

Guidelines for Johne's Disease Test Utilization and Interpretation for Ontario Veterinarians

Ulrike Sorge, Population Medicine, OVC; Ann Godkin and Jocelyn Jansen, Veterinary Science and Policy, OMAFRA.

The causative agent of Johne's Disease in cattle is *Mycobacterium avium* subspecies *paratuberculosis* (MAP). As part of the Ontario Johne's Disease Education and Management Assistance Program, producers have the opportunity to be reimbursed for one herd test for MAP antibody. Veterinary practitioners will be called upon to interpret results and help producers plan for future testing. Using standard interpretation criteria will help us all relay consistent information to producers and reduce confusion and inertia.

Test interpretation – A Key Message of the Ontario Program:

A key message of the Ontario program is to interpret the MAP herd test results at the herd level to achieve maximum benefit with minimum error. You can test your understanding of this with a "test question". If a result is truly being interpreted at the herd level, you would not need to know which cows had which results, you would only need to know how many head were tested and how many had strong positive, positive, suspicious or negative test results. Having said that, individual cow results are reported by both CanWest DHI and AHL and do help us in some ways, but should not be "over interpreted". Cow results can help veterinarians detect disease patterns in a herd (are the positives purchased or home raised cows?), trends over time, make management recommendations and, under very special circumstances, to make individual cow decisions. It is very important that veterinary practitioners help producers make the right interpretation of their test results and use the information to best further their calf health program.

The Individual Cow Level

Using ELISA at the cow level:

- The sensitivity and specificity of the milk and serum ELISA tests for MAP antibody are similar (Lombard et al, 2006).
- Both tests have poor sensitivity for detecting all infected individual animals. There will be false negative test results.
- Specificity of both tests is high but not 100%. There can be a small number of false positive test results (See Table 1).
- Antibody titres in milk and serum may fluctuate over time and this can lead to changes in cow test results (van Schaik et al., 2003).
- Milk ELISA is slightly more sensitive at the cow level at the beginning and end of lactation (Nielsen et al., 2002a & 2002b).
- Serum ELISA may be slightly less sensitive at the end of the dry period or early lactation (3 weeks prior to as well as 3 weeks after calving) (Stabel et al., 2004).

Table 1: "Assumptions for test sensitivity and specificity used when selecting the best test for detection of paratuberculosis in cattle" (Collins et al, 2005)

Test (for individual cows)*	Sensitivity (%)	Specificity (%)
Bacterial Culture of fecal samples	60 ± 5	99.9 ± 0.1
PCR assay of fecal samples	30 ± 5	99.5 ± 0.5
ELISA on serum or milk	30 ± 5	99.0 ± 1.0
Evaluation of biopsy specimens	90.5 ± 5	100
Necropsy	100	100

* The test Sensitivity and Specificity are averaged numbers from the literature.

ELISA interpretation at the cow level:

- Individual test result scores of 1.0 or greater on the milk ELISA or the equivalent on the serum ELISA are **strong positives**.
- The higher the antibody titre (or optical density), the more likely it is that the cows are truly positive and the less likely they are to change their test result status (Sorge et al., Ontario research 2009, unpubl.).
- Research suggests that animals with scores of 1.0 or greater likely have MAP disseminated throughout the body, are actively shedding MAP and are more likely to become clinical in the current or next lactation.
- The significance of the variation in ELISA sensitivity associated with testing at different stages of lactation is small compared to the overall low sensitivity of the test for accurately predicting the infection status of each individual cow, especially those in the early stages of infection or disease.
- There is no rapid or definitive test to know the true infection status of an individual animal prior to purchase.

Take home messages at the cow level:

- #1: Interpret all Johne's tests with caution at the individual cow level. Only when test results are very high, can the individual cow's status be known with any reasonable level of confidence.**
- #2: Interpret all test results using all available information. Use knowledge of the history of MAP in the herd, the age and the breed of the cattle tested, where the animals were raised and the likelihood of MAP introduction through frequent animal additions from other herds.**
- #3: WAIT and retest to gain confidence in a particular cow's status. Repeated testing (multiples) with the same test over time (months to years) gives greater confidence than using different types of tests at the same time.**

The Herd Level

Using ELISA at the herd level:

- Test the full herd at least once initially. Test all cows in the milking herd, including first lactation animals, on a single occasion. Ensure that dry cows are not overlooked.
- The sensitivity of aggregates of individual cow ELISA tests to identify a herd as being positive for MAP infection is high (based on a herd being classified as positive when they have two or more test-positive animals)(Hendrick et al., 2005, Tavorpanich et al., 2008).

ELISA interpretation at the herd level:

- **Interpret the herd test results at the herd level to answer two questions:**

1. Is it likely that the herd has Johne's Disease? (if at least one cow had a positive test, the answer is yes).
 2. If yes, is MAP infection likely to be a big or small problem for this herd owner?
 - 0% *is considered* a test negative herd
 - 1-5% *is considered* a low test positive herd
 - 6-10% *is considered* a moderate test positive herd
 - >11% *is considered* a high test positive herd
- Culling all test positive cows alone does not make a herd MAP infection negative. Undetected (test negative) subclinical MAP shedders can still be present in the herd and transmit infection to calves. This would be an inappropriate use of Johne's test results.

Take home messages at the herd level:

- #1 Testing of all cows in the herd for Johne's at one time gives the best description of herd status. Repeated testing over years gives greater confidence in the herd status.**
- #2 Use the herd test result to answer two questions at the herd level – Is it likely this herd has Johne's? If yes, how big a problem is it?**
- #3 The best prevention for Johne's Disease are changes made to management at the herd level.**
The combination of removing Johne's strong test positive cows and making the appropriate herd level management changes are the most effective means of reducing the prevalence of Johne's.

How often should a herd be tested for MAP?

Currently there are no formal requirements for how often a herd is to be tested for certification or other reasons, so the answer is "it depends". Factors to consider are: the frequency of positive tests in the last herd test, the age distribution of the cows in the herd, the Johne's goal of the herd owner and the expected cost-benefit.

For example:

- A. A herd has no history of clinical Johne's disease, introduces no cattle and was completely test negative at the last herd test. It would be appropriate for the testing interval to be multiple years. It is a low risk herd.
- B. A herd had 15% of cows test positive at the last Johne's herd test. Repeated testing with a short interval between tests (up to 3-4 times per year) would be appropriate. There is need to identify infected animals quickly (as soon as possible after they advance to test positive status) to rapidly reduce the reservoir of MAP on the farm to reduce infection pressure on calves and to reduce the risk of having test positive cows advancing to clinical Johne's Disease.

Ultimately, the testing plan has to be tailored to each herd. The herd veterinarian and the owner need to work together to make the best management and testing plan for each herd's situation.

Take home message about herd programs:

- #1 The frequency of herd testing depends on the herd's disease status and management situation.**

References

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