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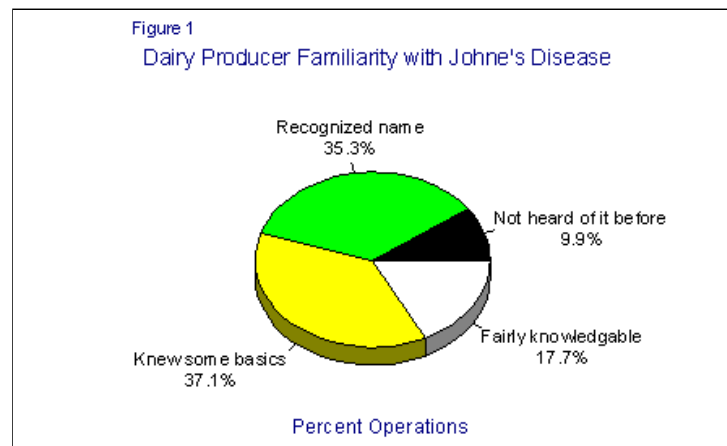
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Who can afford a \$200 loss per cow? OR *Johne's disease* - What do I need to know?

Introduction

Johne's disease, pronounced YO-knees, was identified more than a century ago, yet remains a common and sometimes costly infectious disease of dairy cattle. In spite of this, many U.S. dairy producers are unfamiliar with Johne's disease. A recent NAHMS Dairy '96 Study report shows that 45 percent of dairy producers were either unaware of Johne's disease or recognized the name but knew little else about it (Figure 1). This lack of familiarity has hindered control and prevention of Johne's disease in this country, and efforts are currently underway to change this state of awareness.



While estimates of the number of infected herds in other countries are not available, clinical Johne's disease has been reported similarly from almost all countries in the world. It has also been reported from sheep, goats, deer, llamas, and other ruminants. Johne's disease typically starts as an infection in calves though clinical signs do not usually appear until 2 to 5 years later. The disease is difficult to find in its early stages. It reduces milk production, the productive life of cattle, and has no cure. Producers and others in the industry need to be familiar with Johne's disease and its implications for their operations. While this is a complex disease that we do not completely understand, basic information about this microbe, how it is transmitted and how to control it, is available.

Cost of disease

Recent information from the National Animal Health Monitoring System (NAHMS) Dairy '96 Study, a national study of dairy health issues conducted by USDA-APHIS-VS in 1996, estimates that the cost of Johne's disease can be quite high. The study found that, in infected herds where at least 10 percent of the cull cows showed clinical signs like those of Johne's disease, the average cost to those producers was \$245 for each cow in the herd per year. In other words, the cost for a 100 cow dairy with at least this number of Johne's cull cows with clinical disease would be about \$24,000 each year. The majority of this loss was due to reduced milk production (Figure 2). Other studies, including two from New York and Wisconsin, have similarly demonstrated large economic losses, especially due to reduced milk production and premature culling. This lost productivity costs the U.S. dairy industry \$200-\$250 million annually.

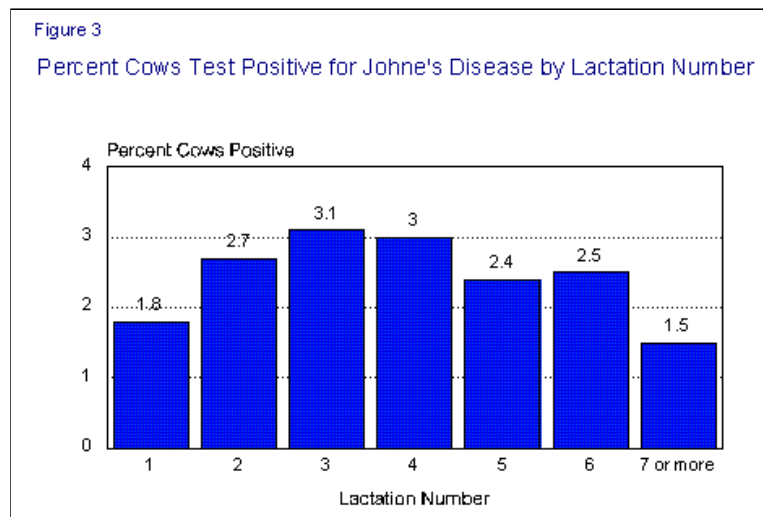
Fig. 2

Impact of Johne's herds with at least 10% of cull cows with clinical signs

Component	\$ per cow
+ Milk value	-214.39
+ Calves born	1.55
- Net cow replacement cost	32.10
= Annual adjusted value	-244.94

About the disease

Johne's disease results from infection with bacteria called *Mycobacterium paratuberculosis*. This organism grows very slowly, causes a gradually worsening disease condition, and is highly resistant to the infected animal's immune defenses. Therefore, infected animals harbor the organism for years before they test positive or develop disease signs. According to the NAHMS study, the highest percentage of blood test-positive milk cows were those in their third and fourth lactation (Figure 3). The infection primarily affects the intestine, leading to prolonged diarrhea, poor digestion and excessive weight loss. Diseased animals do not refuse feed until they are severely affected. These bacteria are typically shed, in varying numbers, in a diseased animal's feces. Once outside the animal, the bacteria is quite hardy, living for months in water, feed and manure. The bacteria may then be picked up in fecally contaminated feed or water by non-infected animals. These newly exposed animals may develop disease and spread it within the herd.



Recent research has added to our understanding of Johne's disease transmission, but has also raised concerns. Many of our previous beliefs about this disease's transmission and control have been challenged. Contrary to earlier notions that fecal contamination of feed and water was the sole means of transmission, infection of calves before they are born is possible. This appears to happen in 20-40% of calves from infected cows showing clinical signs and about 10% of calves from infected cows not showing clinical signs. In addition, the bacteria may be shed directly in milk and colostrum from infected cows, even without fecal contamination.

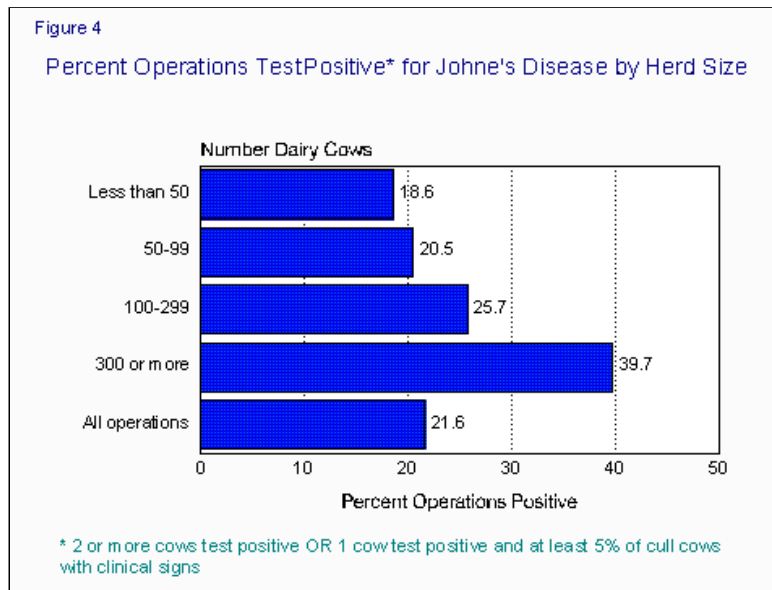
Calves less than 6 months old are most vulnerable to infection. Under intensive housing conditions with a high level of exposure of young cattle to the organism, clinical Johne's disease can become common in cattle from 1 to 3 years of age. As Johne's disease is just beginning to spread in a herd, there may be only one or two animals showing clinical disease signs at a time. These sick animals are culled and the disease may go unrecognized as a whole herd problem for some time.

National picture

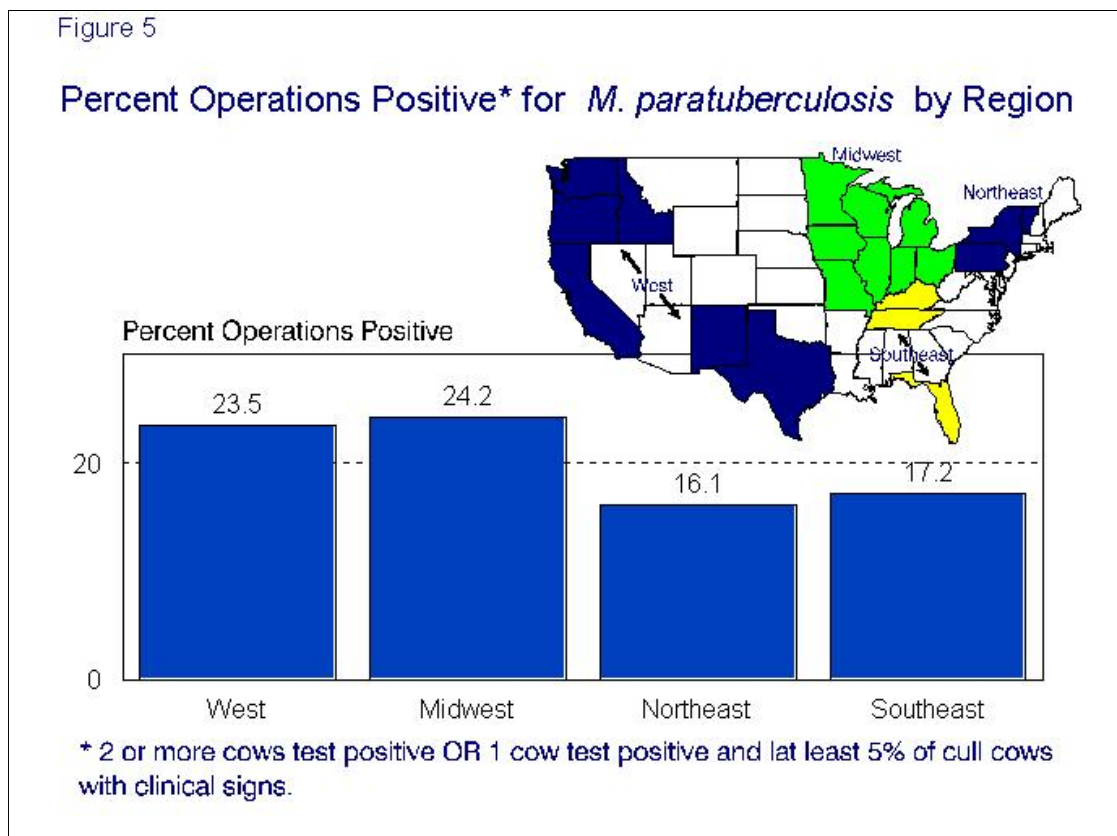
Previous studies have estimated prevalence of Johne's infection from individual states and regions, but it has been difficult to get a national perspective from these studies. A USDA study conducted over a decade ago sampled cattle at slaughterhouses and, finding a low prevalence of infected cull cows, failed to generate concern about Johne's disease. However, the new USDA Dairy '96 Study, focusing on milking herds, presents a different picture.

The Dairy '96 Study was designed, using blood tests and clinical history, to identify herds with at least 10% of cows infected with the organism causing Johne's disease. Results of this study estimated that about 22% of U.S. dairies are infected with the

Johne's disease organism. Larger herds are more likely to be infected, as about 40% of the herds with at least 300 cows were infected, compared to less than 20% of herds with less than 50 cows (Figure 4).



The larger the herd the higher the risk of Johne's disease. Only minor regional differences were noted (Figure 5), indicating that dairy producers in all regions of the country need to consider implications and risks associated with this disease.



About testing

For determining the disease status of a herd or an animal, both fecal culture and blood serum antibody tests are available to producers. A problem with current tests, particularly for the individual animal, is their failure to detect early infections. This is because blood antibody development and/or heavy fecal shedding do not usually occur until late in the course of the disease. The

difficulty in detecting early infections, along with very long period before clinical signs develop, may allow Johne's disease to remain a hidden herd problem. However, test results used along with a history of clinical signs of disease in the herd can provide information to assist disease management in the individual cow and the herd.

Control

The principles of Johne's disease control include reducing exposure and infection of replacement cattle on farm, monitoring and identifying the most highly infected cattle, and preventing introduction of infection by screening sources of off-farm replacements. Johne's disease control programs require a long-term commitment to prevention adapted to individual herds. This approach, however, has not yet been widely adopted by veterinarians and producers.

Finding replacements

Since Johne's disease occurs throughout the U.S., identification of uninfected or low risk herds as sources of replacement heifers would be beneficial. Currently, identification of infected animals before they are in an advanced disease stage and/or shedding significant numbers of pathogens in their feces is not very accurate. This makes it difficult to prevent the start of disease when introducing new cattle to dairy operations. Questions about choosing a source for replacement heifers and the appropriate disposition of young stock from a positive herd remain difficult to answer. Since an estimated 44% of U.S. dairy operations introduce cattle of various classes and ages each year (USDA-APHIS-VS, 1996), the availability of low risk cattle as herd replacements is critical. Johne's herd certification programs, with repeated herd testing, provide the best assurance for obtaining low risk cattle for replacements. This is certainly a lower risk than that from introducing untested or test-negative cattle from a herd with no documentation as to its actual Johne's disease status.

Public health

Johne's disease bacteria, *M. paratuberculosis*, has been isolated from a few humans with Crohn's disease, as have numerous other bacteria and viruses. Since results from various studies evaluating the role of *M. paratuberculosis* in Crohn's disease have been contradictory, uncertainty about potential risk to public health from this organism persists. Recent USDA-ARS research indicates that commercial pasteurization does inactivate the *M. paratuberculosis* bacteria in milk. However, some researchers still have concerns about *M. paratuberculosis* bacteria in undercooked meat, unpasteurized milk products, and water. Because of continued potential public health concerns relating to this disease, animal production industries must give this disease more attention.

Awareness about the disease

Several states have Johne's disease control programs in place or are in the process of implementing them. As reported in the NAHMS Dairy '96 Study, however, many dairy producers are unfamiliar with Johne's disease. The study showed that 45% of dairy producers were either unaware of Johne's disease or recognized the name but knew little else about it. This lack of familiarity has limited the adoption of Johne's control programs.

What is next?

The time is past when we could think of the major impact of Johne's disease as an occasional cow with diarrhea that could be culled and forgotten. Johne's disease is a herd problem that worsens with time, reducing production and profit. It may even come under further scrutiny as a risk to human health. Implications of Johne's disease should be considered by all dairy producers and control strategies are available for implementation.

To this date, there has not been a consistent national or industry-wide education or control program in the U.S., but this is beginning to change. The Johne's Committee of the U.S. Animal Health Association has formed the National Johne's Working Group to begin more cohesive education, research, and control efforts to deal with this insidious disease. This working group has been actively involved with planning the Johne's disease aspects of the NAHMS Dairy '96 and Beef '97 national studies, the USDA-ARS pasteurization studies previously mentioned, and development of a process to standardize Johne's disease tests across laboratories. The next steps for the National Johne's Working Group involve planning to provide additional educational materials and a coordinated education plan in the near future.

On a more direct level, we believe all dairy producers should ask themselves the following questions:

- Is Johne's disease important to me?
- How can I identify Johne's disease in my herd?
- If I find it, what should I do?

To help improve recognition and familiarity with Johne's disease, we intend to publish further articles on various Johne's disease considerations throughout the coming months. For additional informational sources, the following are available:

- Your local veterinarian
- Your state Johne's Disease Committee, if formed
- *Paratuberculosis (Johne's disease)*, Veterinary Clinics of North America-Food Animal practice, July 1996. Ed: R.W. Sweeney.
- *Johne's Disease on U.S. Dairy Operations*, USDA-APHIS-VS, 1997, found at <http://www.aphis.usda.gov/nahms>
- Johne's Information Center on the World Wide Web at <https://johnes.org/>
- National Johne's Working Group, Education Subcommittee Chair, Dr. Don Hansen, Oregon State University

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