

# The Cost of Johne's Disease to Dairy Producers



**Two out of three U.S. dairy operations are infected with the bacteria that causes Johne's disease. Is your herd one of those herds?**

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*Dr. Elisabeth Patton, chair of the USAHA Johne's Committee; Wisconsin Department of Agriculture, Trade and Consumer Protection, Division of Agriculture; Dr. Jason Lombard and Dr. Chuck Fossler, USDA-APHIS-VS-CEAH; and Dr. Michael Carter, USDA-APHIS-VS.*

## Johne's Disease and Dairy Herds

The National Animal Health Monitoring System Dairy 2007 study indicates that 68.1 percent of U.S. dairy operations are infected with *Mycobacterium avium* subspecies *paratuberculosis* (*MAP*), the organism that causes Johne's disease.

The 2007 NAHMS study also suggests that at least one in four U.S. dairy operations may have a relatively high percentage of Johne's-infected cows in their herds.

There are three stages of Johne's disease in cattle:

**STAGE I:** Infected but showing no clinical signs and not shedding *MAP*. Typically this stage occurs in calves, heifers and young stock less than two years of age and many adult animals exposed to small doses of the disease-causing organism.

This stage progresses slowly over many months or years to Stage II.

**STAGE II:** Infected, shedding *MAP* but showing no clinical signs. Typically this stage occurs in older heifers or adults. These animals pose a major, but often hidden, threat for infection of other animals through contamination of the environment.



“The vast majority of Johne’s disease-infected animals appear completely normal although many of them are already shedding the organism and are therefore infectious to others.”

— Pennsylvania Department of Agriculture

**STAGE III:** Shedding *MAP* and showing clinical signs. The onset of Stage III is often associated with a period of stress, such as recent calving. Cattle at this stage have intermittent, watery manure.

Animals lose weight and gradually drop in milk production but continue to have a good appetite. Some animals appear to recover but often relapse in the next stress period. Most of these animals are shedding billions of organisms. Clinical signs often last several weeks to months

before the animals are sent to slaughter in a thin, emaciated condition.

“The larger the herd, the higher the risk of Johne’s disease.”

— USDA-APHIS-VS

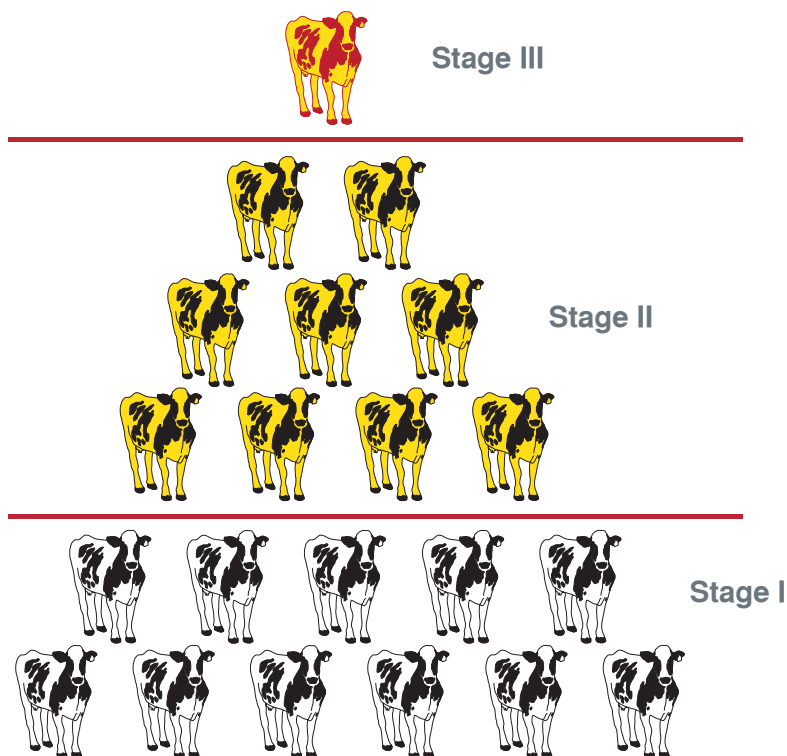
In the final and terminal aspects of Stage III of the fatal disease, animals become emaciated

with fluid diarrhea and develop “bottle jaw.” The carcass may not pass meat inspection for human consumption in the later phases of Stage III.



## 'The Iceberg Phenomenon' - Infection in the Herd

In the typical herd, for every animal showing clinical signs (Stage III), many other cattle are present in the earlier stages of the disease. For every obvious clinical case (Stage III) of Johne's disease on the farm, 15-25 other animals are likely infected. The clinical case represents only the "tip of the iceberg" of the Johne's infection.



### For every Stage III cow expect:

- 1-2 more cows in Stage III (clinically diseased)
- 6-8 cows in Stage II (unapparent carrier adults)
- 10-15 cows in Stage I (infected calves & young stock)

Researchers contend that, in a herd of 100 milking cows, two clinical cases at one time suggest 20-30 others are infected, and less than half of the infected cattle are detectable by fecal culture. If 25-30 animals are fecal culture positive on a single herd (100 adults) fecal culture test, it is likely that at least 50 percent of the cattle in the herd are infected.

The iceberg phenomenon illustrates the key concept in recognizing the potential impact that Johne's disease can have on a herd. That is, if the infection remains unchecked, the rate and number of infected animals in the herd increases progressively over time. Early diagnosis and prevention of spread,

before multiple clinical cases have surfaced, can avoid the development of Johne's disease into a significant herd problem five to ten years into the future.



## Hidden costs associated with Johne's disease<sup>1</sup> include...

- Premature culling of clinical or infected animals.
- Increased veterinary costs.
- Increased replacement costs.
- Increased susceptibility to other disease and possible breeding problems.
- Increase in overall cull rate.
- Decreased milk production in infected but normal-looking animals. (Production effect depends on parity, stage of disease and stage of lactation.)
- Decreased slaughter value of 20% to 30%.
- Decreased pool of available replacements, thereby limiting genetic pool.
- Decreased feed efficiency.
- Loss of marketing animals for sale.
- Loss of investment in young stock that have been infected or exposed since birth.

“Lost productivity from Johne’s disease may be costing the U.S. dairy industry in excess of \$200 million to \$250 million annually.”<sup>2</sup>

—USDA-APHIS-VS



Research also shows that, in addition to reduced production and days in milk, cows testing positive for Johne's disease by milk ELISA had<sup>3</sup>...

- Higher somatic cell scores.
- More days open.

Johne's disease is also a trade issue. The OIE, the World Organization for Animal Health, considers Johne's disease—referred to as "*paratuberculosis*" in official OIE documents—a disease of major global importance. As such, individual countries may restrict entry only to Johne's disease test-negative animals.

"I had heard about Johne's disease but thought, 'That's not me.' Because we have had a closed herd since 1974 and were not bringing new animals into the herd, I didn't think we were at risk for the disease. Boy were we surprised to learn that we had Johne's disease. If we don't continue to test the herd, we won't know if we're continuing to make progress."

— Galen Schalk  
dairy producer, Hillman, Mich.



## What is Johne's Disease Costing You?

There are many ways to look at the cost of Johne's disease to dairy producers, with three ways presented here. Please keep in mind that research indicates that more than two out of three of U.S. dairy herds are infected with *MAP*, and that many owners and managers are not aware of its presence in the herd.

1. The National Animal Health Monitoring System 1996 study found that...
  - Dairy herds with a low Johne's disease clinical cull rate lost an average of \$40 per cow.
  - Dairy herds with a high Johne's disease clinical cull rate lost an average of \$227 per cow.
2. The economic impact of Johne's disease in a herd occurs in a slow, unapparent manner over several years. One research study found that the **average total farm loss per infected animal—an animal that may or may not be visibly sick—is up to \$800.**<sup>4</sup>
3. Because the economic impact of Johne's disease varies widely from herd to herd, the third “what Johne's disease might be costing you” calculation is presented in a worksheet format and allows you to insert figures appropriate for your herd.

Please be aware that the worksheet considers only the cost of clinically affected animals and does not factor in the cost of subclinically affected (Stage II) animals or infected calves and young stock (Stage I) animals. (See “*The Iceberg Phenomenon*” on page 3.) Thus, the financial drain of Johne's disease to your herd may be significantly higher than the worksheet reflects.



## Johne's Disease Cost Worksheet

### EXAMPLE

		Example	Costs
<b>A</b>	No. of cows in your herd	1,000	
<b>B</b>	No. of cows clinically affected with Johne's disease in the last year	20	
<b>C</b>	Annual average rolling herd average (RHA) milk production (lbs./cow)	24,000	
<b>D</b>	Est. percent decrease in milk prod. for clinically affected cows (5%-15% expected)	10%	
<b>Lost Milk Production</b> <i>(Multiply Row B by Row C by Row D)</i>		<b>48,000</b>	
<b>E</b>	Annual average milk price (\$/cwt)	\$12/cwt	
<b>Lost Milk Revenue</b> <i>(Multiply Lost Milk Production by Row E and divide by 100)</i>			<b>\$5,760</b>
<b>F</b>	Annual average replacement cost	\$1,200	
<b>G</b>	No. of cows clinically affected with Johne's disease in the last year	20	
<b>Increased Replacement Costs</b> <i>(Multiply Row F by Row G)</i>			<b>\$24,000</b>
<b>H</b>	Average market price of a cull cow	\$750	
<b>I</b>	Avg. market price of a JD Stage III cull cow	\$550	
<b>Difference in Market Revenue</b> <i>(Subtract Row I from Row H)</i>		<b>\$200</b>	
<b>J</b>	No. of cows clinically affected with Johne's disease in the last year	20	
<b>Decreased Revenue from Sales of Clinically Affected Cows</b> <i>(Multiply Difference in Market Revenue by Row J)</i>			<b>\$4,000</b>
<b>TOTAL ANNUAL COST OF CLINICAL CASES</b> <i>(Add Lost Milk Revenue, Increased Replacement Costs and Decreased Revenue from Sales of Clinically Affected Cows)</i>			<b>\$33,760</b>
<b>TOTAL ANNUAL COST OF JOHNE'S DISEASE PER CLINICAL CASE</b> <i>(Divide Total Cost of Clinical Cases by No. of Clinical Cows)</i>			<b>\$1,688</b>

Using the example on Page 8, complete this worksheet using estimates for your farm to see how much clinical Johne's disease is costing your herd.

		Your Herd	Costs
<b>A</b>	No. of cows in your herd		
<b>B</b>	No. of cows clinically affected with Johne's disease in the last year		
<b>C</b>	Annual average rolling herd average (RHA) milk production (lbs./cow)		
<b>D</b>	Est. percent decrease in milk prod. for clinically affected cows (5%-15% expected)		
<b>Lost Milk Production</b> <i>(Multiply Row B by Row C by Row D)</i>			
<b>E</b>	Annual average milk price (\$/cwt)		
<b>Lost Milk Revenue</b> <i>(Multiply Lost Milk Production by Row E and divide by 100)</i>			
<b>F</b>	Annual average replacement cost		
<b>G</b>	No. of cows clinically affected with Johne's disease in the last year		
<b>Increased Replacement Costs</b> <i>(Multiply Row F by Row G)</i>			
<b>H</b>	Average market price of a cull cow		
<b>I</b>	Avg. market price of a JD Stage III cull cow		
<b>Difference in Market Revenue</b> <i>(Subtract Row I from Row H)</i>			
<b>J</b>	No. of cows clinically affected with Johne's disease in the last year		
<b>Decreased Revenue from Sales of Clinically Affected Cows</b> <i>(Multiply Difference in Market Revenue by Row J)</i>			
<b>TOTAL ANNUAL COST OF CLINICAL CASES</b> <i>(Add Lost Milk Revenue, Increased Replacement Costs and Decreased Revenue from Sales of Clinically Affected Cows)</i>			
<b>TOTAL ANNUAL COST OF JOHNE'S DISEASE PER CLINICAL CASE</b> <i>(Divide Total Cost of Clinical Cases by No. of Clinical Cows)</i>			

## Stop Financial Drain

Because Johne's disease is a hidden disease, testing should be a part of a management plan. Testing for Johne's disease can help you:

1. Determine if an animal exhibiting definite 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 contributing to the spread of 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 Johne's disease test-positive or low-risk animal before it's brought into the herd.

Reasonably accurate and cost-effective tests are available for various diagnostic and control needs. Johne's disease tests are divided into two main types of tests: those that detect antibodies that an animal makes in response to infection —serum or milk ELISA—and those that detect the bacteria that causes Johne's disease—culture or PCR.

“Johne's disease management and testing programs are affordable and achievable.”

— *Michael Collins, DVM, PhD*  
*University of Wisconsin School of Veterinary Medicine*

The accompanying chart shows the recommended test regimen for the detection of Johne's disease in dairy cattle based on herd type and testing purpose.<sup>5</sup>

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 – Rank level of risk*	Bacterial culture or PCR of environmental fecal samples	Bacterial culture or PCR 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 a Voluntary Bovine Johne's Disease Control Program herd classification, 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.*

Because animals at early stages of infection are challenging to identify reliably, repeated testing is recommended. You should work with your veterinarian to determine what test or tests are most appropriate for your herd.

Testing results should be used in conjunction with management practices that can help prevent and control Johne's disease.



### For More Information:

To learn more about specific testing requirements and management practices for Johne's disease, the

Voluntary Bovine Johne's Disease Control Program and how you can benefit from participating in your state program, 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](http://www.johnesdisease.org) and click on "State Contacts."

## FOOTNOTES

- <sup>1</sup> Wisconsin Milk Marketing Board web site:  
<http://producer.wisdairy.com/dairyresources/userfiles/jdecon.htm>.
- <sup>2</sup> Ott SL, SJ Wells and BA Wagner, Herd-level economic losses associated with Johne's disease on US dairy operations, Preventive Veterinary Medicine, June 1999.
- <sup>3</sup> Byrem TM, HD Norman and JR Wright, Characteristics of milk ELISA results for Johne's disease in U.S. dairy cows, American Dairy Science Association poster, 2009.
- <sup>4</sup> Wisconsin Milk Marketing Board web site.
- <sup>5</sup> Collins, MT, IA Gardner, FB Garry, AJ Rousell and SJ Wells, Consensus recommendations on diagnostic testing for the detection of paratuberculosis in cattle in the United States, JAVMA, Vol. 229, No. 12, December 15, 2006.



*This information is provided by:*



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