



JOHNE'S DISEASE – DAIRY

A cooperative effort of the National Institute for Animal Agriculture, USDA, APHIS, Veterinary Services, in association with the National Johne's Working Group & United States Animal Health Association

Top Six Reasons Why You Should Test for Johne's Disease

Johne's (pronounced "Yo-nees") disease is a chronic, incurable, contagious disease estimated to be present in 68 percent of U.S. dairy operations. A National Animal Health Monitoring Systems study found that infected herds experience an average loss of \$40 per cow in herds with a low Johne's disease clinical cull rate while herds with a high Johne's disease clinical cull rate lost on average of \$227 per cow. This loss was due to reduced milk production, early culling, and poor body condition at culling.

Although bacterial-causing organisms ordinarily infect calves, infected animals tend not to show clinical signs until they are three or more years of age. Infected animals maintain a normal temperature but, as the disease progresses, they exhibit diarrhea and weight loss despite a healthy appetite. In the later stages of the infection, animals can become weak and even die.

The bacterium that causes Johne's disease is *Mycobacterium avium* subsp. *paratuberculosis*, first reported in the United States in 1908. Infected animals shed large numbers of the disease-causing bacteria in their feces, leading to contamination of feed and water sources. Infected animals can also shed the bacteria in their colostrum and milk, and infected dams can pass the disease on to their offspring. Research shows that, while the bacterium cannot multiply outside the animal in nature, it can survive in contaminated soil or water for more than a year because of its resistance to heat, cold and drying.

Johne's disease must be managed as a herd problem and not tackled as an individual cow disease. Research shows that diagnosis of one clinically-infected animal in a herd of 100 cows implies that at least 25 other animals are infected.

Why Test?

If one or more animals have been culled from a herd for unresponsive chronic diarrhea combined with reduced milk production and thin condition, then Johne's disease could

be behind this deterioration. Experts maintain that samples from clinical suspects should be collected before the cows leave the herd.

The Top 6 reasons why a herd should be tested for Johne's disease include:

1. Determine if an animal exhibiting definite clinical signs is Johne's disease positive and should be culled.

2. Identify infected animals with
(Continued on Page 2)

Recommended test regimen for the detection of Johne's disease in cattle based on herd type and testing purpose

Testing Purpose	Seedstock - Dairy	Commercial - Dairy
Confirm a clinical diagnosis in a herd with no prior confirmed JD cases	Biopsy specimens, necropsy, bacterial culture or PCR assay – individual animals	Necropsy, bacterial culture or PCR assay – individual animals
Confirm a clinical diagnosis in a herd with prior confirmed JD cases	Biopsy specimens, necropsy, bacterial culture or PCR assay – individual animals	ELISA, bacterial culture or PCR assay – individual animals
Herd classification – infected or not infected*	Bacterial culture of environmental fecal samples	Bacterial culture of environmental fecal samples
Control disease in herd with known infection, high prevalence and clinical disease and owner is concerned	Bacterial culture – individual animals	ELISA
Surveillance (estimation of biological burden)	Not recommended	Bacterial culture of environmental samples
Eradication	Bacterial culture by individual or by pooled fecal samples (5 fecal samples/pool)**	Bacterial culture by individual or by pooled fecal samples (5 fecal samples/pool)**

*For declaring Voluntary Bovine Johne's Disease Control Program Test Negative Status, use the testing strategies outlined in the Uniform Program Standards for the Voluntary Bovine Johne's Disease Control Program.

**Pooled samples should be considered only with low prevalence herds. Pooled samples should be collected in accordance with the Uniform Program Standards from areas in which cattle commingle.

¹"Consensus recommendations on diagnostic testing for the detection of paratuberculosis in cattle in the United States," Michael T. Collins, DVM, PhD, DACVM; Ian A. Gardner, BVSc, MPVM, PhD; Franklyn B. Garry, DVM, MC, DACMIM; Allen J. Roussei, DVM, MC, DACVM; Scott J. Wells, DVM, PhD, DACVPM; JAVMA, Vol. 229, No. 12, December 15, 2006.



Test for Johne's (continued)

suspicious clinical signs early before they further contaminate facilities and lose salvage value.

3. Evaluate the extent of infection in your herd.

4. Monitor progress of control efforts.

5. Know if you are marketing infected or low-risk cattle and, as a result, know if you are helping spread the disease to producers' herds or helping producers prevent Johne's disease from entering their herd.

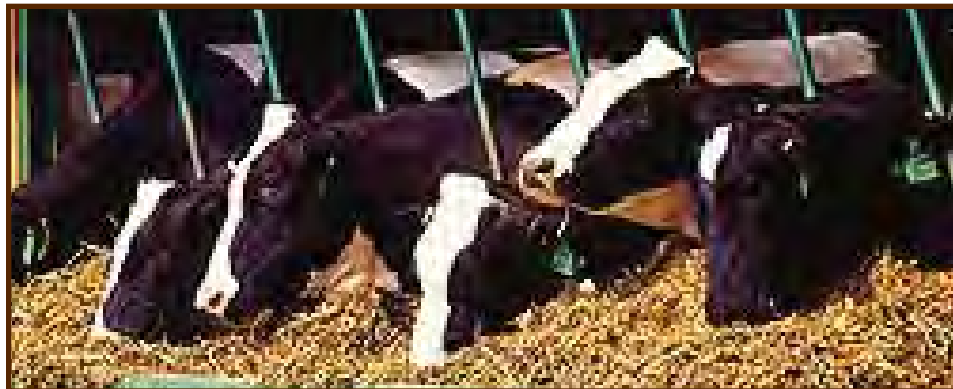
6. Know if you are about to purchase a Johne's disease test-positive or low-risk animal before it's brought into the herd.

"Before testing any animals, producers should know their goals for testing and how test results will be used," states Dr. Andy Schwartz, chairman of the National Johne's Working Group. Dr. Schwartz adds that the dedication and efforts of USDA/Animal and Plant Health Inspection Service/Veterinary Service (USDA/APHIS/VS) to prevent and control Johne's disease has led to increased test accuracy and cost effectiveness.

"Discussions with your veterinarian will determine which test is best for your situation, with the frequency of testing and decisions made based upon the test results dependent of what is practical for your enterprise," Dr. Schwartz continues. "That said, no single test will detect all infected animals."

To learn more about specific testing requirements or regiments for Johne's disease, contact your Designated Johne's Coordinator or state animal health department.

To help prevent Johne's disease and to limit the spread of Johne's disease among herds, producers are encouraged to purchase replacement animals, including bulls and recipients, only from known source herds that are low risk or have a known herd status, based upon their Johne's disease classification or herd testing history.



Take Steps to Avoid Buying Johne's Disease

In the U.S. today, approximately 5 percent to 10 percent of random-source dairy replacements are infected with *Mycobacterium paratuberculosis*, the bacteria that causes Johne's disease. Dr. Michael Collins, University of Wisconsin-Madison, says that means one in 10 to one in 20 purchased cattle will not perform as expected in terms of milk production and herd longevity.

"If a producer buys 100 random-source dairy replacements, there is a 95 percent change that at least one of them is *M. paratuberculosis*-infected," Dr. Collins states. "Worse, depending on herd management practices, the infected replacements can infect calves born on the farm—those destined to become herd replacements, thus amplifying the herd's Johne's disease problem.

"Purchasing an infected animal is not a 'deal' at any price."

Five Johne's disease experts reached consensus regarding proper biosecurity practices to avoid the purchase of cattle harboring a *M. paratuberculosis* infection. For simplicity of use, the group created their biosecurity plan as a decision-tree graphic. (See *decision-tree for commercial dairy herds on next page.*)

Dr. Collins explains that the decision-making system involves a series of questions starting with "Are USDA test-negative program herds available?"

"Purchasing from such herds is clearly the safest way to avoid bringing infected cattle into a herd," Dr. Collins tells. "If such herds are not available as sources of dairy replacements, then five other options can be consecutively considered, listed in order of increasing risk of buying infected cattle due to decreas-

ing objective test data from the herd of origin.

"The main message is that herd owners do have a choice. They can manage the risk of buying infected dairy replacement cattle."

Dr. Collins advises producers to base their purchasing decisions on laboratory test data from the herd where the cattle were born and raised.

Purebred Herds

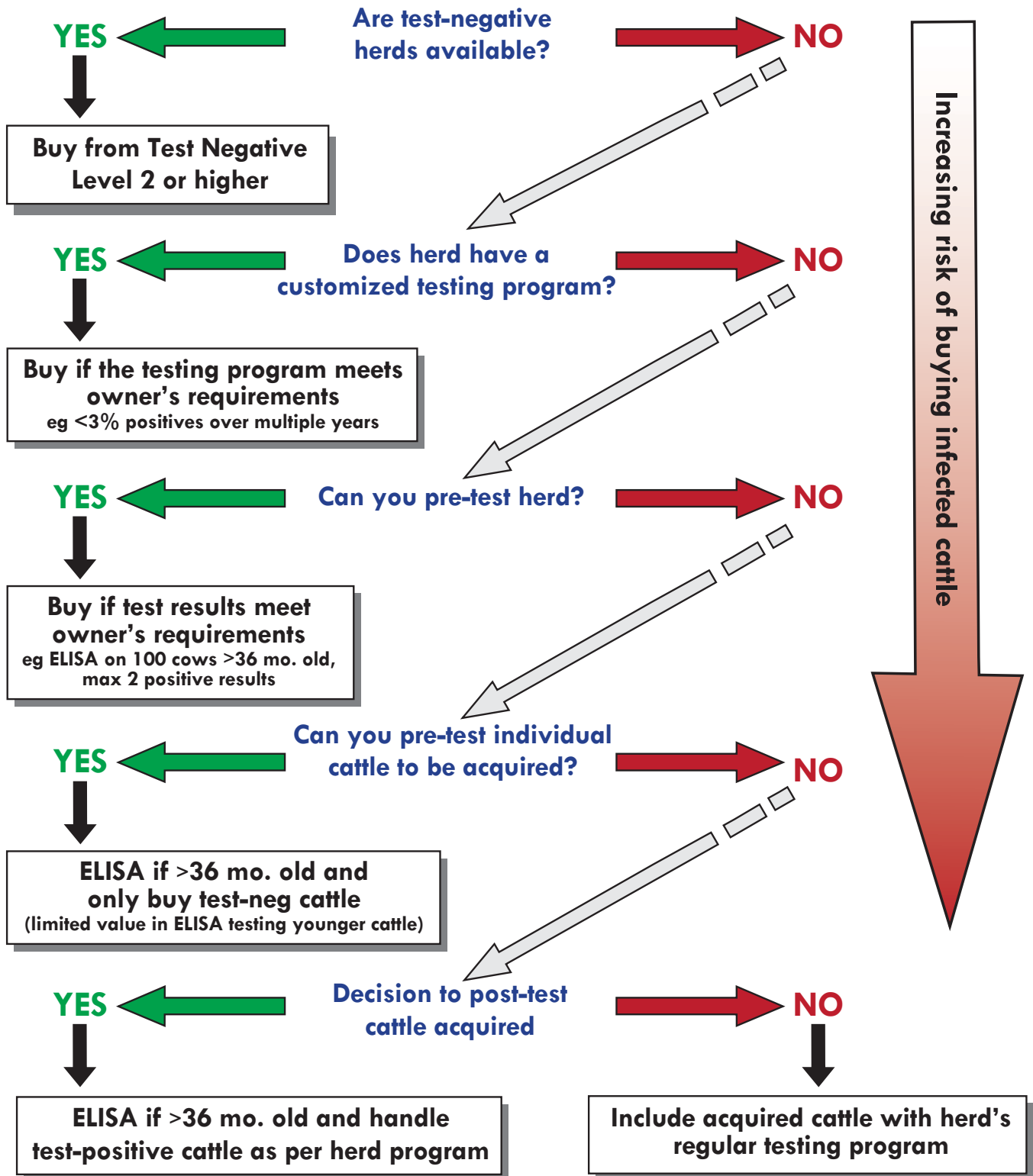
"Registered cattle breeders should work to eradicate paratuberculosis from their herd using strategies that are more aggressive and consequently more expensive than those used for commercial dairy herds," Dr. Collins adds. "If you're marketing genetics, you should be doing everything possible to avoid infecting your customers' herds. Breeders have a moral and ethical obligation to sell livestock and germ plasma from disease-free animals, including freedom from Johne's disease."

Dr. Collins is upfront about the need to know the status of potential additions to any herd.

"It is important to ask up front as to the status of the potential additions to your herd," he elaborates. "If you are at a public sale or farm dispersal, ask the sale manager or consignor if they test for Johne's disease. Remember, you are only seeking information on potential purchases and not out to harm the seller.

"Do not be afraid to do your homework in advance. Some sellers will test on your behalf and expect you to pay the expense. Consider it a wise investment. Knowing that these additional cattle are not harboring the disease is one way to ensure that they can remain a vital part of your dairy operation."

Recommendations to limit the risk of buying *M. paratuberculosis*-infected cattle



Identify Super-Shedders, Remove from Herd

"Super-shedders shed more MAP (*Mycobacterium avium* subsp. *paratuberculosis*, the bacteria known to cause Johne's disease) than all other cows combined," stated Dr. Bob Whitlock, University of Pennsylvania, during a presentation at the 2nd New Horizons in Johne's Disease Workshop in August at the University of Minnesota. "In fact, major new finds include MAP super-shedders excrete more MAP cfu (colony-forming units) per day than 2,000 moderate shedders or 20,000 low shedder cows.



"These super-shedders overwhelm many good management practices resulting in adult cattle consuming enough MAP in their TMR or water to result in passively shedding animals. In a nutshell, super-shedders complicate many management protocols and serve to spread MAP infection among herd mates."

Dr. Whitlock explains that animals infected with MAP can be classified according to visible colony-forming units, commonly referred to as cfus. Very low shedders are individual animals with 5 or less cfu/gram; low shedders have 42 cfu/gram; moderate shedders, 483 cfu/gram; and heavy shedders, 1,260 cfu/gram.

"Twenty percent of dairy cows positive for Johne's disease will likely progress to become super-shedders," Dr. Whitlock states. "They have 1 million cfu/gram to 100 million cfu/gram."

Dr. Whitlock says, theoretically, removal of all TNTC individuals—those with readings of 100,000 cfu/gram to more than 4 million cfu/gram, often referred to as "too numerous to count"—should prevent any further contamination of the dairy environment with MAP. But, he adds that not all dairy producers expeditiously cull cows that have fecal MAP counts reported as TNTC.

"If a super-shedder cow is producing well and has no clinical signs of Johne's disease, the animal is likely to stay in the herd even though it is shedding massive numbers of MAP," he states. "Prioritization of cows for culling on the basis of more categories of shedding levels—with less emphasis on low and moderate cfu—would have practical utility just as ELISA interval-based likelihood ratios have had for serologic results."

Data gleaned from 570 adult dairy cattle in three dairy herds provides evidence that most active MAP shedders have the potential to become super-shedders. During the two-year study, all adult cattle were tested semi-annually by fecal culture and quarterly by serum ELISA for Johne's disease:

- More than 2,289 fecal cultures were completed, with 76 (3.3%) fecal samples as culture positive.
- Of the 76 culture positive samples, 39 (51.3%) were classified as passive shedders or false positive fecal samples.
- Passive shedders were concurrent ELISA negative and had at least one negative follow-up fecal culture with no other fecal cultures as positive.
- The other 37 (49.7%) culture positive fecal samples were classified as active MAP shedders. These 37 originated from 22 cows, and 14 of the 22 cows became super-shedders.

"Preliminary observations suggest



that most super-shedder cows do not have clinical signs of Johne's disease—weight loss and diarrhea—but they are shedding as much or significantly more MAP into the environment than a typical cow with clinical Johne's disease," Dr. Whitlock states. "Since super-shedder cows do not have clinical signs of Johne's disease, they may be responsible for massive environmental contamination that results in a disproportionate percentage of the new MAP infections that occur in a herd.

"They may also contribute to the fecal pass-through phenomenon where positive fecal culture results are obtained from non-infected cows for several days after they have consumed feces from infected cattle."

The best way to identify super-shedders: Test.

To learn more about Johne's disease prevention and control, please contact your state Designated Johne's Coordinator. A list of state DJCs is available online at www.johnesdisease.org.