FrontLine
TECHNICAL INFORMATION FOR TODAY'S FEED PROFESSIONAL

Johne's Disease Prevention and Control

Johne's disease (pronounced "Yo-nees"; also called paratuberculosis) is a protein loosing enteropathy. The most consistent clinical sign of Johne's is weight loss in an animal that appears to feel well: no fever, not depressed, and eating well. In dairy cattle Johne's may also be accompanied by diarrhea, but this is not always the case. *Mycobacterium paratuberculosis* infection of the ileum is the cause of this disease. While the infection most often begins within the first month of life, the consequences of the infection are not typically seen until the second or third lactation. Long before the clinical signs of Johne's are evident, however, the physiology of the animal is disturbed. The best evidence of this is that infected but still clinically normal animals produce less milk.

Johne's can look like a nutrition problem.

Nutritionists are often the first to recognize that something is not right in a dairy herd with paratuberculosis when good rations fail to yield expected milk production.

End Stage Johne's Disease

(clinical disease)

Cattle in the latter stages of paratuberculosis have a markedly thickened ileum. Lymphatics in the ileum are grossly distended and often completely blocked with inflammatory cells responding to M. *paratuberculosis* infection. The cow usually has diarrhea. Protein is lost from the GI tract leading to a serum hypoproteinemia; albumin levels are low.Occasionally, the hypoprotenemia can result in submandibular edema referred to as "bottle jaw".

Weight loss is rapid, particularly if the cow is in early lactation. This medical problem is too often viewed as affecting only one individual animal. If the affected animal was born and raised in the herd, however, then a significant number of other cows in the herd also are probably infected. These infected but apparently normal animals should be the real focus of concern.

Early Stage Johne's Disease (subclinical or pre-clinical)

Even before the clinical signs and pathology of Johne's disease develop, the infection can decrease feed utilization and milk production. All mycobacterial infections, notably tuberculosis, trigger strong cellular immune responses that involve a cascade of potent cytotkines. One of these cytokines is called tumor necrosis factor or cachectin. Cachexia (wasting) is one of the most universal signs of mycobacterial disease, a side effect of the host animal's attempt to control the infection. This is why the old name for tuberculosis in humans was "consumption": the afflicted person appears to be consumed by the disease, slowly wasting away as the infection progresses.

The net result is that humans and animals with mycobacterial infections lose weight in the face of

adequate intake of a nutritious diet (until very late in the course the infection when they are too ill to eat). Thus, the disease looks like a nutrition problem, although not exactly the kind of nutrition problem nutritionists generally deal with. In dairy cattle with paratuberculosis, this often but not always will be manifested by lower milk production.

Johne's disease masquerading as a nutrition problem - case study *Dairy Today, May, 1997.*

Steve and Pat Smith bought a farm and herd of 45 cows in 1982. The facilities were old and in need of modernization. So, they remodeled the barn and improved cow comfort and cleanliness. Herd production steadily increased from 12,000 lb. to 19,000 lb. In the early 90s the herd average stopped increasing and the Smiths called on experts to help find the cause of the problem. It was in vogue at that time to blame herd problems on stray voltage. A stray voltage team investigated the farm and detected some problems. So, Steve and Pat decided to have the barn rewired. However, the herd still failed to perform as it should. On advice from other several sources, the Smiths next decided to try and improve herd production by modernizing feed storage and delivery systems. They bought a Harvestor silo and a TMR mixer. Herd production not only remained unchanged, it started declining. About this time, some of the Smith's heifers died. Johne's disease was briefly considered by the herd veterinarian as a possible cause but was thought unlikely because Johne's disease was considered a disease only of older cows. Eventually, however, a diagnosis of Johne's disease was confirmed. On testing the herd it was found that over 50% of cattle on the farm were infected.

In 1994 an aggressive Johne's disease eradication campaign was started in the Smith's herd. Changes were made to calf management systems. The herd was tested with multiple tests for paratuberculosis and test-positive animals were culled. As of the last herd test, it appears that the infection has been eliminated and herd milk production is once again steadily climbing. The Smiths are convinced that for at least 10 years the real underlying problem in their herd was Johne's disease. The "take home message" is that when the ration and feeding systems look right, but a herd is not performing up to expectations, it is prudent to check the herd for Johne's disease.

What to do if a herd has Johne's

Some people think that control of Johne's is hopeless. Simple changes in heifer management can drastically reduce the rate of new infections, and new diagnostic tests which became available in the early 1990s now make accurate detection of infected cattle much cheaper and faster. A two-pronged approach is needed to control a Johne's disease problem in a herd: 1) manage calves to minimize the chances of new infections, and 2) test the herd to identify infected cows and cull them. Failure to change husbandry practices AND cull infected (testpositive) cows will result in failure to control Johne's disease.

M. paratuberculosis is excreted in the milk and colostrum of infected cows as well as in feces even before they develop signs of Johne's. Most publications on control of Johne's describe a long list of "do's" and "don' ts" about herd management. Preferred is a short list focusing on the most critical recommendations. On dairies with Johne's disease:

Do not pool colostrum. Feed colostrum only from one cow to her calf.

only feed colostrum from test-negative cows; the oldest test-negative cows are the very best colostrum sources. NEVER ever use discarded fresh milk to feed calves; only feed milk replacer to calves.

- house calves away from the adult herd and avoid manure contamination of calf feed and water supplies.

M. paratuberculosis infections are clinically invisible. Lab tests are the only way to find cows in a herd that are infected and shedding the bacteria. Selecting tests and choosing the frequency of testing are influenced by many factors. Interested readers are urged to read the publications listed at the end of this article for more comprehensive discussion of this issue. For a typical commercial dairy herd confirmed to be infected with M. *paratuberculosis* the following is recommended

- test all cows >2 years old by ELISA (blood test) and cull the test-positive animals.
- repeat the ELISA annually until less than 2% of the herd tests positive, then monitor the problem by a herd test with ELISA every other year.
- If the herd owner elects to eradicate the infection from his/her herd instead of just controlling it, test the herd by fecal culture yearly and cull all test-positive cows.

Note: Send serum samples only to laboratories using the *USDA-licensed ELISA kit for paratuberculosis. The accuracy of other tests has not been verified.*

"....an ounce of prevention....."

How to Avoid Johne's disease

The old adage "an ounce of prevention is worth a pound of cure" was never more true than for Johne's disease. Control of Johne's takes time and money. Avoiding the problem is comparatively simple and potentially free of charge. In my opinion, every dairy herd veterinarian /consultant / advisor should understand the means by which herds become infected and the consequences of this happening. They should also explain to their clients the simple precautions to minimize the risk of bringing paratuberculosis into their herd.

Herds almost invariably become infected by purchase or lease of infected cattle. Thus, closed herds have no risk of becoming infected. In the real world few herds are closed, however. In fact, many herds in the Midwest today are expanding and the risk of accidentally bringing Johne's disease into these herds is great. Surveys in the upper Midwest indicate that roughly 10% of dairy cattle are infected. That means that for every cow bought there is a 1 in 10 chance of buying a cow with Johne's disease, even if it looks clinically normal.

Making Johne's disease biosecurity even more challenging is the lack of awareness about the disease by many producers. A 1996 survey by USDA-APHIS of 1200 dairy producers revealed that while 55% of producers were familiar with Johne's disease, 35% were not familiar with it beyond name recognition and another 10% had never heard of it.

To minimize the risk of introducing Johne's disease into a herd, owners should; l)buy as few cattle as possible,
2) buy them from as few different source herds as possible, and
3) buy them from herd owners willing and able to show laboratory test results for paratuberculosis done on their herd within the past 12 months.

These guidelines are translated into specific recommendations about sources of replacement cattle.

They are listed in order from best source to worst source:

Good Test-negative herds. Ask for written records. The more years a herd has tested negative the lower the risk any animal in the herd is infected. Herds with only a single negative herd test are a better source of herd replacements than herds that have never been tested.

OK Herds with honest, conscientious owners that are knowledgeable about Johne's and rarely buy cattle. The better you know the owner's husbandry methods, the more likely the cattle you buy will be free of Johne's.

Worst Sale barns or dealers where the health history of the herd from which replacements originate is unknown.

Take as many precautions as practical when buying cattle but leave nothing to chance. After purchase, cattle should be tested for Johne's, regardless of origin, and quarantined until test results are available if possible.

In Wisconsin, special laws regarding paratuberculosis apply. These are described in the Wisconsin Statute 95.195 - Paratuberculosis; implied warranty in sale of animals. The law states that; "in each contract for the sale of an animal, there is an implied warranty that the animal is not infected with paratuberculosis [the law makers actually mean *Mycobacterium paratuberculosis]* unless the seller a) notifies the buyer in writing before the sale that the animal is not warranted as being uninfected, or b) complies with testing and disclosure requirements of the Dept. of Agriculture, Trade and Consumer Protection."

The implied warranty law is basically a buyer protection plan. Unfortunately, most cattle buyers fail to take advantage of this law and simply accept the statement "not warranted free of paratuberculosis (Johne's)": words now commonly written on bills of sale in Wisconsin. In accepting bills of sale with this statement, buyers eliminate the possibility of getting compensated from the seller for the value of the animal(s) bought or the damages inflicted on their herd as a result of buying an M. *paratuberculosis-infected* cow. In my opinion, buyers of cattle should use this innovative law to their advantage: avoid purchase of animals when the bill of sale says they are not warranted free of paratuberculosis, and seek compensation when purchased animals develop Johne's disease.

Research on Johne's is accelerating and new information and new or improved diagnostic tests are being described in the literature all the time. It is important that advisers to dairy producers stay current with new developments in this field. The Internet and World Wide Web are useful means of accessing the most current information. The University of Wisconsin, School of Veterinary Medicine maintains a web site called the Johne's Information Canter. This web site has answers to questions written for both lay and professional readers. It also has photographs of affected animals and pathology that are useful for explaining the disease to herd owners. The address of this site is:

http://www.vetmed.wisc.edu/pbs/johnes/

Source: Dr. Michael T. Collins. DVM, PhD, University of Wisconsin-Madison, School of Veterinary Medicine. Johne's can look like a nutrition problem: Simple, practical ways to prevent or control this disease, 4-State Applied Nutrition and Management Conference and Zinpro Technical Symposium, August 5-6, 1997, The LaCrosse Center, LaCrosse, Wisconsin.