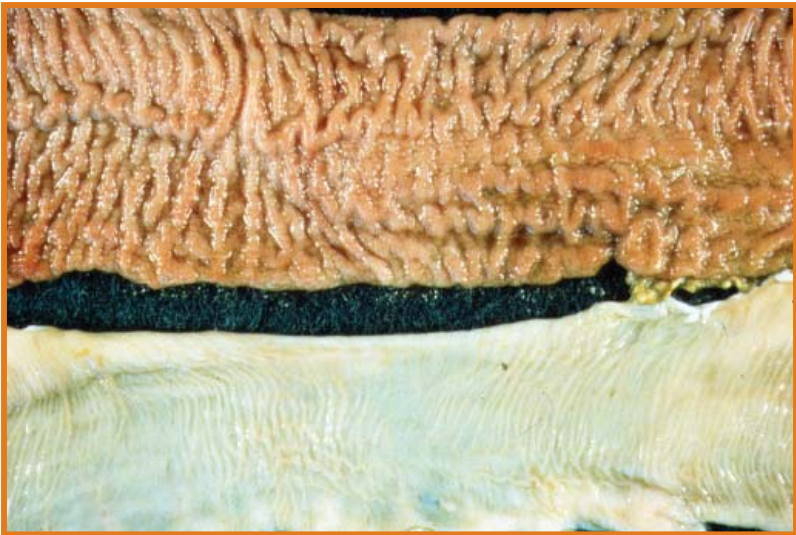


A sheep showing symptoms of Johne's disease.

When an animal with signs of Johne's disease is discovered, it is very likely that other infected animals—even those that still appear healthy—are in the flock. Control of the infection requires that you and your veterinarian address it on a whole flock basis rather than on an individual animal basis.

Q: *Why do animals with clinical signs of Johne's disease lose weight and become weak?*

A: When an animal is infected with *MAP*, the bacteria reside in the last part of the small intestine—the ileum—and the intestinal lymph nodes. At some point, the infection progresses as bacteria multiply and take over more and more of the tissue. The sheep's immune system responds to the *MAP* with inflammation that thickens the intestinal wall and prevents it from absorbing nutrients. As a result, a sheep in the final stages of Johne's disease in effect starves to death. At this stage, the organism may also spread beyond the gastrointestinal tract, travelling in the blood to muscles or other major organs such as the liver or lungs.



Top: Thickened intestinal mucosa caused by Johne's disease.

Bottom: Thin, pliable, normal intestine

Q: *How do sheep become infected?
How is MAP spread in a flock?*

A: Johne's disease usually enters a flock when an infected, but healthy-looking, sheep is purchased. With *MAP* hiding in its small intestine, this infected sheep sheds the organism in its pellets onto pasture or into water shared by its new flockmates.

Sheep—particularly those less than 6 months old—are at risk as they repeatedly swallow the organism. If the ewe is infected, her offspring



can become infected even before they are born (*in utero* transmission). Since the organism is also shed in an infected ewe's milk and colostrum, lambs ingest *MAP* through suckling. Other sources of infection are manure-stained teats plus feed, grass or water contaminated by manure containing *MAP*.

Bottle-fed lambs may also become infected if the milk was contaminated.

Since sheep usually produce more than one lamb per birthing, Johne's disease can spread swiftly in a flock, especially if the infection remains undetected in a flock for several lambing seasons.

While lambs are most susceptible to infection, older sheep may become infected, particularly when their immune systems are suppressed for other reasons.

MAP infection can be transmitted from one ruminant species to another—for example from cows to sheep, sheep to goats, etc.

Q: *When do infected animals start shedding the bacteria?*

A: *MAP*-infected sheep shed the organism on and off throughout their lives. The older the animal, the more likely that shedding occurs as the infection progresses. As sheep enter the latter stages of infection and clinical signs begin to appear, *MAP* is shed more often and more heavily.

Q: *Is it difficult to know if my flock has Johne's disease?*

A: Sometimes.

Johne's disease is often mistaken for other problems such as intestinal parasitism, chronic malnutrition, environmental toxins, cancer and caseous lymphadenitis—particularly in sheep thought to have internal abscesses.

In early stages of flock infection, infected sheep appear healthy. You then might notice a number of poor does that don't respond to deworming. Many flocks rotate parasite treatments for several rounds before testing and determining that Johne's disease is the reason their sheep are so thin.

If Johne's disease is suspected but has not been confirmed in a flock, a necropsy of a sheep with symptoms of the disease may be helpful in determining if the infection is in the flock. This necropsy may reveal enlarged intestinal lymph nodes and a thickened, corrugated intestinal tract.

To give you the greatest confidence in the diagnosis, a complete necropsy of sheep suspected of having Johne's disease should include culture of the intestine and adjacent lymph node to isolate the organism plus microscopic examination of these tissues.

The sooner you confirm the infection, the sooner you can act and keep it from spreading.

Q: *How can I help keep Johne's out of my flock?*

A: Buyer beware! The most common way that the infection is introduced to a flock is through the purchase of an animal from an infected flock. Since many people raising sheep are unaware of Johne's disease, both the seller and buyer may be surprised when the diagnosis is made.

In short, it is easier to keep *MAP* out of a flock than to control the disease once *MAP* is found.

Practices that can help prevent the introduction of Johne's disease into a flock are:

- Maintain a closed flock. Don't buy Johne's disease.
- If you bring new sheep into the flock, purchase animals only from flocks that have tested for Johne's disease. Ideally, purchase only from flocks that have had a negative whole-flock test in the last year. If this is not possible, you should buy from someone who is aware of the infection, has tested for it and can provide accurate records on the disease in their flocks than to purchase an animal from individuals who have never evaluated their flock for Johne's disease.
- If no diagnostic testing has been conducted in the source flock, at least closely evaluate the body condition of all the adult animals, discuss the history of any clinical signs in the flock over the past few years with the seller and test the adult animal to be purchased.
- If the animal to be purchased is less than a year old, test its dam since young animals in an early stage of infection are unlikely to test positive.
- Do not bring in or share pastures with other untested ruminants since they are all susceptible to Johne's disease.
- Avoid grazing sheep on pastures where *MAP*-infected ruminants have grazed. Graze young sheep on such a pasture only after it has rested for a year. To date, *MAP* infection of free-ranging ruminants such as deer or elk is uncommon, and currently these species are not believed to be an important source of infection to your flock or pastures.

Q: *How can I control Johne's disease once it has entered in my flock?*

A: Since there is no cure for Johne's disease, control of the infection is critical. Control of Johne's disease takes time and a strong commitment to management practices focused on keeping young animals away from contaminated manure, milk, feed and water. A typical flock clean-up program may take a number of years.

The basics of control are simple: New infections must be prevented, and animals with the infection must be identified and removed from the flock.

Your State Designated Johne's Coordinator can help you undertake an on-farm risk assessment that evaluates your operation, your resources and your goals. This on-farm risk assessment highlights current management practices that may put your flock at risk for spreading Johne's disease and other infections. At the completion of a risk assessment, your veterinarian can work with you to develop a management plan designed specifically for you and your flock that will minimize the identified risks for disease transmission. (Risk assessment is discussed as part of the Johne's disease course for sheep producers at www.vetmedce.org.)

Most control plans follow basic rules of sanitation to block transmission of the infection within the flock. Management recommendations include:

- Prepare "low risk" lambing and weaning paddocks that are used only for sheep believed to be free of infection. (Six weeks destocking of a premises can dramatically reduce contamination levels.)
- Lamb suspect or test-positive ewes in an area separate from low-risk ewes.
- Fence off wet and low-lying areas so young animals do not graze these areas.
- Cull clinically ill or test-positive animals as soon as possible, and consider culling the most recently born lambs of these ewes as well.

- Progressively destock and decontaminate sections of the property, restocking with the lowest-risk adult sheep you can find after the premises have been empty for several months.
- If feasible, clean the udders of ewes before lambs nurse. If bottle feeding, use milk and colostrum from test-negative ewes, does or cows.
- Be aware that colostrum purchased from another flock or herd may be contaminated. Pasteurization needs to be at 145°F (63°C) for 30 minutes (batch pasteurization) or 162°F (72°C) for 15 seconds (flash pasteurization) to kill *MAP* in milk.



- Move young animals and their dams to “clean” pastures as soon as possible after lambing.
 - Keep water sources clean, particularly those used by lambs. Use waterers designed to minimize manure contamination.
 - Raise all feeders and avoid feeding on the ground.
- Use diagnostic tests to identify infected animals and remove them promptly from the flock.
 - Necropsy sick or cull animals to determine if your flock is infected with *MAP*.
 - If your flock has had numerous cases of Johne’s disease, discuss depopulation with your veterinarian, or, at a minimum, immediately remove all test-positive animals and their last-born lamb. Do not allow lambs to be exposed to milk or manure from infected animals.

Remember: Preventing Johne’s disease is much less costly than controlling it.

Q: *How can I clean equipment, sheds or fields potentially contaminated with MAP?*

A: The *MAP* organism is very hardy in the environment: It resists heat, cold, drying and dampness. Although the majority of organisms die after several months, some may remain for a year or more. In fact, research shows that *MAP* can survive—at low levels—for up to 11 months in soil and 17 months in water. *MAP* has also been recovered from grasses fertilized with *MAP*-contaminated manure. This is why pastures and fields known to be contaminated with *MAP* should not be grazed by lambs, calves or kids for at least one year after last exposure.

Feed and watering equipment that may have become contaminated with *MAP* should be washed and rinsed. When cleaning a water trough, sediment and slime from the sides and bottom should not be dumped onto ground that will be grazed by young sheep.

Disinfectants labeled as “tuberculocidal” may be used as directed for cleaning tools, implements and some surfaces. These disinfectants, however, are inactivated by organic material—such as dirt and manure—and are therefore not effective on dirty surfaces, wood surfaces, soil or even cement floors.

Composting of manure and used bedding can reduce the number of living *MAP* organisms they may contain.



Q: *Should I test my flock for Johne's disease?*

A: If you have sheep with a normal appetite that have become thin and are not responding to treatment, talk to your veterinarian. The culprit may be Johne's disease.

Remember: Since Johne's disease is a flock problem, testing should focus on the flock and not just on a single animal.

Diagnostic testing for Johne's disease can help to:

1. Determine if *MAP* infection is present in your flock.
2. Estimate the extent of *MAP* infection in your flock.
3. Control *MAP* in an infected flock.
4. Make a diagnosis for a sick animal.
5. Check if *MAP* is present in the environment.
6. Meet a pre-purchase or shipping requirement.
7. Demonstrate to potential buyers that your animals are low risk for Johne's disease (test negative).



Once your veterinarian knows your goals in testing for Johne's disease, a testing plan that best meets your needs can be put in place. This plan should outline the type of test, when to test, which sheep to focus on, the cost of testing, how to interpret the results and what actions to take based on test results.

Decide how you plan to act on your test results **before** the samples are collected.

Q: *What diagnostic tests are available?
Which one is best?*

A: There are a number of effective assays for Johne's disease testing in sheep. The best testing program is one developed by you and your veterinarian since you know your operation best—its goals, resources, other animal health issues.

Diagnostic tests for Johne's disease look for either the organism that causes Johne's disease (*MAP*) or the animal's response to infection.

Tests that look for the organism in manure include culture and direct PCR. Individual animals can be tested or a laboratory can pool manure samples from multiple animals and provide owners with effective Johne's disease surveillance for a fraction of the cost of individual culture or PCR.

The animal's body eventually responds to *MAP* infection by making antibodies. The test that measures antibody levels in the blood is the ELISA.

Due to the biology of *MAP* infection, older, infected sheep are much more likely to shed *MAP* or produce antibody. Therefore, diagnostic tests are less reliable for most sheep less than 18 months old.



Testing approaches that have worked well for other flocks include:

Testing Purpose	Option A	Option B
Confirm presence of <i>MAP</i> in a flock.	Culture 5 – 10 environmental fecal samples collected at high sheep traffic areas.	Using ELISA* or fecal culture, test the oldest or thinnest sheep— 10% or more of the flock.
Determine number of sheep that are infected.	Blood test (ELISA*) all adult sheep.	Collect fecal samples for the lab to test by pooling for culture. Samples comprising positive pools are retested individually.
Control or eradicate <i>MAP</i> in an infected flock.	Blood test (ELISA*) sheep after their second lambing or older.	Collect fecal samples for the lab to test by pooling for culture. Samples comprising positive pools are retested individually.
Diagnose a sick sheep (weight loss and/or diarrhea).	If previous cases have been seen in the flock: ELISA*. (Fecal culture if CLA is a problem in the herd or if the flock has been vaccinated for CLA.)	If <i>MAP</i> has never been confirmed in the flock, use fecal culture.

**Use commercial ELISA kit approved by the USDA for small ruminants to limit the chance of false-positive results due to cross-reacting antibodies from other types of infections.*

Test samples should be submitted to a laboratory that has passed an annual “check test” demonstrating their competency. These labs are listed here:

http://www.aphis.usda.gov/animal_health/lab_info_services/approved_labs.shtml

Q: *Where can I find more information about Johne's disease?*

A: The University of Wisconsin School of Veterinary Medicine's website—www.johnes.org—addresses all aspects of Johne's disease for multiple species, including sheep. The site has an "Ask An Expert" feature that allows you to submit your own questions and receive a personalized response from an expert.

The University of Wisconsin School of Veterinary Medicine also offers a free online course for sheep producers. Simply go to www.vetmedce.org, click on "Courses" in the lower left hand corner of the homepage. Once on a new page, click on "Johne's Disease." At the next new page, click on "Johne's Disease Courses for Producers" followed by clicking on "0017—Johne's Disease for Sheep Producers."

To learn more about Johne's disease in sheep, please contact your State animal health regulatory agency or your State Designated Johne's Coordinator. Contact information for your State's Johne's disease program is available online at www.johnesdisease.org when you click on "State Contacts."





This information is provided by



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