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JOHNE'S DISEASE: Part II

Transmission of Johne's (pronounced *yo-NEES*) disease was reviewed in the last article. The bacterial agent that causes this disease, *Mycobacterium paratuberculosis*, is most commonly transmitted via ingestion of feces by young cattle; however, it can also be transmitted in the semen of bulls, in the milk (or colostrum), and across the placenta to the newborn calf (in utero transmission). The agent survives in nature partly because there is a prolonged carrier state when the infected animal shows no illness and sheds large numbers of the *M. paratuberculosis* organisms into the environment where other cattle can become infected.

Diagnosis of cattle with clinical signs of Johne's disease is relatively easy. These animals exhibit weight loss and diarrhea as the primary signs. However, many diseases show signs of diarrhea and weight loss, including: (1) parasites (roundworms, liver flukes, coccidiosis), (2) BVD (bovine virus diarrhea), (3) copper deficiency, (4) liver failure, (5) grain overload (founder), (6) selenium deficiency, and (7) Salmonellosis, to list just a few. Cattle with advanced Johne's disease have "bottle jaw" (fluid accumulation under the jaw). A serum sample submitted by your veterinarian to the California Veterinary Diagnostic Laboratory can confirm a diagnosis of Johne's disease for these animals exhibiting diarrhea and weight loss. The serum sample is tested for antibodies to the Johne's agent. If the sample is positive, the animal has Johne's disease. If an animal dies or is euthanized, the post mortem examination can also easily diagnose the condition. Also, for clinical cases, the feces can be cultured for the presence of *M. paratuberculosis*. When testing serum from cattle that have not yet developed clinical signs of diarrhea or weight loss, this laboratory test is often negative, despite the fact that these carrier animals will eventually develop clinical disease and be positive on the serum tests. The laboratory culture of this organism takes about 12-16 weeks, as it is a very slow-growing bacterium. The problem with Johne's disease diagnosis is in identifying the carrier animal that is not yet showing signs of weight loss or diarrhea and is shedding *M. paratuberculosis*. At present the best tool for identifying these infected cattle that are not yet losing weight is the culture of feces for the organism. As stated, this takes about 12-16 weeks and there are many false negative test results, i. e., no growth of the organism from animals that will eventually have the disease and are presently shedding the organism in small numbers---too small to be detected on the test. Your veterinarian, working with the laboratory, can easily and quickly diagnose cattle with clinical signs of Johne's disease. Also, your veterinarian can help you make the more difficult decisions about diagnosis of the carriers that are not yet showing clinical signs of diarrhea and weight loss.

Animals of exceptional genetic value are sometimes candidates for treatment. It is important to remember that *M. paratuberculosis* has been isolated from semen and genital organs of infected bulls. Also, *M. paratuberculosis* has been shown to survive freezing and semen processing, although antibiotics used in semen preparation may diminish the viability of the organism in the semen. While the risk of causing infection in the cow with contaminated semen is low, it is within the realm of possibility and may influence the decision to treat an infected bull. Because transplacental transmission can occur in a pregnant cow, possible infection of the fetus can be a limiting factor when considering the economic value of a cow with Johne's disease. The goal of treatment is the prolongation of life, the drugs used **do not** cure the disease, but only prolong the animal's life so semen or embryos can be collected. No drugs are approved for treatment of Johne's disease, so all effective drugs must be used in an extralabel manner. Your veterinarian must prescribe the appropriate drugs and monitor the progress of the animal being treated. Drugs used to treat Johne's disease patients include isoniazid, rifampin, clofazimine, and dapson. The cost of therapy ranges from a few dollars per day to more than \$200 per day, depending on the drug(s) selected. Drug therapy will not prolong life indefinitely as Johne's disease is invariably fatal. Prolongation of life for six to 12 months is a possibility with effective treatment.

Johne's disease is one of the diseases reportable to the animal health authorities, i. e., the California Department of Food and Agriculture's Animal Health Branch. This is because of the infectious nature of the disease and the consequences when spread from one herd to another. Because of the insidious nature of this disease, it can be potentially devastating to purebred herds. Infected herds that sell bulls or replacement heifers could lose their market. Knowingly selling cattle from an infected herd could cause the seller to become liable for future losses by the buyer due to Johne's disease.

Control of Johne's disease is essential for a healthy herd. One very important point of control is preventing the introduction of known infected cattle into a herd. **The problem with controlling the spread of Johne's disease is that we can't efficiently identify the carrier animals before they show signs of weight loss or diarrhea.** Therefore, you must avoid introducing animals into your herd from unknown sources, such as leasing bulls, purchasing dairy cattle (which have a higher incidence of Johne's disease than beef cattle) for nurse cows, fertilizing pastures with manure from other herds (particularly dairy herds), or other practices that would expose calves to manure from potential Johne's carrier cattle.

Preventing Johne's disease introduction is particularly important because elimination of the disease from a herd can be very

difficult.

Eliminating Johne's disease from a herd is complicated by two major factors: (1) the difficulties involved with identification of carrier cattle not showing clinical signs of diarrhea or weight loss, and (2) the fact that *M. paratuberculosis* can survive in the environment (manure, soil, pasture, stream water) for up to one year. Methods to control or eliminate Johne's disease from an infected herd must be ranch-specific and account for such things as the prevalence of Johne's in the herd, sources of replacement heifers, and other risks specific to the herd. The basics of control involve (1) hygiene---reducing fecal contamination in the environment of calves, and (2) testing and culling of infected cattle and their offspring. In some states, vaccination can be used to assist in control of Johne's disease and you may read about the use of a Johne's vaccine. The vaccine must be given to very young calves (35 days of age) and **does not prevent infection**, but can reduce the shedding later in life. The vaccine is usually only of benefit in herds with large numbers of infected cattle. Vaccination interferes with Johne's disease testing and with tuberculosis testing. The Johne's vaccine cannot be used in California because of these reasons.

Recently, there has been quite a lot written about the possible link between Johne's disease in ruminants and a disease in humans called Crohn's disease. Crohn's disease is an inflammatory disease of the intestine (ileum and colon) that usually affects patients during the prime of life (teens to early twenties). Most Crohn's disease patients require surgery and intensive medical therapy and suffer chronic pain throughout their lives. Most Crohn's disease patients describe their quality of life as poor. **Whether *M. paratuberculosis* is the cause of Crohn's disease is not known at present.** Some of the evidence that argues for a link between *M. paratuberculosis* and Crohn's disease is (1) the tissue abnormalities are similar between Johne's disease and Crohn's disease, (2) *M. paratuberculosis* can be isolated from the feces of **some** Crohn's patients (10-20%), and (3) these isolates can cause disease in experimental animals. Evidence that argues against a causative link between Johne's disease and Crohn's disease is (1) there are no *M. paratuberculosis* organisms in the diseased intestinal tissues of patients with Crohn's disease, and (2) *M. paratuberculosis* can be found in the feces of patients with ulcerative colitis (another intestinal disease) and in control patients (no disease). The association may be that patients with severe bowel disease have more chance of opportunistic colonization of their disrupted intestinal mucosa by these types of bacterial agents. To date, there is no evidence that the agent of Johne's disease causes Crohn's disease in humans. Research in this area will continue, however.

In summary, Johne's disease in cattle causes diarrhea, weight loss, and eventual death in infected cattle. It is a complicated disease because it has a long incubation period, the agent can survive in the environment for long periods, and carrier cattle (that can shed the organism) with no signs of disease are difficult to detect at present. Your veterinarian is your most important source of specific information about this disease and can help you diagnose this condition and help control this disease in your herd if necessary.

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