



Testing Cattle for Johne's disease Choosing the Right Test for the Right Purpose

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Have a testing strategy

Despite some limitations, testing is indicated and a useful adjunct to many Johne's disease farm plans. However, if you and your client are lacking a plan for interpreting and using the test information, the results can prompt confusion, waste time and money, and erode confidence in efforts to prevent or control Johne's disease. To get the most from an investment in testing, veterinarians and producers should critically consider what they want to accomplish with testing and how results will be used to help achieve the farm's control goals.

Have a management plan

Before investing time and money in testing for Johne's, take the time to complete a risk assessment and herd history for Johne's Disease. Then develop a management plan for prevention or control. Base it on the prevalence, transmission risks identified in the herd, and the producer's control goals and resources. Follow the outlined steps in the Johne's Disease Prevention/Control – Manual for Veterinarians or use the short version entitled Johne's Disease Risk Assessment and Management Plan – Baseline Facts.

Do a reality check on your Johne's plan.

Well-implemented management efforts that are complemented by an appropriate testing scheme will be a very effective Johne's control strategy. Critique whether you believe your overall strategy will be effective enough in the long run to achieve your control goals:

- a. Are your management practices adequate to effectively reduce the cycle of spread to susceptible youngstock, at birth and later on, due to contact, feed and water?
- b. Can animals identified at higher risk of being infectious be effectively removed from the herd by segregating, culling or managing differently?
- c. Consider how to work risk management, hygiene, and test and cull/management strategies together to systematically make effective and affordable progress toward your goal.
- d. Decide on a plan. Use it for 6-12 months. Re-evaluate based on what you learned.

Testing for Johne's for different purposes

Choice of a test scheme will depend on what level of control (or information) the producer wants to strive for with current efforts. Factors to consider include what test to use, cost, who will be tested and when, and what decisions will be made based on results. Some useful strategies for different objectives are outlined below as a guide.

1. Diagnosis for a cow with clinical signs of Johne's disease.

The most rapid and least costly tests to confirm this "suspected case of Johne's disease" are the ELISA and AGID. Positive results may be interpreted by using a predictive value (Table 1). For a definitive diagnosis and or to confirm herd status, follow up a positive ELISA test with a fecal culture or tissue biopsy.

Table 1. Probabilities (Prob) of correct ELISA & culture results at various pre-test probabilities (Est)

Est. Chance Before Testing	Prob. ELISA Positive is TRUE	Prob. ELISA Negative is TRUE	Prob. A culture Positive is TRUE	Prob. A culture Negative is TRUE
< 1%	15%	99%	100%	99%
10%	67%	92%	100%	94%
+20%	+82%	84%	100%	85%
+50%	95%	57%	100%	63%

2. Follow up after serology.

Following serology testing in a herd or in individuals with uncertain status, or for the Voluntary Johne's Disease Herd Status Program, it is recommended to retest positive ELISA animals with fecal culture, or histology and culture of appropriate tissues. Retesting with an organism-detection test is also recommended whenever a positive serology test is not consistent with your clinical assessment.

3. Preliminary evaluation of the herd.

This is an opportunity for "targeted testing". The object of targeted testing is to find infected animals. Choose animals that are suspect or at greater risk of being infected or otherwise of interest. Start with the ELISA and fecal culture any animals with S/P or OD values in the range around the positive cut-off, both below and above.

- a. Test mature animals that may have higher risk of being infected i.e., suspected exposure, poor performance, unknown source, etc.
- b. Test 10-20 percent of the adult herd. Appropriate to select animals by a random method and representative of different age or management groups.
- c. For another simple estimate, randomly test 30 animals over 2 years old. If all are negative, it offers a preliminary suggestion that the prevalence in the herd may be 10 % or less.

4. Estimating the herd prevalence.

An estimate of prevalence based on history, better if backed by testing, is important to help interpret test results, choose management strategies, and monitor progress. One reasonably accurate and quick way to measure the herd's infection level is to ELISA test all mature cattle (2 years and older) and calculate an estimate of true prevalence from the results. Crude rule-of-thumb to estimate the true prevalence from the test results is to double or triple the test result value. A simple formula that uses test prevalence and an estimate of the test's Se and Sp can also be used (Article 4).

5. Testing for control.

Implementing critical management practices plus minimizing the risk associated with suspects and high-risk test-positive animals (separation, management, or removal) are necessary to confidently reduce transmission and control or eliminate Johne's disease. Some options include:

- a. Test all animals above 2 years old with ELISA and fecal culture. Fecal culture will detect animals in earlier infection and missed by ELISA.
- b. Test all animals above 2 years old alternating ELISA with fecal culture at 6-month intervals.
- c. Test cows in mid to late gestation with ELISA and fecal culture animals with S/P ratios or OD values around the cut-off point. Results will be available between dry-off and calving. Advantages are the distribution of testing and costs over time, timelier results, and a routine and inflow of new results that forces Johne's management to become an active daily issue on the farm.
- d. To accommodate management in cow calf herds, test all cows once or twice a year, timed so that results are available before calving or breeding.

In general, asymptomatic cattle that are positive on both tests have a very high chance of being in late stage II or stage III infection and are good candidates for "segregating" and culling as soon as feasible. Cattle positive on one test and not the other may be infected but is more difficult to predict the stage. They should be evaluated for their overall condition and performance and value to the operation in making culling decisions. Their contacts, manure, colostrum and milk can be managed with the consideration that they have a higher risk of being infectious than test negative animals. Animals negative on both tests may still be infected, but they are likely relatively low risk.

6. Testing immature replacements.

Unfortunately, because of the slow progression of *M. paratuberculosis* infections from Stage I to Stage III, no currently available test has demonstrated sufficient sensitivity in young cattle, <20 months old and in Stages I or II, to warrant routine recommendation. Status of immature cattle can only be assessed from the status of the source herd. Testing 30 mature cattle (random) can give a crude indication of the herd's status.

7. Testing herd additions.

Obtaining cattle from a low risk source is the only reliable way to know that any individual is low risk. Thus, securing animals from herds that are one-time or repeatedly test-negative reduces the risk of introducing Johne's to a minimum. Testing individuals and introducing only those that are negative can reduce risk to limited degrees only. For highest assurance of negative status, mature herd additions should be repeatedly tested.

Potential source herds are ranked below in order of decreasing risk due to introducing Johne's. History is paramount in assessing risk. Low risk history means that history suggests that risk of established infection is remote and critical management practices have been in place:

- Unknown history, test additions before buy
- Unknown history, test before and after buy
- Low risk history
- Low risk history plus testing, even if positives are identified
- Low risk history and 30 random animals tested negative
- Low risk history, low prevalence positive on herd test
- Low risk history, negative herd test
- Low risk history, repeated negative tests

8. The Voluntary Johne's Disease Herd Status Program for Cattle

This program is designed to establish herds in a low-risk category based on progressive levels of testing over three years at 10-14 months intervals. A risk assessment and maintenance of critical management practices are also required. More details are available www.usaha.org or from the New York State Cattle Health Assurance Program.

- a. Randomly select and test 30 mature cattle (2nd lactation and greater) with the ELISA. Culture ELISA positives. If all tests are negative the herd is at Level One.
- b. Test cattle 2nd lactation and greater (a random subset if herdsize > 531) with ELISA and culture positives. If all tests are negative the herd is at Level Two.
- c. Test cattle 2nd lactation and greater (a random subset if herdsize > 313) with fecal culture. If all tests are negative the herd is at Level Three.
- d. Test cattle 2nd lactation and greater (a random subset if herdsize > 531) with ELISA and culture positives. If all tests are negative the herd is at Level Four.
- e. Herds can maintain their current status at any level by an annual test (ELISA with fecal culture of any positives) with negative results of 30 2nd lactation and greater randomly selected cattle.

Figure your cost to test the herd and consider the expected long-term benefit to herd health and potential profits if goals are reached.

Test choice	Herd	Selected groups or statistical sampling	Selected individuals
Serology			
Fecal culture			
Serology and culture positives			
Serology and fecal culture			