Johne's Control in Cow-Calf Operations

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Johne's disease (paratuberculosis) is a fairly common problem in cow-calf beef herds based on clinical experience. Exactly how common it is should be known more precisely by late fall 1998 when the NAHMS Beef 97 survey results are published. The NAHMS survey sampled 500-600 herds in 21 states and collected over 11,000 blood samples. ELISA results on these samples will give us a more objective and exact measure of Johne's disease prevalence. A portion of the survey results were reported at a recent meeting and clearly there is a major need for client education. When asked about Johne's disease, 70% of herd owners responded that they had never heard of it and another 22% said they knew the name but nothing more.

The economic impact of Johne's in beef cattle has not been reported. It is largely dependent on the perception of the industry about Johne's disease and this, in turn, is quickly changing. For commercial beef producers, direct economic impacts such as decreased weight gains or decreased fertility are probably minimal. Purebred producers, however, face huge economic problems from Johne's disease. If, in the future, buyers of cattle consider it important to keep *Mycobacterium paratuberculosis* infections out of their herds, owners of infected herds may find their cattle bringing a lower sale price or are even unsaleable, while those from herds that are test-negative for paratuberculosis or are certified-free of the infection will bring a premium. This economic impact will be driven by buyer perception of the importance of Johne's disease.

There are three reasons why the beef industry may decide to get more aggressive about Johne's control in the near future:

1. Prevent spread to the non-infected herds: the herd prevalence of Johne's disease in cow-calf operations is likely low and action now can eliminate the infection before it becomes endemic.

2. Preserve genetics: the infection spreads along family lines and valuable breeding stock will be lost unless infection prevention measures are taken for registered herds.

3. Protect product image: medical evidence suggests that *M. paratuberculosis* may cause Crohn's disease and control of this infection may be necessary to insure consumer confidence in their products.

Control or even eradication of Johne's disease takes several years. The challenge for practitioners and herd owners is to gauge what industry / public perception of the importance of this infectious disease will be in 3 to 6 years. If the decision is that Johne's disease will be important, then herd management and control programs must be instituted *now* to establish that the herd is free of Johne's or the infection is at very low prevalence when the market demands it.

Control programs are largely built on what is known of the epidemiology of Johne's disease and assessment of risk factors, in other words control programs are largely theoretical. Field trials to test the success of such programs or to evaluate which techniques are most cost-effective are lacking due to a paucity of research funding. Consequently, the control methods I outline in this paper are scientifically well grounded but largely untested. Research data and clinical experience used to support these recommendations come primarily from work on dairy cattle. In spite of this disclaimer, I am confident the recommendations will work. *The single most important factor governing the success of Johne's disease control programs is consistent application of controls over an extended period of time, that is 5 to 6 years:* ***THERE IS NO QUICK FIX.***

Five techniques or critical points for paratuberculosis control will be discussed beginning with the most effective and feasible and ending with the more difficult to implement.

Non-infected Herds

Non-infected herds should try to stay that way. Prevention pays! *M. paratuberculosis* is always introduced into herds by purchase of carrier animals. The

surest way to remain uninfected is by maintaining a closed herd. Truly closed herds must not have any biological contact with other herds. This includes never bringing leased animals on to the property, not using embryo transfer recipients, and not accepting colostrum or milk from other farms.

For herds that are not closed, pre-purchase testing of the seller's herd should be a condition of sale, to limit the risk of buying infected cattle. Ideally, purchased (or leased) cattle would originate from certified-free herds. Until such programs are more widely used, I recommend the following simple cost-effective pre-purchase biosecurity program: *require ELISA testing of 40 cows ≥4 years old from the sellers herd.* If all 40 tests are negative, the probability the herd is free of paratuberculosis is >95% (estimations based on ELISA accuracy and estimated prevalence of paratuberculosis among and within infected beef herds). The cost of testing (lab charges of $5.00 / head in most states), even if borne by the buyer, is far far less than the cost of dealing with the infection after it gets established in a herd. These same principles should apply to bulls, ET recipients, and colostrum or milk for orphan calves. Bovine practitioners have an opportunity and a professional responsibility, to help herd owners limit their risk of bringing this disease into herds. If you think about it, the herds with the strongest incentive to test should be the non-infected herds. Knowing this will enhance vigilance against introduction of the infection and down the road, their cattle may bring a premium at sales.

Infected Herds

1. **Test-and-cull cows**
   Annual ELISA testing of the herd is necessary for culling the subclinical carriers of *M. paratuberculosis*. The sensitivity and specificity of the new ELISA for paratuberculosis from IDEXX Laboratories, Inc. (the only USDA-licensed ELISA at this time) is 56% and 99.2%, respectively based on independent evaluation on >800 cattle at the University of Wisconsin. This means that *positive tests are rarely wrong* but negative tests only give somewhat increased confidence the animal is not infected. Annually repeated negative tests increase the reliability of the non-infected status of individual cows. Quantitative interpretation of the ELISA can be used to create ranked culling lists: from cows most likely to be infected and shedding *M. paratuberculosis* to those less likely to be infected or less likely to be fecal shedders. The test can be applied to cattle 2 years and older, however, restricting the test to cattle over 3 years old or over 4 years old is rational for beef herds and will decrease herd testing costs without seriously decreasing the rate of infection detection.

2. **Cull off-spring of test-positive cows**
   Transmission of *M. paratuberculosis* in beef cattle herds is most likely to occur from dam to off-spring rather than to other calves and herdmates. This bacterial infection becomes disseminated in the latter stages and *M. paratuberculosis* bacteria are excreted not only in feces but also directly into colostrum and milk, and can also infect the unborn fetus. Consequently, the highest risk of infection follows family lines: daughters of infected cows have a greater likelihood of being infected than do daughters of non-infected cows. Calf rearing environment and management will greatly influence risk of infection. On operations where young calves are more confined for longer times with infected adult cattle shedding *M. paratuberculosis* in their feces, the risk of random transmission from adults to calves is greater. This also occurs with cross fostering of calves or in the face of heavy environmental exposure with *M. paratuberculosis* and substandard hygiene. Nevertheless, herd owners wishing to make most rapid progress toward elimination of Johne's disease from their herd will be well advised to cull daughters of ELISA-positive cows starting with the last daughter born and working backwards in calving history.

3. **Avoid or eliminate infection transmission at breeding**
   Bulls -
   Infected bulls are frequently responsible for introduction of Johne's disease to herds. It is unclear whether the infection spreads from these animals through semen to the conceptus or simply by fecal contamination of the environment. Regardless, purchase of infected bulls should be avoided by requesting the Johne's disease herd test history from bull owners, ie. biosecurity. Exclusive use of artificial insemination is the only alternative.
   Cows -
   To "rescue" the genetics of valuable cows, embryo transfer is considered a safe means of producing non-infected calves from infected cows. Thorough embryo washing is required and careful selection of paratuberculosis-free recipients is a must.

4. **Correct herd / environmental management conditions that facilitate infection spread.**
   a) Ponds that drain contaminated pastures will harbor *M. paratuberculosis* for over a year and are very potent means of infection spread and so should be fenced off. Clean well water in stock tanks should be provided.
   b) Overcrowding in wet muddy lots should be avoided, particularly during calving season. If cattle are gathered up for calving, the pasture, calving pens and the cows should be kept as clean and dry as possible. Dam and newborn calf should be

removed from the calving area to a lower risk environment as soon as possible.

c) Hay bales/rolls for winter feeding should be placed in different sites to prevent accumulation of contaminated feces in one area (areas which are often congregation sites for susceptible calves).

d) Grazing contaminated pastures is a possible means of infection transmission and pastures can remain contaminated for over a year. However, the risk of infection transmission from grazing is likely low and control efforts such as pasture rest or tilling and re-seeding are too expensive to be warranted for most producers.

5. **Calf management**

For dairy herds, artificial rearing of calves is one of the most effective paratuberculosis control methods. While this technique is out of the question for most cow-calf operators, in some small herds for a few select cows, "rescue" of calves by hand rearing with clean colostrum and milk replacer could be considered.

In closing, I re-iterate that prevention is far more cost-effective than control after infection. If herds are infected, a steady consistently applied control program will succeed and potentially eradicate the *M. paratuberculosis* infection. The foundation of a Johne's control program in cow calf operations is a test-and-cull plan.

Acknowledgments

Thanks to Dr. Frank Garry, Colorado State University and Dr. Alan Roussell, Texas A&M for reviewing this manuscript and offering many helpful suggestions.

Note: Statements regarding use and interpretation of the ELISA for bovine paratuberculosis only pertain to the USDA-licensed test (IDEXX Laboratories, Inc.) performed by laboratories where Johne's testing has been USDA-certified (list available from Dr. Janet Payeur at NVSL, Ames, Iowa).

Abstract

Use of ultrasonography to help to predict observed oestrus in dairy cows after the administration of prostaglandin $F_2\alpha$

S. T. Smith, W. R. Ward, H. Dobson
Veterinary Record (1998) **142**, 271-274

A total of 76 cows from seven herds with an ultrasonographically visible corpus luteum at routine herd fertility examinations were treated with prostaglandin $F_2\alpha$. The sizes of the cavities of all the follicles on both ovaries with a diameter greater than 5 mm were measured. The cows were observed for signs of oestrus over the following six days and the time to onset of oestrus was recorded. Milk samples collected when the prostaglandin was administered and at oestrus were assayed for milk progesterone concentration. The herd of origin, lactation number, body condition score, days after calving at the time of examination and the total number of follicles when the prostaglandin was administered were not found to have any correlation with time to oestrus. Seventy-three of the 76 cows had milk progesterone concentrations consistent with active luteal tissue when the prostaglandin was administered, and 33 of them were observed in oestrus and had low milk progesterone concentration within six days. The mean time to the onset of oestrus was significantly and inversely related to the size of the cavity of the smallest follicle with a diameter of more than 5 mm.