

BALANCING ACT

Culling highly infected cows has a big role to play along with other key factors to combat Johne's disease

Johne's Fact Sheet

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When it comes to Johne's disease control programs, culling tends to stir up the most discussion. No one wants to dispose of cows that still have years of valuable production ahead of them—even if they are infected. On the other hand, no one wants to keep cows with declining milk production that are actively infecting young replacements.

Culling high-risk cows to prevent the disease's spread is one of three main elements in the on-farm portion of the Ontario dairy industry's recently proposed Johne's program. The other two elements are a veterinarian's on-farm risk assessment and cow testing to classify herds as negative, or low-, medium- or high-prevalence for Johne's infection.

Johne's programs used around the world initially varied widely, but have become similar during the last 10 to 15 years due to experience and research. These programs always include some form of culling. The Ontario program's design freely takes advantage of this experience.

In the early 1990s, the first Johne's programs focussed on testing. Once producers and their vets received herd test results, test-positive animals were frequently culled. Often little else was done. Over time it became clear a test-and-cull prevention program, which had been used successfully against other contagious diseases like Brucellosis in Canada, won't work for Johne's.

Test-and-cull only doesn't work

Infected cows could not be identified soon enough or accurately enough to remove them in time to stop them from infecting young cattle. By the time mature infected cows were discovered and removed, infection had started all over again in the young stock. The infection and disease cycle continued in the herd.

Today's Johne's knowledge shows cattle are most likely to be infected well before they are one year old. However,



Calf management that protects young animals from infection allows culling in a more orderly traditional manner.

infected animals don't shed or pass on infection until they are more than four years old on average. As they age, they shed more and more bacteria. Cattle that actually get sick with Johne's do so years after infection and months to years after they start shedding the bacteria. This time lag means paying closer attention to finding the optimum time for each herd owner to remove cows for effective Johne's prevention.

Culling cows for Johne's can be an expensive proposition if done too early or too late. The objective is to pick the right time to remove animals to achieve the best results for both disease control and economic benefit. Culling decisions are not easy to understand or study. They vary from herd to herd, and even within the same herd at different times. A lot depends on several factors that can occur in the herd at the same time.

Culling still needed

While research and herd studies tell us the simple test-and-cull won't work on its own, we also know adding a cow's Johne's status to the culling decision process for a herd is still an important practise. We don't want to abandon culling for Johne's completely.

Only recently, however, have studies been published that provide some practical perspectives on culling information. One study used mathematical techniques and updated information about how Johne's infection is transmitted to clarify culling's role in Johne's control.

Researchers created herd scenarios where they considered a variety of prevention practises and how well they were done in herds with low to high infection rates. They wanted to describe how culling decisions should be included in a herd's overall Johne's prevention strategy. This helped clarify whether test-positive cows should be removed.

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This research showed it is always advantageous to permanently remove highly infectious cows shedding large numbers of Johne's bacteria in their manure—at all herd infection levels using currently available tests and a whole range of prevention strategies. Other studies have shown these cows suffer from advancing Johne's and produce less milk as a result. Removing high shedders makes sense for improving both Johne's prevention and production efficiency.

You can confidently identify most high-shedding cows with testing. Most have very high antibody titres in milk or blood—1.0 or higher titres on the milk ELISA test or an equivalent value on serum ELISA. New York researchers followed 112 individual cows in six herds for 18 months with monthly serum and manure testing. They found the first high-titre serum ELISA value alone would have reliably identified more than 80 per cent of high-shedding cows.

Animals with high antibody titres of 1.0 or higher on the milk ELISA are the most risky of Johne's infected cows. There is no justification to keep them or move them to another herd once they are identified. You can be confident in the accuracy of these results.

Test reliability for predicting the course of Johne's in lower titre cows was not nearly as dependable, the researchers found. The best culling decisions for lower titre cows depended on other herd management criteria.

Calves need protection

For example, removing the high-titre cows was not enough in herds with poor Johne's prevention practises that left calves unprotected—they needed to cull much more aggressively. These herds also needed to remove lower titre cows and test much more frequently. The only way to prevent the spread of Johne's was to remove as many test-positive cows as possible, as quickly as possible.

Even then, while these herds could reduce Johne's spread, this was a costly strategy. Cows were removed at a younger age, so they had fewer lactations, producing less milk and fewer calves. Additionally, at the lower titre levels some uninfected cows could mistakenly be removed in the push to rapidly clear out as many infected cattle as possible.

If herds had excellent Johne's prevention practises protecting their young calves from infection, culling could be less aggressive. Testing could be less frequent since safeguards were in place to protect calves if infected cows shed Johne's bacteria before being identified. Fewer cows would be needed to be culled to prevent infection from spiralling upwards, and culling could proceed in a more orderly and traditional manner. Yet successful Johne's prevention would still be possible.

Culling remains an important feature of all Johne's prevention programs around the world. You can be confident that permanently removing high-shedding, high-titre cows based on currently available tests is a good decision for everyone.

Ontario test data so far indicate these cows are relatively uncommon. Beyond culling high-titre animals, removing test-positive cows is a strategic decision you have to make with your vet. For Johne's prevention, rapid removal is a good strategy if you can't protect calves, but has stiff costs from premature loss of productive cows and the creation of replacement problems.

Slower removal or non-removal of lower titre test-positive cows can be a good strategy. However, you have to protect calves thoroughly so they don't pick up the disease from remaining infected cows.

A balancing act

Culling for Johne's prevention is a balancing act. Deciding how fast to cull or whether to cull test-positive cows at all—not including the high titre ones—hinges on how well you can protect young calves from infection.

To make good culling decisions for Johne's prevention, you have to understand the disease's complete pattern on your farm. Herd testing will help, but you need to assess calf-raising practises so you can factor the risk to calves into the culling equation.

You can get an objective assessment by doing a Johne's risk assessment with your herd vet. The questionnaire guides a systematic examination of calving practises, calving management, calf housing and calf feeding. It estimates the likelihood that calves will be exposed to Johne's bacteria in the early stages of life on your farm.

Herd vets can also use their knowledge of the herd's health background. They can help put the Johne's test results, risk assessment findings and your goals in perspective to develop the best culling policies for economical, effective Johne's prevention.

As more research accumulates on the details of Johne's prevention programs and their cost effectiveness, it is clear the most costly decision you can make is not testing to see if Johne's is present in your herd, and not including a prevention strategy in your overall herd health program.

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References: Lu Z, RM Mitchell, RL Smith, JS Van Kessel, PP Chapagain, YH Schukken and YT Grohn. The importance of culling in Johne's disease control. *Journal of Theoretical Biology* 254 (2008) 135-146. Van Schaik G, CR Rossiter, SM Stehman, SJ Shin and YH Schukken. Longitudinal study to investigate variation in results of repeated ELISA and culture of fecal samples for *Mycobacterium avium* subsp *paratuberculosis* in commercial dairy herds. *American Journal of Veterinary Research* V 64 N 4 (2003) 479-484.

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