

Successful control of Johne's disease

Michael T. Collins, DVM, PhD, DACVM and Vic Eggleston, DVM
Proceedings of the Wisconsin Veterinary Medical Association
October, 2007 Madison, WI

A research team from the University of Wisconsin, School of Veterinary Medicine is conducting a field trial on Johne's disease control in nine Wisconsin dairy herds ranging in size from 75 to 1,400 cows since January 2002. All herds in this so called "demonstration project" are on the same control program: standard herd *M. paratuberculosis* infection control management, ELISA testing every cow once during each lactation, culling cows that test strong-positive at the end of their lactation and labeling and managing the other ELISA-positives to maximize production income for the producer but minimize chances for *M. paratuberculosis* infection transmission.

The specific management changes required in the program are:

Maternity pen management

- Separate, "clean", pen for exclusively ELISA-negative cows
- Never allow sick cows in maternity pens; clean or for ELISA-positives

Calf management

- Remove calf from cow as soon as possible, ideally within 1 hour
- Feed 4 quarts of clean colostrum within 6 hours (3 qt for Jerseys)
- House calves well away from the adult cattle

Colostrum management

- Use only colostrum collected from ELISA-negative cows
- Take extra care for to assure hygienic colostrum collection
- Promptly feed or freeze colostrum

Calf care & feeding

- Feed only pasteurized milk until weaning either as milk replacer or as on-farm pasteurized milk
- Maintain good hygiene in calf rearing facilities and insure no manure contamination of feed and water

Herd testing program:

- Serum ELISA (IDEXX Laboratories, Inc.) on all cows during every lactation
- Record ELISA numerical result or interpretation in the cow's computer record
- Visibly label all ELISA-positive cows
- Manage cows based on ELISA result as follows:

ELISA result*	Action
Negative	Calve cow in clean maternity pen and use colostrum
Low to medium-positive	Calve in segregated maternity pen; discard colostrum; consider not keeping heifer calf
Strong (high)-positive	Finish the cow's lactation, do not breed back, cull at dry-off <u>for slaughter only</u>

* All ELISAs can and should be interpreted quantitatively

Timing of testing:

Some herds use a pre-dryoff testing scheme where blood samples are collected from cows such that ELISA results are available before dryoff, specifically before use of any dry cow treatments. Pre-dryoff testing has the advantage of getting test results as close in time to calving as possible and at a time when culling decisions are normally made.

An alternative scheme is fresh cow testing (15-45 DIM). In this scheme, ELISA results are obtained before breeding. Cows that test ELISA strong-positive can be labeled DNB (do not breed). This effectively designates them as culls at the end of their lactation with the added advantage that when culled and not pregnant they are unlikely to be sold as dairy replacements thereby infected another dairy herd.

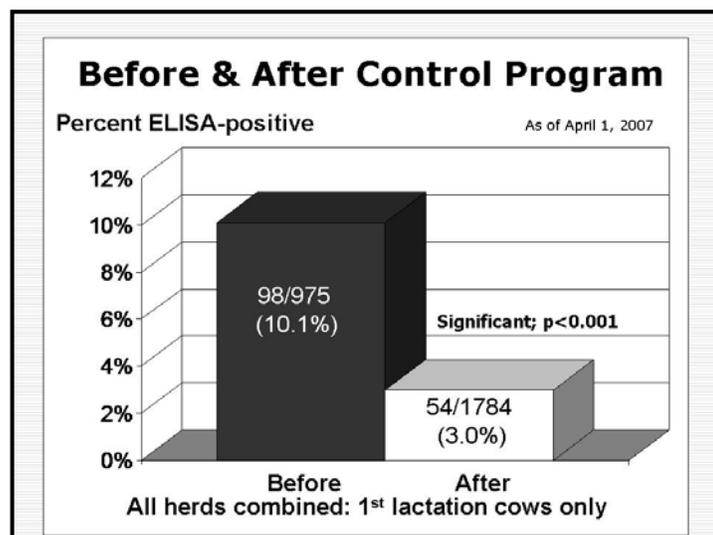
All herds are visited four times during the year by the project veterinarian, Dr. Vic Eggleston, assuring good program compliance. Herd DHI data is collected electronically from AgSource and processed by the Food Animal Production Medicine unit of the School of Veterinary Medicine. Fecal samples are collected and cultured by the BACTEC method but herd owners are not given the results to avoid culling bias.

The objective of the study is to reduce the within herd prevalence of *M. paratuberculosis* infections using only herd management and ELISA testing for serum antibodies to detect and manage infectious cows. The purpose is to demonstrate to veterinarians and producers that Johne's disease control is both possible and affordable.

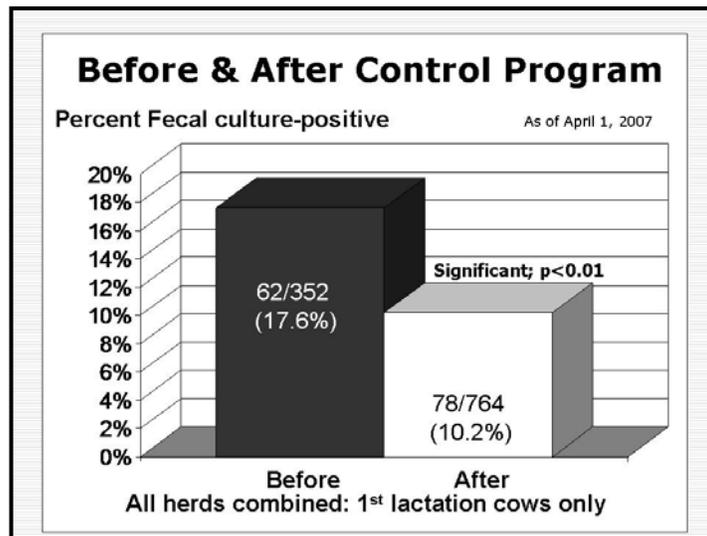
Results:

Overall within-herd apparent prevalence, as determined by either ELISA or fecal culture, has not yet changed in our demo herds but significant apparent prevalence reduction in 1st lactation heifers has been achieved. Over the past 12 months, heifers raised in herds after full implementation of the control program have entered the herds as milking cows and some have graduated to their 2nd lactation. The lower rate of ELISA-positive 1st lactation cows in the previous 12 months

compared to before start of the program is statistically significant ($P < 0.001$), providing solid evidence that the control program is succeeding (see adjacent figure). All 9 study herds observed a significant reduction in ELISA positive 1st lactation cows.



The same comparison of 1st lactation cows based on fecal culture results provides independent confirmation that the Johne's disease control program is effective (see adjacent figure). Since herd owners were not given the fecal culture results they were not making culling decisions based on that information. Among all 1st lactation cows in the 9 study herds 17.6% were fecal culture-positive at the start of the project while only 10.2% were



culture-positive in 12 months prior to April 1, 2007 ($p < 0.01$). This also demonstrates that although the ELISA does not detect all of the cows shedding *M. paratuberculosis* in their feces, and only the strong ELISA-positive cows are culled, use of the ELISA to detect the most infectious cows for culling or management is a useful adjunct to herd management changes to decrease the prevalence of infection.

In 2007 we are capturing data on 2nd lactation cows as the program proceeds. As a steadily greater proportion of each herd is composed of cattle born after full implementation of the control program, we predict that a significant reduction of within herd *M. paratuberculosis* infection prevalence as measured by ELISA and fecal culture will occur.

In addition to being effective, the control program is affordable; less than \$10/cow/year added expense for ELISA results. Current studies are evaluating the accuracy of ELISAs on milk samples to support a Johne's control program. If found sufficiently accurate, routine use of milk ELISAs could further reduce the costs of this type control program. Herd management changes are essentially considered best management practices and are easily justified in that they are effective at controlling multiple pathogens transmitted from cows to calves by the fecal-oral route.

Acknowledgements

This project has been made possible by financial and in-kind contributions from multiple sources. Most notable among these is the Wisconsin Milk Marketing Board which provided the first funding to launch the project. That money was matched by the USDA-APHIS-VS when the study herds joined the National Johne's Disease Control Demonstration Project. In-kind support has been provided by the nine participating producers and the School of Veterinary Medicine.