



Johne's Disease

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*Johne's disease, also known as paratuberculosis, is caused by *Mycobacterium paratuberculosis*, a slow growing bacterium that can survive in the environment for approximately one year. It is best known in the dairy industry, where it costs U.S. dairy producers an estimated \$1.5 billion annually, but cases in beef herds, especially seedstock operations, can be devastating as well. In addition to death loss, premature culling, and decreased weight at slaughter, losses due to decreased milk production and increased susceptibility to other diseases such as mastitis can be major.^{2,3}*

Johne's disease is a reportable disease in Kansas. Recently, *M. paratuberculosis* has been associated with Crohn's disease in people, but scientific evidence is not available to prove or disprove its involvement in the disease at this point. Most cattle with Johne's disease were infected as young calves, as calves are most susceptible.² Calves have no clinical signs, and, therefore, this stage of the disease has been called the "silent" stage.² After an incubation period of 2 to 10 years, infected adult cows may be more prone to mastitis or infertility.² These animals may be shedding the organism in their feces at undetectable levels, which can contaminate the environment.² Within a few weeks, clinical signs such as gradual weight loss with a normal appetite, diarrhea, and decreased milk production may appear.² In advanced cases, animals are very weak, have profuse, "pipestream" diarrhea, and can have intermandibular edema, or "bottle jaw," with death following shortly.² For every such case of advanced Johne's disease on a farm, it is likely that 15 to 25 others are infected.²

The major route of infection of calves is ingestion of colostrum and /or milk contaminated with fecal

material.^{1,2} Calves can also be infected in utero, especially if their dam is clinically ill—in utero infection is unlikely in early, subclinically infected dams.² Infected cows may shed the organism directly in colostrum or milk as well, which is another potential source of infection for calves.¹ Adults may be infected from contaminated feed, but they are less susceptible than calves, and due to the long incubation time, will likely be culled before they shed the organism.¹ The organism may also be transmitted by semen, in uterine fluids, by rectal examinations, and by wildlife, but these are not likely sources of infection.¹ Embryo transfer and artificial insemination are not likely sources of infection due to frequent testing, but all embryo transfer recipient cows should be tested, as fetal infection can occur transplacentally.¹

Due to the nature of the disease, prevention is much more economical than controlling the disease once it has entered the herd. Herds are primarily infected by purchasing infected animals.¹ These animals may show no clinical signs for many years, and may even test negative on serologic and fecal culture tests.^{1,5} The sensitivity of tests for Johne's disease are only about 50 percent,⁵ which means 50 percent of animals

with Johne's disease will not test positive. Therefore, it is best to maintain a closed herd or purchase replacements from certified test negative herds.¹ If this is not possible, pre-purchase testing of the seller's entire herd should be done, and if none or very few test positive, chances are very good the animals purchased are not infected.⁵ At the minimum, replacements should be purchased from reputable herds with no clinical history of Johne's.⁵ All new animals should be isolated and tested before they enter the herd.¹ It has been estimated that the risk of bringing in paratuberculosis in an animal from a sale barn is 10 percent per animal. Another preventative measure that should be practiced on all farms is proper cleaning of calving areas and calf hutches.⁶ Many tests are available to test individual animals and screen herds for Johne's disease. The sensitivity of these tests for early detection of the disease is low because of the slow progression of the disease. Fecal culture is the gold standard for detection of infected animals in a herd.² It is 100-percent specific, which means every positive test truly indicates an infected animal, and 50-percent sensitive.⁷ The major drawback to this test is the 12- to 16-week incubation period before results are available.^{2,7} There is a new culture method available which only has a four- to seven-week incubation period, but it is more expensive.⁷ Three serum tests are commonly used which detect antibodies to paratuberculosis.⁷ They are the Comple-

ment Fixation test (CF), the Agar gel immunodiffusion test (AGID), and the Enzyme-linked immunosorbent assay (ELISA).⁷ Results from these tests are available in two to four days, and they are nearly 100-percent specific and quite sensitive in detecting infected animals, especially animals with clinical signs.⁷ ELISA has a sensitivity of 99 percent and specificity of 15 to 87 percent, depending on the stage of the disease, but overall specificity of 45 percent. It is the most sensitive and specific of the serum tests.⁷ There is also a DNA probe test, which is fast, but expensive and less sensitive than fecal culture.⁷ Rectal scrapings or histopathology of tissues are both sensitive in detecting clinically ill animals.² The newest test method, which tests for cellular immunity, is not proven yet, but has a promising future.⁷ The Johnin Test, which has been used in the past, is no longer recommended.⁷

Control and/or eradication of Johne's disease on a farm that has had confirmed cases of the disease is a long, difficult process, and should be undertaken only if management changes can be instituted.⁵ No "cookbook" method of control works for every farm, but a summary of key points follows. Control programs have two fundamental objectives.^{2,3,5} The first is to prevent highly susceptible newborn calves and young animals from ingesting manure, colostrum, and milk from infected cows.^{2,3,5} The second is to reduce total farm environmental contamination by culling infected animals.^{2,3,5} To accomplish the first

objective, remove the calves early and put them in hutches, feeding them only uninfected colostrum, milk or milk replacer.⁵ Improving hygiene to reduce exposure of calves to *M. paratuberculosis* also reduces exposure to salmonella, *E. coli*, crypto, and coccidia because of decreased fecal contact.³ To accomplish the second objective, screen all animals over 20 months of age with the ELISA test or fecal culture and cull all animals that test positive.⁷ A more aggressive strategy is to cull all offspring from cows that test positive, due to the possibility they were infected in utero.⁵ The ELISA test is recommended for the first screening because it is the least expensive test with similar sensitivity and specificity to fecal culture.⁷ Within one year after the test-positive cattle have been culled, all animals over 20 months of age should be tested again, with either ELISA or fecal culture, and the test-positive animals culled.⁷ Herd screening should continue, but the time between screenings varies depending on multiple factors.^{2,7} Elimination of Johne's disease takes many years, and biosecurity measures as outlined above should be practiced along with the control program.⁵

A killed vaccine is available for use by accredited veterinarians, usually under the supervision of the state veterinarian, and its usage varies from state to state.² It does not prevent infection, but it does delay the onset of clinical signs.² It interferes with diagnostic tests for Johne's disease, and is not recommended.²

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