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Johne's disease: 3rd in a series

Prepare for Battle

Biosecurity and good management practices are key to the defense against most cattle diseases.

by Brad Parker

Johne's disease is a wily opponent. It can lie hidden for years while staging the main offensive, confound defenders by stealthily averting early detection and camouflage itself among a number of other digestive foes.

The only sure defense against *Mycobacterium paratuberculosis*, the organism that causes Johne's disease, is to prevent it from getting a toehold in your herd and dispatching its agents throughout your environment. Otherwise, it will infiltrate your animals' bodies and attack their digestive systems by thickening the intestinal lining so

nutrients can't be absorbed. It's a deadly, debilitating siege from within.

Testing and certification programs are drawing attention to this threat to profitability, but until everyone gets involved, how do you protect your herd?

The best defense

Mike Collins, a professor of microbiology at the University of Wisconsin School of Veterinary Medicine, says the first step to combating Johne's disease is preventing it. He recommends good biosecurity, which

equals good prepurchase testing. And he doesn't just advise producers to test purchased animals; he also advocates testing the herds from which they come.

"Maximize the probability of not buying this infection," says the former co-chairman of the National Johne's Working Group (NJWG) subcommittee on certification programs.

Bill Rotenberger, a former North Dakota state veterinarian and former chairman of the U.S. Animal Health Association (USAHA) Johne's disease committee, also says it's important to know the producers from whom you buy stock and to understand their management systems. "Anytime we're buying livestock, we need to be aware of where they're coming from and maybe some herd history," he says.

Rotenberger, who owns Spruce Hill Angus Ranch near Ludlow, S.D., notes that limiting the number of purchases and exposure to other animals (such as at shows or performance tests) is the first line of defense with any disease.

The biosecurity plan at Smith Flooring, an Angus seedstock enterprise near Mountain View, Mo., dictates that new animals be quarantined and blood-tested for Johne's disease before joining the resident herd.

"If we get a positive result, we then do a more accurate fecal test, which can take months to get the results," Kent Smith explains. "Johne's is an encapsulated bacterium, making it almost impervious to the strongest antibiotics, so treatment is most always out of the question. The animal is disposed of, and much time and money are wasted."

Don Bush of the BUB Ranch Beef Alliance, Koshkonong, Mo., also quarantines and tests animals — particularly recipients for his embryo transfer (ET) program — for Johne's disease before adding them to his herd. And all stock 2 years or older are subject to annual testing for Johne's disease, bovine leukosis virus (BLV) and brucellosis (Bang's disease).

That's a good strategy, says Judy Stabel, lead scientist of the Johne's disease research project at the U.S. Department of Agriculture (USDA) National Animal Disease Center in Ames, Iowa.

"You have to test religiously with those animals and make sure that your cows are negative and your bulls are negative," Stabel says. "If you're replacing any animals, they need to come from certified-test-negative herds. You need some kind of certification that the herds have been tested for Johne's and have been test-negative for five years or more."

Rotenberger adds that when outside bulls are brought on the premises, they should be

►Above: *Mycobacterium paratuberculosis* has been found in semen, but sexual transmission of Johne's disease still needs more study, says Mike Collins of the University of Wisconsin School of Veterinary Medicine. The risk of seminal transmission via artificial insemination may be minimal, but transmission via natural service is another story, he says. "If you just avoid the use of infected bulls, it becomes an academic question."

kept from the calving area or holding areas for young calves. Most experts agree animals usually are infected as calves. The infection may remain undetected for years, until clinical symptoms of diarrhea and weight loss become noticeable.

Collins explains that adult cows seem to be more naturally resistant to the disease. Although, Stabel notes, producers usually aren't testing until it becomes clinical, so it's tough to determine when infection actually occurred.

"It's hard to know which animals are clean to begin with and that become infected as adults rather than as calves," says Stabel, who chairs the NJWG research subcommittee.

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The risk of seminal transmission via artificial insemination may be minimal, but transmission via natural service is another story, Collins says. "If you just avoid the use of infected bulls, it becomes an academic question."

Rotenberger further cautions producers to find colostrum from reliable sources. Get it from a test-negative outside herd or from your own older cows that have tested negative for a number of years. While pasteurization is effective against *M. paratuberculosis*, he says, there's the danger of destroying the immunoglobulins in the process, thus defeating the purpose of giving colostrum.

Because a link between Johne's disease in cattle and Crohn's disease in humans has been suggested, Stabel has studied whether the organism can be transmitted through

dairy products. That led her to study the effects of pasteurization.

Raw milk has been proven to transmit the organism, so Stabel's experiments turned to on-farm pasteurization of waste milk fed to calves at dairy enterprises. She hasn't tried to pasteurize colostrum, but she is collaborating with the University of Minnesota on that research.

"We would suggest, at this point in time, to pool colostrum from known noninfected cows so you have a source that you know is clean," she echoes.

A good offense

Sometimes, despite a producer's best efforts, an infectious invader breeches a herd's defenses. It's then time to fight back.

"The whole process of finding Johne's disease, controlling it in a herd and eliminating it from a herd is a long, drawn-out process," Rotenberger says, adding that it takes management, sanitation, testing, segregation and culling.

If your herd does become infected, Collins recommends environmental control first. Calve where it's clean, dry and sparsely populated, he says. And watch the water source. "Those two things control many infectious problems in cattle, not just Johne's," he states.

Since it is generally accepted that calves contract Johne's disease in their first six months of life, producers should look at halting the infection then. Keep animals with the disease from calving areas, maternity wards and weaning lots.

Winter calving and spring weaning could contribute to the incidence of Johne's disease, Stabel reminds producers, because of the associated confinement issues.

Collins also recommends annual blood-testing and culling test-positive cows and their latest calves. "We're dealing mostly with theory here because field trials to actually carry this out and prove that it works have yet to be done," he admits.

"Because the infection largely — in beef cattle in particular — spreads from cow to calf, when you have a test-positive cow, you need to assume that her last calf has a pretty good chance of being infected," Collins continues.

"That means a producer has to have good-enough records to know who the last calf is."

It's most likely that a calf became infected via its mother's milk or by nursing a dirty teat, although Stabel says there is

indication of maternal-to-fetal infection in heavily infected cows. The odds are slim, however, that a cow with an infection so advanced would conceive, calve and stay in the herd, she notes.

Collins says the transfer of fresh embryos can be tricky because they already may be infected and could produce an infected calf. But, if embryos are washed according to the international 10-wash protocol, he thinks transmission of Johne's disease can be prevented.

"We consider embryo transfer under those conditions safe and, in fact, a very good way to rescue the genetics of a cow that is carrying this infection," he explains, although he lists ET as an area requiring more research.

The riskiest part of ET is the recipient cow, Rotenberger says. Producers need to be careful where they get recipients, and those animals should be separated from the resident herd. If you're concerned, test cows before using them as recipients, he advises.

In any event, it takes a lot of education and consultation to develop a culling strategy, Rotenberger says, adding, "It's not a cut-and-dried system for everybody." Herd size, calving season, finances and source of replacements all influence the decision, so there are no standard recommendations for every instance. Each herd has to tailor a strategy to its own situation, he concludes.

If several blood tests indicate an animal is positive for Johne's disease, careful consideration is warranted. "You need to decide whether their value is high enough to justify the risk of keeping them," Rotenberger advises.

Fecal-culture-positive animals that aren't yet exhibiting clinical signs could be "seeding" the environment if you keep them around the farm. "You really need to evaluate whether it's economically wise to keep any animal that's culture-positive," Rotenberger says.

Cull any animal that's confirmed infected, he asserts. "In an embryo-transfer situation, if she were a really good donor cow, I'd put her in a separate facility apart from everything else. Other than that, I don't know that it warrants the economic risk to the rest of the herd. She needs to be eliminated."

Test-positive animals don't have to be culled immediately, Bush says, although he's never had to make that call because he's never had a confirmed case of Johne's disease in his herd. Based on his research into the matter, he suggests that producers could split their herds and isolate the test-positive animals, creating a leper colony of sorts.

"But don't interchange bulls, whatever you do," he emphasizes.



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Yet there's always the risk of contaminating the quarantine area, and Smith believes seclusion can't be foolproof. He says it's not worth segregating an infected cow unless she's extremely valuable. "The hazard of infecting other cattle is too great," he maintains.

Other strategies

Smith has fought the good fight. After bringing Johne's disease to their premises in a purchased animal, Smith Flooring went on the offensive. They're now in their second year as a state-certified test-negative herd.

Their battle plan for keeping the disease at bay is threefold. "One is testing currently owned animals yearly. Two is to use sterile vaccination techniques (a new injection needle) with every animal. Three is isolation of additional animals to our herd from other producers," Smith shares. "The latter is the most difficult of the three because we desire to add new animals."

Likewise, Bush never injects two animals with the same needle or uses the same obstetrics (OB) glove twice.

The environment also is a major source of infection, Stabel says. Management practices contribute, too. For example, don't move manure and feed with the same loader.

Along those lines, put manure on cultivated fields, Rotenberger advises. Never spread it on pastures or hay ground. "That's just a good all-around management suggestion for all diseases, not just Johne's," he notes.

It's important to understand that the organism, after it leaves the cow, can't

multiply, Collins explains. If 10 organisms are shed, there never will be more than 10, but it could take 12-18 months for all 10 to die.

Collins adds that soil pH may be connected to the organism's survival. "We're not that far down the road that we can say this is definitely a control mechanism," he says. "But it's an interesting association."

He doesn't advocate changing soil pH unless it's an agronomic recommendation, however. "With the data we have in hand, I would never go out and spread lime or try to change soil pH *just* to control Johne's," he admonishes.

Yet Rotenberger does recommend using lime inside barns because sunlight can't get to the organism there.

Father Time and Mother Nature are your best allies. Till, reseed and rest pastures, Collins advises. He notes the Australian recommendation is to wait two years, but tillage could shorten the period to 18 months.

Collins tells producers to invest time and effort where it will do the most good. "The best thing to do is to stop the infection source. Find the cows that are excreting this bacteria in the manure and get them out of the herd, then the environment will clean itself up," he says.

The vaccination gambit

Stabel says that there's been resurgence in the interest in vaccination for Johne's disease in the last five years. It wasn't recommended for a long time, she says, and it's the same killed vaccine as always.

She explains that vaccination reduces fecal shedding and the clinical signs of Johne's disease. And the vaccine, which is given once during calthood, is cheap.

Unfortunately, the procedure leaves animals serologically positive for paratuberculosis, which thereafter voids the use of blood-testing for Johne's disease.

The vaccination also confuses tuberculosis (TB) testing, Rotenberger adds.

"I think there is some merit in looking at a vaccination program, especially in herds that are highly infected and [when] it's not economically feasible for that producer to completely eliminate his herd and go out and buy new animals and start over," Rotenberger continues. "If he's looking for a way to stay financially solvent, then maybe vaccination is something to look at, especially if we get some better vaccines than we've had in the past."

Collins agrees that, occasionally, herds that are about to go out of business because of Johne's disease may vaccinate for a limited time to get ahead. But he believes that's just masking the problem.

While it makes cattle stronger, vaccination doesn't stop the infection. "I do not recommend vaccination. I think it causes a false sense of security, and there are much more effective ways to deal with it — especially for the beef industry, where the percentage of herds that have this infection is very low," Collins says.

Stabel and Rotenberger point out that the vaccination must be administered by a veterinarian because accidental self-injections are a serious concern.

Adapt for survival

While prevention and control strategies are relatively standardized, "you can't use the same procedure in every herd," Rotenberger says. "You've got to adjust and use different procedures within a herd, and there's a lot of management things that go on. There's a list of things that can be done, but you don't do everything on every place."

Collins tells producers to control their own destinies: "Understand that the disease threatens your business, your livelihood, your animals, your genetics — and deal with it."



► Management practices contribute to the control of Johne's disease. For example, don't move manure and feed with the same loader, lest you introduce *M. paratuberculosis* to the ration.

Editor's note: This is the last installment in our series addressing Johne's disease. If you're just now joining us, you can find the first two articles (published in August and September) by accessing www.angusjournal.com on the Web and clicking on the "Back Issues" link to the left.