Tools to Use Against Johne's Disease in Cattle Herds

Don Hansen, *DVM, MPVM, Chair of the AABP Food Safety Committee, National Johne's Working Group*
Christine Rossiter, *VMD, MS, AABP Food Safety Committee, National Johne's Working Group*

Why Revisit This Old Subterranean Disease?

A question of a potential risk to public health

Recently, people throughout the dairy and beef industries have developed renewed interest in Johne's disease. Part of the reason for the interest arises from some medical researchers' assertions that exposure to *Mycobacterium avium subspecies paratuberculosis* may be associated with human Crohn's disease. Crohn's is an inflammatory bowel disease of unknown etiology that particularly affects young adults. Using PCR, and in a few instances culture, some researchers have identified the bacteria in intestinal samples taken from human Crohn's patients in a higher proportion than in those from non-Crohn's patients. Results across studies, however, are inconsistent as a few other researchers have failed to reproduce similar findings. But, there are also other provocative findings. One medical investigator identified the bacteria in a young patient with cervical lymphadenitis, five years before he developed Crohn's disease. From yet another perspective, some clinical trials have reported patients remaining in remission much longer than expected after being treated with multi-antibiotic regimens.

The evidence for a direct link between the two diseases is not conclusive and the medical community continues to debate the significance of the association in understanding a cause for Crohn's disease. Nonetheless, the hypothesis is perceived as probable by many and, justifiably, is perceived as offering potential new avenues of treatment for Crohn's patients and their families. Producers, suppliers, and governments are committed to upholding and demonstrating the wholesomeness of milk and meat products. However, until necessary scientific studies provide more conclusive data, everyone involved with milk and meat products must also be concerned about a premature perception among consumers that a risk for human disease exists, and the impact on milk and meat prices that could result.

The impact that could result from the perception that beef or dairy products pose any risk for developing Crohn's disease could be devastating for the milk and meat industries. Yet, if a relationship between Crohn's disease and *M. avium subs. paratuberculosis* is established, the industries must also have the foundation in place to move toward assuring that products and herds are Johne's disease free.

Many herds in the major livestock states in the US are infected with Johne's disease.

The NAHMS survey was designed to detect Johne's infected herds with at least a 10% prevalence of infected cows. Herds with < 10% prevalence were not likely detected. Results showed that 22% of 1008 dairy herds in the top twenty dairy states had a prevalence of *M. paratuberculosis* > 10%. Infection ranged between 18% in small to medium herds and 40% in larger herds (>300). The survey underestimated the number of Johne's infected herds, but provided the first national estimates. Data from beef herds is scarce but estimates place the prevalence near 9% of herds. Johne's disease is a silent stalker. Unchecked as it has been for years, coupled with expanding dairy herds, more herds continue to become infected.

Most producers do not know about Johne's disease

The NAHMS Dairy '96 survey also found that 57% of dairy farmers knew little or nothing about Johne's disease. The similar NAHMS '97 survey of beef producers found 69% had never heard of Johne's disease and 22% had name recognition only. Owners of many herds that were positive in the Dairy '96 study also had no working knowledge of the disease.

High cost of infection for some

Farm level adjusted income analysis in 974 NAHMS Dairy '96 herds determined that across all dairies, infected herds experienced an average annual loss of $75 per cow inventory in the herd compared to non-infected herds. However, herd size does influence the economic impact of Johne's disease. The data were analyzed by herd size categories and found that in small herds (< 50 cows) the loss was $178 per cow and in large herds (> 500 cows) the loss was $181 per cow. That is a cost between $17,800 and $18,100 per year per 100 cows

in the herd for small and large herds respectively. Actual costs will vary for individual herds depending on their size and feed and management factors. But, for herds where Johne's becomes established, the associated costs can be substantial. Economic losses in beef herds are speculative, but could include premature culling and genetic loss, unrealized weight gains in nursing calves, and delayed conception and late calves in infected dams.

Where Do We Start?

Develop a farm or ranch specific Johne's disease prevention or control plan

To begin, every farm should have a specific plan for Johne's disease that accommodates their current goals and situation. Specific goals for Johne's control today should be to preserve a herd's uninfected status, minimize its introduction, prevent spread and reduce infection if already present in the herd, and for some consider moving toward eliminating the infection in the long term. Johne's disease is a herd problem. Unfortunately, this is rarely apparent at the point when prevention plans are low cost and most effective. Because Johne's disease has a long incubation period, most infected animals show no signs. The individual Johne's case is merely a hint of the magnitude of subclinical infection that may exist.

Preventing or controlling Johne's disease necessitates understanding its epidemiology and pathogenesis. Translating understanding into a successful control program on the farm will require a long term commitment by veterinarians and their clients to high standards of management practices and using them everyday. Once infection becomes established, control becomes more difficult and expensive.

On the benefit side, management actions directed against Johne's disease are procedures that prevent or control other fecal/orally transmitted pathogens. Johne's prevention will help minimize calf diseases caused by BVD, Corona and Rota viruses, E.coli, and Salmonella. Clean environments will promote periparturient cow health. Attention to manure removal, cleaner environments and feed and water sources for growing animals can improve growth and control of coccidia, Cryptosporidia, and nematodes.

Steps in developing a specific program for farm or ranch

Veterinarians have the knowledge, skill and the confidence of their clients to educate them and initiate the farm or ranch specific Johne's disease prevention or control plans. Johne's disease is a complex chronic disease that requires thoughtful decisions. It is an excellent example of a problem that is solved best with a team approach. To aid veterinarians in providing this service to their clients, the National Johne's Working Group collected, edited and collated the most current and accurate information on Johne's disease into an information booklet, and developed on-farm workbook manuals for dairy and beef herds. The National Johne's Working Group is a USAHA subcommittee whose membership includes the nation's recognized Johne's disease experts.

The workbook manuals are tools to help veterinarians customize a biosecurity plan with clients to reduce the risk of acquiring Johne's disease, control a current infection and evaluate progress over time. The manuals guide the users through the key steps in the process. The manuals are printed in this issue of The Bovine Practitioner. For convenience, they were designed to be removed and placed in a separate binder. Feel free to make additional copies for your use. The background information will appear in a series of articles inserted into in the monthly AABP Newsletter throughout 1999; one for the practitioner and another for the client.

Develop an information base

It is important to have current knowledge about Johne's disease and its control before attempting to help clients formulate farm or ranch plans. Johne's disease is not a emergency and there is plenty of time to become familiar with some unique Johne's disease issues first.

1.) *Review good and current information about the pathogenesis and epidemiology of Johne's disease.* Understanding the infection and transmission routes is important for assessing the risks associated with different management practices and helping clients prioritize and implement the most important ones. The July 1996 Food Animal Issue of Vet Clinics of North America, Paratuberculosis, is a good starting reference. The information articles published in the AABP Newsletter are even more current.

2.) *Know state regulations and laws regarding Johne's disease that affect a client.* Some states require reporting of "test-positive" results, with or without any other official follow-up action by the state veterinarian. These requirements or related confidentiality issues can have an impact on a your client's enterprise. It is important to be aware of these implications before discussion of a Johne's disease plan with clients. Veterinarians are encouraged to become involved in their State Johne's Disease Advisory Group to help assure that reasonable policies on Johne's disease are pursued and premature actions are avoided.

3.) *Be current on all aspects of liability.* Some clients may have an ethical responsibility and potential legal liability in the sale of infected animals from their herd. They should sell culture-test positive animals to slaughter only. If the herd is low risk for infection and has a control plan in place, owners could consider the merits of marketing test-negative animals, along with declaring information about the herd status. In circumstances where buyers are informed, they may be increasingly willing to accept animals from infected herds based on knowledge of estimated risk. An estimated risk status for the herd can be derived from knowledge of the origin and health of the herd, Johne's diagnostics policy and test results, and individual farm risk-assessment.

4.) *Know about the diagnostic tests that are available for Johne's disease, how they perform, and how to interpret them.* It is crucial to explain to clients what to expect from diagnostic tests and that they are tools to enhance preventive management efforts in a control program. Tests for Johne's disease are very useful tools in the hands of those who understand their capabilities and limitations. There are three key issues to be familiar with. Sensitivity is low for both culture and serological tests on the average and they do not detect animals in the very early stages of infection, i.e., Stages I and II. However, the majority of animals shedding significant microbes can be detected. Secondly, false-positive test results may occur with serology but the test specificity is near 98% and errors can be avoided with judicious use of history and culture confirmation in making decisions. Third, it is important to understand in herd or animal level decision making, that an estimate of the prevalence of infection in the herd or the chance of infection in the individual, based on other known information, influences how an individual test result should be interpreted, i.e., the chance that any individual test result is actually correct.

5.) *Use NVSL approved diagnostic tests.* It is highly recommended to use a diagnostic laboratory that has NVSL approval for the tests that you want to use and be familiar with the test methods and interpretations they provide.

Strategy planning

There is no clear cut recipe for Johne's disease control in many herds. It requires long term effort or sustained vigilance. It is likely to impact many management areas on the farm and many employees' daily routines. Thus, owners and employees need to know how they will be involved, what will be expected of them, and what they can expect from their prevention or control efforts over time.

1.) There are different approaches to Johne's control and different outcomes to target. Each plan's success depends largely on the exactness with which control efforts are designed and executed to meet a farm's decided objective. Some clients may choose preventive management alone to control or eliminate Johne's disease, whereas another farm may want to use a more aggressive and expensive management and herd testing strategy. The time to achieve goals will depend on the prevalence of infection and aggressiveness of the control efforts. The more infection, the more difficult and time consuming control of Johne's disease will be. People who understand Johne's disease on the farm or ranch will be best suited to mold the right approach.

Veterinarians are best suited to help clients and employees decide which control strategies may work best for the operation. Approaches may involve combinations of the main strategies: adopting specific management practices, implementing testing schemes with culling and/or managing practices, vaccination, and in extreme cases, depopulating the herd. The most successful plan will be the one that best matches the farm objectives, and makes the best use of resources, capabilities, and commitment of the veterinarian and client.

2.) Keep a written copy of the plan. The short-term (e.g., 12 months) and long term goals of the control program, a summary of the resources and expected time investment should be included. An outline of the specific measures, how they will be implemented, and who is responsible to implement and monitor them should follow. A written plan should clarify efforts for everyone and be the reference for discussing, evaluating and modifying the elements regularly (e.g., weekly or monthly, not months afterwards).

How To Use The Veterinary Manuals With Dairy and Beef Clients

Similar workbooks have been designed for dairy and beef herds to guide the users through a thorough physical and medical-risk examination of a client's farm or ranch. One may wish to succumb to the temptation to do less than a complete examination and work-up for a client's Johne's disease prevention or control plan. However, experience has demonstrated that complete consideration of all farm or ranch factors produces the best possible plans for success. Taking the shorter path is like failing to tighten all the nuts on a wheel when replacing a flat tire on a car. The wheel stays on for a while but inevitably comes off, usually when one is driving on a bumpy road or

at high speed in a rain storm. Practitioners who used the manual in a pilot program credited the process with helping them improve their overall client relationship, developing a better understanding of the operation, and discovering better ideas for benefiting clients with other health problems.

The workbooks lay out the following basic steps for designing workable and practical Johne's control plans:

1.) Assessing current and long term goals of the owners. Without an owner and employee buy-in, Johne's control is doomed to fail at the start.

2.) Assembling the history of Johne's disease and risk of infection for the herd, and estimating a most-likely prevalence of infection in the herd. This is an important beginning benchmark from which to examine and discuss the disease, its impacts on the herd and profits, objectives for control, and against which to measure future progress.

3.) Identifying farm or ranch-specific risks for transmitting or preventing Johne's disease. A risk assessment tool addresses practices across major management areas that can promote fecal-oral transmission of animal pathogens, including *Mycobacterium avium subs. paratuberculosis.*

4.) Examining various options to manage identified risks, including costs and benefits.

5.) Considering diagnostic and herd testing strategies. Which strategy may help achieve the desired results for the client and disease control simultaneously?

6.) Defining objectives and owner's expectations from the control effort, and the time frame in which to accomplish them. This step helps everyone solidify commitment to a defined outcome.

7.) Discussing the benefits that Johne's specific management can have on other priority areas. Achieving related health and performance goals may also be improved by making sure that priorities in those areas are addressed and that management efforts and the multiple expected benefits are coordinated as part of the Johne's plan.

8.) Setting up a scheme to monitor the plan and its progress over time.

The dairy (page 193) and beef (page 194) manuals can be found in the next section of this issue. If you have any questions please contact Don Hansen (541-737-6777) or Chris Rossiter (607-253-3944) for assistance. They can answer your questions or direct you to someone else who can.

Book News

Poisonous Plants

A Veterinary Guide to Toxic Syndromes (CD-ROM)

Murray Fowler

Publication Date: February, 1999 **For Immediate Release**

Approximately 1,000 plants—including fungi—that are poisonous to animals (and humans) appear in this easy-to-use, full-color diagnostic tool and reference. Veterinary practitioners and students, toxicologists, agronomists, plant specialists, and agricultural extension agents will find it a valuable aid.

Three cross-referenced indexes make each plant instantly accessible by:

- Common name index
- Scientific name index
- Poisonous syndromes (groupings of plants by similar toxins, effects, structures, and other common relationships).

Each plant selected by common or scientific name appears on its own page with one or more full-color photographs, and detailed information—including common name, scientific name, poisonous parts, and links to pages for related plants.

Icons on each plant description page provide access to additional information including:

- common circumstances in which poisoning occurs
- management or treatment
- clinical signs
- poisonous principle
- distribution (native region, habitat)
- diagnosis (laboratory tests; pathology)

Other features include: hypertext links of specific words to related information on other pages and a digitized segment—movie with audio—in several of the clinical signs components. The movie shows symptoms displayed after toxic exposure and, selectively, methods of treatment.

ABOUT THE AUTHOR: *Murray Fowler, DVM,* is professor emeritus of zoological medicine, School of Veterinary Medicine, University of California-Davis, and former chief of the Zoological Medicine Service of the hospital. He is a diplomate of the American Board of Veterinary Toxicology, the American College of Veterinary Internal Medicine, and the American College of Zoological Medicine. He also is past president of the American Association of Zoo Veterinarians.

November 1998, (produced as Multimedia Courseware for Veterinary Medicine by the University of California-Davis, distributed by ISU Press). PC platform (Windows), ISBN 0-8138-2090-1, $89.95. Power Macintosh platform, ISBN 0-8138-2100-2, $89.95 Available through ISU Press. Price subject to change without notice. Sixty-day examination copies available to U.S. instructors. Complimentary copies available to reviewers. For more information contact Beverly Fisher, Publicity Coordinator, ext. 624. Visit our Web site at http://www.isupress.edu