

# What is the value of Johne's testing?

The key is how you use the results. Is your goal control or eradication?

by Scott J. Wells, D.V.M.

**M**ANY have expressed frustration with Johne's diagnostic tests. Why don't test results always agree with each other? Why do culture results take so long? Why do tests cost so much? What do test results mean? Rather than respond to each of these complex questions, I want to present a larger perspective of Johne's control and the role of testing.

Let's first review the Johne's basics:

- Johne's disease is not new. It was identified more than 100 years ago and probably has been around much longer than that.
- The bacteria causing Johne's, *Mycobacterium paratuberculosis*, has a thick, fatty cell wall that helps it survive very well, including wet, cool weather.
- The effects of Johne's usually are hidden from view, partly because of a very long incubation period between initial infection and clinical signs years later.
- Johne's is a contagious disease that spreads from one animal to another usually through fecal-oral routes. Infected manure is high risk!
- Young cattle (and other ruminants) are more susceptible to infection than older cattle.
- There appear to be differences in susceptibility between cows within a herd. Genetics may be a factor.
- The Johne's disease bacteria somehow survives for a prolonged period without causing apparent harm in infected cattle. Similarly, a cousin bacterium, *Mycobacterium tuberculosis*, remains one of the leading bacterial killers of people in the world, despite research efforts, implementation of effective control programs, and widespread education.
- A vaccine, conditionally licensed and available in several states, can be used in calves less than 35 days of age. Limited research shows some beneficial effect in reducing clinical signs of disease in infected cattle later in life.
- The primary factor in initial infections is moving infected cattle in with uninfected cattle.
- The best and most controllable way to control Johne's is through making changes in how you care for your cattle. You have to reduce exposure of susceptible cattle to infected cattle and their manure.
- The primary cause of infection in a herd is exposure of young stock to manure from older cattle.

## Control is enough for most . . .

Most dairy herds, especially those with visible signs of Johne's that bring in cattle from other herds, primarily should be interested in the goal of Johne's control. Even without testing, you can estimate the impact of Johne's, recording cows culled from the herd with clinical signs of Johne's disease (persistent or intermittent diarrhea and weight loss not responsive to treatment). These economic losses have been estimated at around \$250 each for all cows in infected herds with at least 5 percent of cows culled due to Johne's each year. Since *M. paratuberculosis* multiplies only in animals (not the environment), on-farm control is focused on breaking the chain of transmission from adult cows to young stock.

Implementing a control program includes ini-

tial herd testing to determine infection status and periodic testing to evaluate progress. Of less importance is individual cow testing. Results from individual cow testing are important only when linked to specific herd care changes. If you feed milk replacer to calves and segregate calves from cows immediately after birth (including their dams), but will not cull cows with positive test results, then it may not be important to identify test positive cows individually.

The risk of transmission of Johne's from cow to calf through colostrum is not fully understood. Some people use results from individual cow testing to make colostrum feeding decisions. This practice fits into the system on some dairies but not all. Its effectiveness for control of Johne's should be evaluated on a herd-by-herd basis.

Diagnostic tests available today allow identification of most infected herds, as well as a crude estimation of within-herd prevalence. Using a blood ELISA test with follow-up fecal culture of ELISA-positive cows, detects most infected herds, except those with very low prevalence of infection. It is important to follow up ELISA-positive cows with fecal culture at the beginning of the control program. This is because some uninfected herds have been identified with misleading blood ELISA results, likely due to cross-reactivity to related organisms.

We need better methods of detecting low-prevalence herds and inexpensive, high-throughput methods to detect the causative organism. This could replace fecal culture which takes up to 16 weeks. Research at the University of Minnesota has shown that Johne's bacteria can be detected from pooled fecal samples (in groups of five cows per pool). Additionally at the University of Minnesota, the genomic structure of *M. paratuberculosis* has recently been sequenced and work is underway to develop valid rapid DNA-based tests. Other research is exploring the value of environmental testing (including lagoons). These



**GETTING CALVES AWAY** from cows and getting colostrum into them soon after birth are two of the most important things we can do. A growing number of dairymen are managing as if all cows have Johne's, regardless of individual cow test results.

methods could be used in the future as part of strategies for herds that do not require individual cow testing.

## To attempt eradication . . .

On the other hand, some people, especially those purebred herds, are interested in eradicating Johne's. They have financial incentive to spend money to do so, including a desire to reduce their liability from selling potentially infected cattle to others.

A strategy to identify herds likely to be free from infection has been developed nationally by USDA-Animal and Plant Health Inspection Service and adopted by many states. This program, the Voluntary Johne's Disease Herd Status Program (VJDHSP) for Cattle, involves an annual test of all or a subset of cattle within the herd. It can add value to cattle marketed to other herds as herd replacements. Lists of herds participating on this program already are available in several states and soon will be available on the USDA-APHIS website.

In addition to using this control program, infected herds interested in eradication can justify additional testing to identify infected individuals to be removed from the herd. Current tests do not identify all infected cattle. Our best estimates are that the blood ELISA tests currently available detect only about 25 percent of normal appearing infected adult cattle. Similarly, the tests falsely identify as positive about 1 to 3 percent of uninfected cows. The cost-effectiveness of a test-and-cull program depends upon a herd's situation. But it has been shown not to be feasible for most herds using currently available blood ELISA tests.

Certainly, herds willing to make this investment should have a low prevalence of infection within the herds to begin with. They also should avoid reintroducing Johne's through purchased cattle either by maintaining a closed herd or buying cattle only from low-risk, VJDHSP herds.

As far as Johne's eradication is concerned, individual cow testing is a very important yet troublesome issue. Since herds working on eradication often have low prevalence of infection, many of the test-positive cows are not truly infected. For example, in herds with 1 percent of cows infected, only about 20 percent of serum ELISA-positive cows are truly infected. By contrast, in herds with 20 percent of cows infected, about 86 percent of serum ELISA-positive cows are truly infected. This points out the importance of careful interpretation of test results based on knowledge of the herd being considered.

## What's your goal?

Is your goal Johne's control or eradication? If control, have you performed a herd risk assessment and put a herd control plan in place? What is the purpose of your testing? How will you use the results? Do you need results from individual cows to implement your herd plan?

If your goal is eradication, are you willing to pay for the additional testing needed and for the lack of 100 percent validity of currently available tests? Also, have you committed to maintaining a closed herd or purchase of cattle only from herds participating in the Voluntary Johne's Disease Herd Status Program?