

Johne's Diagnostic Results – Supplemental Information

Johne's is a chronic infectious disease of ruminants caused by *Mycobacterium avium subsp. paratuberculosis* (MAP), which induces thickening and breakdown of the lining of the small intestine which significantly reduces its absorptive capacity. Because there is currently no effective treatment or vaccine, disease detection and management remain the best weapons in the battle against this disease.

Johne's, in its clinical stages, is characterized by persistent diarrhea, progressive weight loss, and eventually death. Losses, estimated at \$40 to \$227 for every cow on dairy operations with a moderate incidence of clinical Johne's disease (1997, NAHMS Dairy Study), are primarily attributed to reduced milk production and premature culling, but losses in milk component value and reproductive efficiency are also significant.

Infection occurs primarily in young animals by ingestion of contaminated feces or milk from infectious adults. Intrauterine transmission has also been documented. Risk factors for transmission include contaminated maternity areas, suckling, and proximity between replacements and infectious adults. Contaminated feed, including pooled colostrum, waste milk and contaminated water sources are also common points of infection in calves.

Johne's disease remains largely silent during its slow progression into the final clinical stages. However, subclinical animals are often infectious and require testing for identification, management and removal.

To date there is no single test sufficient for complete diagnosis of the disease; however, the most cost-effective approach to determine the Johne's prevalence in a herd is by screening for potentially infected animals with enzyme-linked immunosorbent assays (ELISA). ELISA's are inexpensive, fast and easily automated. Lacking the sensitivity required of individual animal diagnostics, these antibody-based tests are very effective as herd screening and monitoring tools. The AntelBio Milk ELISA is equivalent to the serum ELISA in sensitivity and specificity.

An alternative to the ELISA-based antibody tests are assays that detect the organism directly. While organism-based tests are considered more reliable than the antibody-based tests and are often used as follow-up tests to antibody-based assays, they are also generally slower (up to 16 weeks for traditional culture) and relatively expensive. AntelBio also offers a DNA test that detects MAP in feces, providing results in approximately 10 days.

Regardless of the assay, antibody-based or organism-based, their performance or sensitivity suffers because of the physiology of Johne's disease. During the early stages of Johne's disease, fecal shedding of the organism and onset of antibody production have not yet occurred. Therefore, Johne's management programs rely on controlling risk by quickly identifying test-positive animals and reducing the odds of transmission through selective management.

Interpreting Your Johne's Results

The enclosed results offer valuable information that should be shared with your veterinarian and other members of your farm management team. Members of your farm management team are critical in implementing any Johne's program.

Research has indicated that the risk of transmission increases with increasing ELISA score. Based on ELISA score animals can be segregated into groups based on relative risk of transmission. This enables owners to use appropriate management practices with each group.

Management actions should generally be operation or goal specific, and it is frequently beneficial to consult with herd health professionals prior to developing Johne's control programs. However, some basic risk groupings, based on ELISA score and the relative risk of disease transmission, as well as associated management actions are described below. Animals can be identified to reflect their grouping for easier management.

High Group (ELISA score greater than 0.50): Cows with ELISA scores above 0.5 are considered major threats for transmission of MAP.

- ✓ Strong consideration should be given to immediate culling
- ✓ Don't rebreed
- ✓ Discard colostrum
- ✓ Use separate maternity pens
- ✓ Don't keep calves for replacements or identify daughters automatically as low risk
- ✓ Watch for clinical symptoms
- ✓ Retest to determine disease progression

Moderate Group (ELISA score between 0.15 and 0.50):

- ✓ Consideration should be given to culling
- ✓ Don't save colostrum
- ✓ Utilize separate maternity pen
- ✓ Identify daughters
- ✓ Retest to determine disease progression

Low Group (ELISA score between 0.07 and 0.15):

- ✓ Discard colostrum
- ✓ Use separate maternity pens
- ✓ Retest annually to determine disease progression

Ultimately, any animal above the cutoff line (0.1) on the graphical results should be considered higher risk for Johne's disease. Johne's control and management practices should be implemented on these animals. If more than 3 percent of your animals are located above the line and Johne's has been previously diagnosed on your farm, it is very likely that Johne's is having a significant impact on your economic return. Implementation of a Johne's control and eradication program will add value to your farm through increased production efficiency and improved biosecurity. If less than 3 percent of your herd is above the line, your herd has a low prevalence of Johne's disease. With low prevalence it is imperative that management practices are implemented to control the spread of Johne's from the suspect animals, and to stop the introduction of Johne's disease.

Whole-herd testing is extremely helpful in interpretation of individual animal results. The probability that any individual test result is correct depends on the prevalence of Johne's in your herd. Whole-herd testing can be a tremendously valuable tool to manage the risk associated with individual infected animals.

A high prevalence level may demand that the definition of "high-risk" animals include animals and their family tree. More rigorous management strategies should be applied to this group of animals. Depending on your goals for Johne's eradication, management strategies can range from simple improvements in hygiene in the maternity area to radically depopulating the "high risk" group. On-going testing with a whole-herd milk ELISA will continually redefine your "high risk" group and monitor the progress of your Johne's program.

Enhanced management strategies also apply to herds with a low Johne's prevalence, but the definition of "high risk" may be different because it can be assumed that the majority of the animals are negative. To start, follow-up testing with an individual animal test could be implemented to increase the likelihood of identifying the last of the truly Johne's-positive animals. In low prevalence herds it is critical to avoid the reintroduction of Johne's by limiting purchases to test-negative animals from herds with a lower prevalence than what exists in your own herd. Herds without a legitimate estimate of prevalence must be considered high risk and of lower value in the marketplace.

Whole-herd testing enumerates the risks associated with the management of individual animal test results, and it can also be used to categorize individual animals into management scenarios designed to achieve goals associated with the control and eradication of Johne's disease. Whole-herd test results should be used to develop management practices that discourage the introduction and spread of Johne's disease on the farm. The rigorousness of these management practices depends entirely on how Johne's is affecting your production efficiency and profitability and the priority you set for the control and eradication of the disease.