

Johne's Disease

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Introduction

The national survey of the dairy industry conducted by the USDA:APHIS National Animal Health Monitoring System (NAHMS) Dairy '96 study provided our first national view of the extent of JD infection in the US dairy industry. This study showed that the disease was distributed throughout the entire dairy cow population, not just one or more regions of the country, and that the problem was more costly to producers than previously recognized. The Dairy '96 study also showed that dairy producers were not well informed about the disease, and thus were ill prepared to deal with it effectively.

Johne's disease has been a major focus area for ILM activities. Because the disease was not seen as a major livestock production issue prior to the mid-1990's, there are important needs for producer and veterinary education, program organization and research that need to be met in order to effectively work with this problem. ILM participants have worked at both the national and state levels to help address these needs.

Research Projects

ILM research efforts in Johne's disease have primarily been directed at farm level questions important to disease control.

Hirst H, Garry F, Salman M. Assessment of test results when using a commercial enzyme-linked immunosorbent assay for diagnosis of paratuberculosis in repeated samples collected from adult dairy cattle. *J Am Vet Med Assoc*, 220:1685-1689, 2002. Many producers use serum ELISA testing to evaluate *Mycobacterium avium* paratuberculosis infection in their herds. It is a common finding that test results from individual animals can change over time. We have investigated the amount of change in test values that can be expected when animals are sampled repeatedly.

Hirst H, Garry F, Salman MD, Dinsmore RP, Morley PS, Wagner B, McSweeney K, Goodell, G. Seroprevalence of *Mycobacterium avium* subsp paratuberculosis infection among dairy cows in Colorado and herd-level risk factors for seropositivity. *J Am Vet Med Assoc*, 225;1: 97-101, 2004.

Johne's disease was not considered a major national dairy cattle disease problem priority to the 1996 national study conducted by NAHMS. In order to assess the problem in the state of Colorado, we conducted a sero-prevalence survey of the state's dairy cattle population.

Wells SJ, Whitlock RH, Wagner BA, Collins J, Garry F, Hirst H, Lawrence J, Saville WJ, Naugle AL. Sensitivity of test strategies used in the Voluntary Johne's Disease Herd Status Program for detection of *Mycobacterium paratuberculosis* infection in dairy cattle herds. *J Am Vet Med Assoc*, 220:1053-1057, 2002.

We have collaborated with colleagues at several institutions to evaluate test strategies that can be used to identify infected and noninfected herds for the voluntary national disease control program.

Lombard JE, Garry FB, McCluskey BJ, Wagner BA. Risk of removal and effects on milk production associated with paratuberculosis status in dairy cows. *J Am Vet Med Assoc*, 227;12:1975-1981, 2005.

We have worked with collaborators at NAHMS to evaluate more closely the production impacts and economic costs of Johne's disease in dairy cattle.

Lombard JE, Wagner BA, Smith RL, Garry FB, McCluskey BJ. Evaluation of environmental sampling and culture to determine *Mycobacterium avium* subspecies paratuberculosis distribution and herd infection status on U.S. dairy operations. *J Dairy Sci*, submitted 2006.

We are working to evaluate the utility of environmental sampling in identifying herds with infection.

Current Research Endeavors:

1. Johne's Disease Demonstration Herd Project

We are currently collaborating on a multi-year to study being conducted by 18 states across the country and coordinated by collaborators at NAHMS. There are approximately 60 dairy and 15 beef operations enrolled.

There are three main goals of the JD demonstration herd project. The first goal is to measure the incidence of clinical disease within a herd. Previous studies suggest that as infection rate in a herd decreases, the number of clinical cases observed will also decrease. Incidence of clinical disease along with whole herd or partial herd testing allows a good estimate of herd prevalence of infection. This is a critical parameter to measure since the overall goal of the demonstration herds is to show that proper management practices will decrease the prevalence of disease over time.

The second goal is to determine the percentage of animals that are removed from a herd based on test results without any evidence of clinical disease. This measure allows us to evaluate how producers manage using test results and also can be used, along with incidence of clinical disease, to determine if infected animals are more likely to be removed from the herd compared to test negative cattle. Some research has shown that

test positive cattle are more likely to be removed, but it is unclear whether this is based on test status, or progression of the clinical disease and subsequent removal.

The last goal, which may be the most difficult to reach, is to measure the risk of spreading the infection to other animals in the herd. Presently, this requires a risk assessment which is based on basic research information but not been confirmed by field based studies. A potential outcome from the demonstration herd project is to determine the most critical management practices associated with decreased prevalence of infection. Ultimately, veterinarians may be able to prioritize management practices based on current herd practices and those that have been proven to decrease prevalence in other operations. Hopefully, with increased producer participation in the voluntary control program and using the data generated from the demonstration herd project, we can work together to stop this epidemic.

The demonstration herd project is a 5-7 year project where farms are monitored over this period for changes in management practices and prevalence of MAP infection. One huge obstacle to overcome in researching this infection is the long time between exposure and subsequent clinical disease. This is the reason for monitoring farms over multiple years. The bottom line is that prevalence of infection in the herd today is a result of management practices in place over the last 3-5 years.

Expected date of completion: 2008.

2. Post-mortem studies on dairy cattle with suspected *Mycobacterium avium* ssp paratuberculosis infection: Evaluation of testing strategies.

The purpose of this study is to evaluate the occurrence of disseminated infection with MAP in dairy cattle. Most of the work to date has focused on infection of the gastrointestinal tract, although it is known that the infectious organism distributes throughout other tissues in the body. Understanding when and how this organism gets distributed to other tissues is important for understanding the course of disease, the ability of the organism to transmit to offspring, and the potential of distributing the infectious agent in tissues intended for human consumption. We are identifying the occurrence of disseminated infection in cattle and evaluating whether antemortem tests can adequately identify this form of the disease.

Lombard JE, Antognoli MC, Hirst HL, Dennis MM, Jensen SM, Salman MD, Garry FB. Use of antemortem tests to identify cattle with disseminated *Mycobacterium avium* ssp. paratuberculosis infection detected by postmortem culture of 15 tissues. Proc 8th Intl Colloquium Paratuberculosis, 2005.