

Johne's Disease at a Crossroad
Frank Garry, DVM, Coordinator of ILM,
Colorado State University and
Mike Collins, DVM, PhD,
University Of Wisconsin - Madison

Why is there so much fuss about Johne's disease in dairy cows? In the last six years the State of Colorado, as well as most of the other states in this country have developed voluntary bovine Johne's disease control programs modeled after the national program standards. Several commercial companies have developed and marketed tests for rapid identification of infected animals. In 2003 the federal government allocated more than \$20 million to support efforts to control this disease.

About 22% of U.S. dairies have JD infection in 10% or more of their cattle, according to the 1996 NAHMS Dairy survey. The NAHMS study also estimated about a \$220 annual loss of production per cow in the herd when infection rates were that high. Cattle with JD lose weight and develop diarrhea. Their production declines and affected cows will ultimately die from the disease, but they are usually culled prior to death. Decreasing the economic losses associated with JD can improve a dairy's bottom line, but there are many other health problems such as infertility, lameness, mastitis, and calf death that can cost producers as much or more in losses. So why has Johne's disease caught so much attention that it warrants federal spending to assist in its control?

The answer, of course, is that there is ongoing concern that the infectious agent that causes JD in cows (*Mycobacterium avium paratuberculosis*, MAP) may also be part of the cause of a human disease called Crohn's disease. Infections that occur in both humans and animals are called zoonoses. The possibility that JD is a zoonotic disease like TB or brucellosis is a major concern.

Whether Crohn's disease is caused by infection with MAP is an extremely important question that needs to be determined by the human medical community. However, that determination will also have profound effects on the approach to dealing with Johne's disease in livestock. As depicted in the figure below, if Johne's disease is considered to be an animal disease without public health impacts, then control programs will logically follow the course currently being undertaken. Specifically, such control programs are based on the economic importance of the disease to producers, and include voluntary program participation with limited public subsidies. The target of such control efforts would be keeping JD occurrence low enough to minimize its impact on productivity. On the other hand, if the disease is believed to be zoonotic, then aggressive control programs with mandatory testing and substantial public subsidies would be highly likely. Designation as a zoonotic disease would put this animal health problem in the same league as TB, brucellosis, West Nile disease, rabies, or anthrax.

There is a good deal of scientific evidence supporting the possibility that MAP is indeed a zoonotic infectious agent. Whether this evidence is sufficient to conclusively say that MAP is part of the cause of Crohn's disease is the pertinent question. Some of the key evidence is listed below:

1. The majority of studies that used appropriate techniques have detected MAP genes and even grown MAP bacteria from patient tissues.
2. A statistically significant number of Crohn's patients test positive for serum antibody to MAP.
3. MAP has been shown to be capable of infecting a wide range of animals including primates.
4. MAP is guilty by association: all mycobacterial pathogens are zoonotic (examples include the causes of TB in humans, TB in cattle, TB in birds, and leprosy).
5. Antibiotic treatments directed against MAP can cure Crohn's disease in a high proportion of patients. however, these studies are limited in number.

The National Academy of Sciences recently convened a committee to review information on Johne's disease, and included an assessment of the link between JD and Crohn's disease. The report can be read online at the National Academy Press website, www.nap.edu by doing a title search on Johne's disease. The committee asked the question "What data would it take to convince us that such a link exists?" The committee concluded that Crohn's disease is a complex problem without a simple cause, and that there was insufficient evidence to prove or disprove that MAP is a cause of Crohn's disease in humans. However, a causal link between MAP and Crohn's is a plausible hypothesis that warrants further research.

There are indeed a growing number of research reports that point to an infectious agent as one of the contributors to Crohn's disease. Additionally, the most common infectious agent toward which these studies point is MAP. There are also numerous studies that fail to identify a causal role for MAP. Such conflicting results are expected if a disease problem has a complex, multifactorial cause. Therefore, it is unlikely that there will be flawless scientific proof of cause and effect, and a determination will rely on the collective judgment of medical investigators. Until a convincing argument is made one way or the other, the issue will remain controversial. However, if sufficient public concern develops, then the safety of dairy products, cull cow meat, and water supplies potentially contaminated with animal feces will become important issues. Two recent articles by Patrick Perry in the Saturday Evening Post (March/April and May/June, 2004) are good examples of the type of lay press publications that can lead consumers to draw conclusions about the cause of Crohn's that specifically suggest dangers associated with dairy products. This concern may have negative repercussions regardless of the judgement pronounced by medical experts.

Although there is no firm consensus yet about the relationship between MAP and Crohn's, there is no question that this debate is gathering substantial attention. Clearly this is an important question for the dairy industry and many public policy decisions hang in the balance. If MAP is ultimately considered to be a human disease agent, then the occurrence of JD in cows will surely be considered an important risk to human health. The dairy industry is at a crossroad on this issue. Producers and veterinarians can choose to act now to minimize the occurrence of this infection, and the developing state programs can help focus these efforts. Alternatively, we can wait until someone defines an answer, and then see if public pressure or government regulations mandate the effort.

For more information on Johne's Disease in general and the Colorado Voluntary Control Program, please visit the archives of the Colorado Dairy News posted on the web at < www.cvmb.edu/ilm.cdn >.

Figure One: The approach to control of Bovine Johne's Disease will vary depending on whether

or not it is considered a zoonotic disease.

