

Until recently, beef producers have tended to pass off Johne's disease as a dairy problem. But speakers at a special symposium held prior to the National Cattlemen's Beef Association (NCBA) Centennial Convention urged producers to face the problem in beef herds head-on. The speakers stressed that it's time to take Johne's disease out of the closet; to educate producers as to what Johne's is; and to develop proactive, voluntary programs that encourage producers to find out their herds' Johne's status and to clean up any problems that exist.

The disease isn't a new bug. In fact, it was identified by Heinrich Albert Johne (pronounced yo-knee) in 1895— even before the foundations were laid for what is now the NCBA. Unfortunately, the disease has been as enduring as the cattlemen's organization.

Still, nearly 70% of beef producers surveyed last fall by the National Animal Health Monitoring System (NAHMS) said they had never heard of the disease. Another 22.3% said they recognized the name. Only 2.4% admitted being fairly knowledgeable about Johne's.

"This has been a disease that historically we've pushed under the rug. It's a disease that we didn't want anybody to know that we knew," says Gary Wilson, an Ohio Angus producer who chairs NCBA's committee on emerging animal health issues. "Time has passed. And we no longer can call this disease 'hardware.' We're going to have to identify it for what it is. And we're going to have to deal with it."

For the NAHMS Beef '97 study, blood samples were collected to establish the prevalence of Johne's disease in the U.S. beef herd. Those figures will be available in late summer.

Not one to take lightly

It's a time bomb, says Robert Whitlock, University of Pennsylvania School of Veterinary Medicine, New Bolton Center. Usually purchased, Johne's disease can enter a herd very quietly. By the time an unsuspecting cattleman realizes the purchased animal was infected, the disease could be spread throughout the herd. There is no treatment. There is no cure. And it is fatal.

Johne's disease is caused by infection with *Mycobacterium paratuberculosis*, an acid-fast bacterium that's related to tuberculosis, explains Whitlock, who also co-chairs the National Johne's Working Group. It initially affects the lower intestine, gradually thickening the intestinal wall and thus preventing nutrient absorption. Even though an infected animal has a normal

JOHNE'S DISEASE: What is it?

A century-old problem gets pulled from the closet

BY SHAUNA ROSE HERMEL



appetite, it will basically starve.

Though initially the disease affects only the intestinal tract, like a cancer, it will spread to other parts of the body. "Especially in the later stages, when the animals are showing clinical signs, the bacteria circulate throughout the bloodstream, throughout the lymph nodes,

throughout the body," says Whitlock.

Perhaps the most perplexing aspect of the disease is that it has a long incubation period. An animal may be infected the day it's born, but not show a symptom for up to 10 years, says Whitlock. It can shed the bacteria for months or years before it shows any clinical signs.

This leads to what Whitlock describes as the iceberg theory: If you see one animal (home-raised) with clinical symptoms, there are likely 15-25 other animals in various stages of infection.

Stages of infection

A pamphlet on Johne's disease published by the Pennsylvania Department of Agriculture's Animal Health Commission describes the stages as:

Stage 1 — subclinical, nondetectable infection. Animals in Stage 1 can't be detected with current tests. Infection progresses slowly. It may take months or years for an animal to reach Stage 2.

Stage 2 — subclinical shedders. Cattle in Stage 2 (typically older cattle) appear healthy but are shedding adequate numbers of *M. paratuberculosis* organisms to be detected by fecal culture. Blood tests may not be reliable at this stage. Animals in Stage 2 pose a major, but often hidden, threat of infecting other animals.

Through Stage 2, infected cattle appear and can function normally.

Stage 3 — clinical Johne's disease. "Signs of Johne's disease are essentially weight loss and diarrhea," says Whitlock. Affected cattle will lose weight and drop milk production even though they exhibit a normal appetite.

"Usually, clinical signs occur after 2 years of age," he says. "On rare occurrences, they can occur at 12 to 14 months." On the other hand, he has seen a case where an animal was held in isolation for 10 years before developing symptoms of Johne's. Experts agree that the younger cattle reach Stage 3, the higher the probable prevalence of Johne's in the herd and the greater the level of contamination.

Onset of Stage 3 may coincide with a period of stress, such as calving, says Christine Rossiter, Extension veterinarian at Cornell University. Some animals may appear to recover, but relapse in the next stress period.

Rossiter says producers will often misdiagnose the diarrhea and weight loss as a parasite problem. Johne'-infected animals will often respond to parasite control if they are infected with parasites. However, she says, it only postpones the inevitable.

Most animals in Stage 3 are shedding billions of organisms and are positive on fecal culture. Many are positive on serologic tests.

Stage 4 — the final stage of the disease. Animals become emaciated with fluid diarrhea and develop bottle jaw. Officially described as hypoproteinemia and edema under the lower jaw, bottle jaw appears as a

lump under the jaw. It's also a symptom of parasite infection, so it's not specific to Johne's disease.

"Ninety-five percent of the infected animals do not show clinical signs," emphasizes Whitlock. So those that do are the tip of the iceberg.

How it starts

Most experts agree that infection usually occurs in the neonatal period — in utero or right after a calf is born, says Whitlock. The most common means of transfer is believed to be fecal-oral. For example, calves are infected by nursing udders contaminated with feces from infected animals.

Pennsylvania studies have also shown that among cows exhibiting clinical symptoms of Johne's disease, 25-30% of their calves will be born infected, says Whitlock. The organism can also be passed to the calf in the cow's colostrum. So even in an immaculate environment, if the calf nurses an infected cow, or is given purchased colostrum from an infected cow, it could ingest the organism and become infected.

Larry Horstman, Purdue veterinarian, has traced several cases of Johne's disease in beef herds to embryo transfer calves with Holstein mothers. University of California-Davis Extension Veterinarian John Maas believes rental bulls to be a common denominator among Western beef herds that have seen cases of the disease.

Researchers believe there may be some genetic resistance to Johne's disease, says Whitlock. But not much is known in that area.

Some of the other things that aren't known about how animals are infected, says Whitlock, include:

- How often adult cows become infected. Cases have occurred, but it's not very common, he says. "Most people believe that adult cattle are more resistant to the infection if they're exposed for the first time as an adult over 2 years of age."
- How often bulls infect cows through semen. Whitlock believes chances for infection via semen would be rare but, he adds, a case has been documented.
- Significance of other species. Other ruminant species, like deer, can carry the disease, but how often they would be a source of infection for a cow herd isn't known.
- Significance of drinking water. The bacteria can survive in water for a year. There's very little known about water serving as a source of infection, says Whitlock. The potential is there, but the extent of the possibility is unknown.
- How to decontaminate pasture. The

Johne's disease

Transmission: What we know

- ✓ Infects many species, including cattle, goats, deer, elk and antelope.
- ✓ The bacteria multiply very slowly after infection.
- ✓ Fecal shedding of bacteria from infected animals occurs long before clinical disease develops.
- ✓ Usual transmission of the disease is by ingestion of bacteria from feces (fecal-oral spread).
- ✓ Young calves are at the highest risk for contracting the infection.
- ✓ Clinical signs may take two to 10 years to develop after infection.
- ✓ Of the cattle infected with Johne's, only 5% show symptoms of the disease.
- ✓ Clinical symptoms of Johne's include weight loss, diarrhea and bottle jaw.
- ✓ In clinically infected dams, 30% of fetuses may become infected while in utero.
- ✓ There is no treatment, and there is no cure.

The microbe: What we know

- ✓ *M. paratuberculosis* does not readily multiply outside of the host animal.
- ✓ It may survive up to a year in manure, cold temperatures and some sources of water.
- ✓ In an infected herd, all manure should be suspected to be contaminated with Johne's-causing *M. paratuberculosis* organisms.
- ✓ Antibiotics are not effective against *M. paratuberculosis*.
- ✓ Common disinfectants are not effective against the organism.

Source: Summary of the NCBA Johne's Symposium held Feb. 3, 1998.

organism is quite resistant and can survive in feces and soil for over a year.

Left unchecked, Johne's disease can become quite widespread within a herd. How quickly and how far it will spread depends on herd management, says Cornell's Rossiter. In a worst-case scenario, cows could be dying of Johne's at 3 to 4 years of age within 15-20 years after introduction of the disease — that time-bomb effect.

In future issues we'll look at the current status of diagnostic tests for Johne's, how to prevent Johne's from entering your herd and how to clean up a Johne's problem.

Editor's note: Second in a series on Johne's disease.

