

# AGRI-FACTS

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## Johne's Disease

Johne's disease (paratuberculosis) is a chronic, debilitating disease that affects the intestines of all ruminant animals, including cattle, sheep and goats. Although many animals in a herd may be infected, usually less than five per cent of infected animals develop clinical signs of disease. This is called the "Iceberg effect." Under circumstances of stress, inadequate nutrition or parasitism, more of the infected animals may develop clinical disease. Once clinical disease develops, affected animals eventually die due to dehydration and starvation as a result of malabsorption of nutrients. There is no treatment for Johne's disease.

The true prevalence and economic losses associated with Johne's disease have not been determined. This is because there is no practical diagnostic test that reliably detects infections of *Mycobacterium paratuberculosis* (MAP) in living animals that have not developed clinical disease. The fact that MAP grows very slowly delays the immunological response and detection of the bacterium in serum and in feces.

The epidemiology of the disease is different in dairy and beef herds, mainly due to management factors. The differences in cow and herd prevalence, along with the long incubation period of MAP, causes a broader range in sensitivity of the diagnostic tests (10 to 50 per cent) and high variation in the serology versus fecal culture tests, mainly during early stages of the disease when it remains sub clinical.

Several studies have been performed in Alberta in the last few years to determine the prevalence of Johne's disease. In these studies more than half of dairy herds and approximately 14 per cent of beef herds appear to be infected with MAP. However, these numbers may be higher due to the factors explained before.

The most significant economic losses associated with Johne's disease are decreased milk production and reduced salvage value of clinically affected animals. Milk production from dairy cows affected with

Johne's disease has been estimated to drop by 590 kg in the third lactation and up to 1,270 kg in the fourth lactation. Affected animals have an increased risk of being culled early and the slaughter weight of these animals was 59 kg less than non infected animals.

### Cause

This disease is caused by *Mycobacterium paratuberculosis*, which is closely related to the organisms that cause tuberculosis and leprosy. This organism does not cause disease in non-ruminant animals, however, these animals may perform as reservoirs, creating a risk to transmit the disease. Infection with *M. paratuberculosis* is usually acquired by consuming feed and water contaminated with manure from infected animals. Fecal shedding from clinically affected animals has been estimated to reach more than 500 billion organisms per day. Obviously, the environment can become very heavily contaminated and most animals on these farms will be exposed to the infection.

*There is no effective treatment for Johne's disease*

Up to 35 per cent of cows with advanced clinical disease will shed *M. paratuberculosis* in their milk. As well, there are reports of calves being born already infected, but this appears to occur only among dams that are shedding very high numbers of the organism.

*Mycobacterium paratuberculosis* is resistant to environmental degradation, as well as many disinfectants. This organism survives in stagnant water, manure or deep soil for up to a year. It also withstands freezing at minus 14°C for up to a year. The ability of this organism to survive in the environment is reduced by the presence of urine or by the ensiling process.

Calves under six months of age are the most susceptible to infection. Depending on the number of organisms the calf is exposed to, only about a third of exposed calves become chronically infected with *M. paratuberculosis*. Clinical signs of disease are seldom observed in animals under two or three years of age. Consequently,

this is a disease of adults in which the infection was acquired in the first few months of life.

*M. paratuberculosis* infects cells that line the intestines, but does not damage them. It is also not detected by the immune system, or does not trigger an immune response enough to eliminate it at early stages in younger animals. However, as the disease progresses clinical signs may appear as a result of the body's immune response to the presence of *M. paratuberculosis*, not by direct damage of the intestinal cells by the organism itself.

## Signs of Infection

Less than five per cent of infected animals develop clinical signs of illness. The reason for this is unknown. Infected animals without clinical signs act as carrier animals and are a source of infection to the environment on the farm. Clinical signs seldom develop in animals under two to three years of age. Affected animals may develop intermittent bouts of diarrhea that gradually become more frequent. Other animals suddenly develop diarrhea, which persists until death. Progressive weight loss is typical of this disease and may begin before diarrhea develops. Although affected animals appear unthrifty, with a rough hair coat and declining milk production, their appetite remains normal until the terminal stages of the disease. As a result of the chronic protein loss through diarrhea, affected animals may develop ventral edema (bottle jaw).

Weight loss without diarrhea is the main sign of disease in sheep and goats.

## Diagnosis

Animals with chronic, non-responsive diarrhea and progressive emaciation, coupled with a normal appetite should be viewed with suspicion. Johne's disease is confirmed by a postmortem examination where increase thickness and transverse folds in the intestinal lining are observed.

It may be difficult to detect infected animals that do not exhibit clinical signs. Culture of feces for *M. paratuberculosis* is expensive because of the long time required to grow the organism. Cultures must be incubated for up to four months before they can be called negative. Intermittent shedding also makes a negative fecal culture difficult to interpret. Several blood tests are available, but the number of false positives and negatives makes these tests unreliable.

## Vaccination

Vaccines have been developed in the United States, Europe and New Zealand. They are effective in reducing the number of clinically affected animals. Unfortunately, vaccination does not reduce the total number of infected animals in the herd.

Reactions at the injection site in animals or in humans injected accidentally are major concerns regarding the use of paratuberculosis vaccines. These vaccines are not available in Canada because they interfere with subsequent tuberculosis tests.

## Control

Producers should attempt to maintain a disease free herd by rearing their own heifer replacements. Purchasing replacements is risky because of the lack of a reliable test to detect infected animals that are not showing clinical disease.

Once the disease has been diagnosed in a herd, avoid selling the animals for dairy or breeding purposes. Infected herds have up to 20 times more carrier animals than those showing signs of disease.

Because of the difficulty in detecting carrier animals, eradication of Johne's disease from a herd is unlikely to be successful. Even complete depopulation may be unsuccessful due to the risk of purchasing carrier animals to repopulate the herd. Rigid culling procedures and improved herd management will reduce Johne's disease to acceptable levels.

Recommended management practices for infected herds include the following:

- Cull animals exhibiting signs of clinical disease that suggest of Johne's disease. Have the carcasses examined to confirm the diagnosis.
- Cull all offspring, dams and siblings of confirmed cases.
- Separate unthrifty animals from the herd.
- Clean and disinfect areas where affected animals have been kept. *M. paratuberculosis* is susceptible to 10 minutes exposure to five per cent formalin, 1:32 cresylic disinfectant, 1:40 phenol, 1:1000 mercury bichloride and 1:50 calcium hypochloride.
- Remove manure from the barn yard regularly and spread on cultivated land. Avoid spreading manure on pastures.
- Pasture calves on clean pasture and maintain in winter quarters separate from adults until the heifer enters the milking herd.

- Drain, fill or fence off sloughs.
- Protect young animals from adult manure drainage.
- Ensure feed and water are not contaminated with manure. Drinking water should be piped from clean sources.
- Remove calves from their dams immediately after birth and put them in clean quarters separate from adult animals.
- Clean the udder before drawing colostrum for calf feeding.
- Rear calves in individual pens and switch to a high quality, powdered milk replacer after 72 hours of age.

## Prevention and Control Programs in Alberta

Currently, there are two programs and one project in Alberta:

### The Alberta Voluntary Johne's Cattle Herd Status Program (VJHSP)

This Alberta initiative was started in September 2001 to reduce the likelihood of Johne's disease in Alberta's cattle herds. The goal of the herd status program is to: identify and categorize herds on the strength of apparent freedom from Johne's disease, provide a simple system to communicate to cattle buyers the risk of Johne's disease infected animals and stop the spread of this infection to non-infected cattle herds. This four-level voluntary program offers to interested cattle producers the opportunity to work with accredited veterinarians and to evaluate the Johne's disease status of their herds using specific sampling and testing protocols. Each level represents an increase in confidence that the herd is free from Johne's disease.

### The CanWest DHI Johne's Disease Prevention Project

This project was initiated in Ontario in 2005 and in 2006 it was extended to the western provinces. Several industry organizations, government agencies and academia are the project partners. This project began in Alberta on March 2006. It provides assistance to veterinarians and dairy producers to develop sound calf rearing programs that help prevent the spread of Johne's disease. This project is executed through trained veterinarians who conduct risk assessments and evaluate the potential financial impact of Johne's disease in a particular herd.

### The National Johne's Disease Prevention and Control Program

Alberta producers, including dairy, beef, sheep and goat producers, have agreed to join the National Johne's Disease Prevention and Control Program, an initiative proposed by the Canadian Animal Health Coalition. This organization was formed by a broad group of stakeholders in 2006. The program provides two pathways. The first is the testing pathway, which is designed for herds with low prevalence of infection. The second is the prevention pathway, which takes many elements from the CanWest DHI project. The key element of the prevention pathway is keeping the healthy and susceptible animals in the herd (i.e. young calves) disease free by reducing the risk of transmission from those animal that are presumably infected with Johne's disease.

This strategy is designed to determine the risk factors present at each farm that influence the occurrence of Johne's, and then to gradually reduce the presence of the disease by eliminating those risk factors. A trained veterinarian works with the producer to design a plan of best management practices for implementation. Every year this plan is reviewed and updated, with the ultimate goal of reducing and eventually eradicating the problem. Some degree of testing may be required during this process to provide information on the progress and the impact of the new management practices.

### For more information:

Call (780) 644-2148 or Alberta Agriculture and Food's Ag-Info Centre at 310-FARM (3276).

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