

Crohn's-Johne's Connection: Scientists Look Into Controversy, Herd Control Options

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21st Century Conference at the Grantville Holiday Inn.

What science has found is that a predisposition to acquiring Crohn's is inherited in 15-30 percent of the cases, according to the professor who studies disease in the human gastrointestinal (GI) tract. The disease is similar in humans in that it attacks the small intestine, according to Bayless, but can attack any part of the intestinal tract.

Johne's, on one hand, is an illness that infects primarily young cattle. Clinical symptoms include diarrhea, loss of diet, reduction in the amount of milk in dairy animals, a general "gaunt" appearance of cattle, and other problems.

Crohn's, on the other hand, also affects young people — the average age of human onset of the disease is 27 years old, with similar symptoms.

Crohn's is more frequent in people of European descent, more common in whites, and is more common in Ashkenazi Jews. It is more common in urban and developed countries but remarkably is less common in those with poor sanitation as a child. There is increased severity in smokers. But there is no evidence it can be passed from human to human (including patient spouses, physicians treating CD, veterinarians treating Johne's, and farm workers or families working with herds infected with Johne's).

About 400,000 people in the U.S. have Crohn's disease. About 80 percent have surgery to get a specific diagnosis.

"Is (mycobacterium paratuberculosis — what causes Johne's) a human pathogen? Can it cause human disease?" said Bayless.

Bayless noted that there is no proof that the same bacterium causes Crohn's disease. Science cannot identify the antigen and there is no immune response.

To treat Crohn's, various antibiotics are used. Bayless provided a picture of a girl who had Crohn's onset at 10 years of age. She looked gaunt and had leg lesions.

Even former President Dwight D. Eisenhower was a victim of Crohn's. And he was a Pennsylvania farmer.

"Are farmers at risk of Crohn's disease?" Bayless said. Bayless noted the evidence is inconclusive. Sweden, which has no Johne's disease, has a high incidence of Crohn's.

The cause could be related to perhaps a bacteria, a virus, dietary, genetics, or some kind of combination of the above with a total immune system failure. More work is under way.

Though samples of human and cattle intestine match for response to Johne's and Crohn's infections, that could be simply because the intestinal tract has a limited response to any type of infection.

The Crohn's and Colitis Foundation of America spends \$4 million annually to research the disease. They can be contacted at their Website, www.cffa.org.

Bayless pointed to a recent workshop sponsored by the National Institute of Health on Dec. 14, 1998 to see if a connection between the two diseases

could be made. These were the conclusions from the workshop summary available on the Website www.niaid.nih.gov/dmid/crohns.html:

- There is insufficient evidence to prove or disprove that Mycobacterium avium subspecies paratuberculosis (MAP) is a human pathogen or that it is the cause of Crohn's disease. Considerable controversy continues to exist in the scientific community on this point.

- The difficulty in detecting and growing the organism, or being able to demonstrate a consistent immune response to it in Crohn's disease (CD) patients, continues to frustrate researchers.

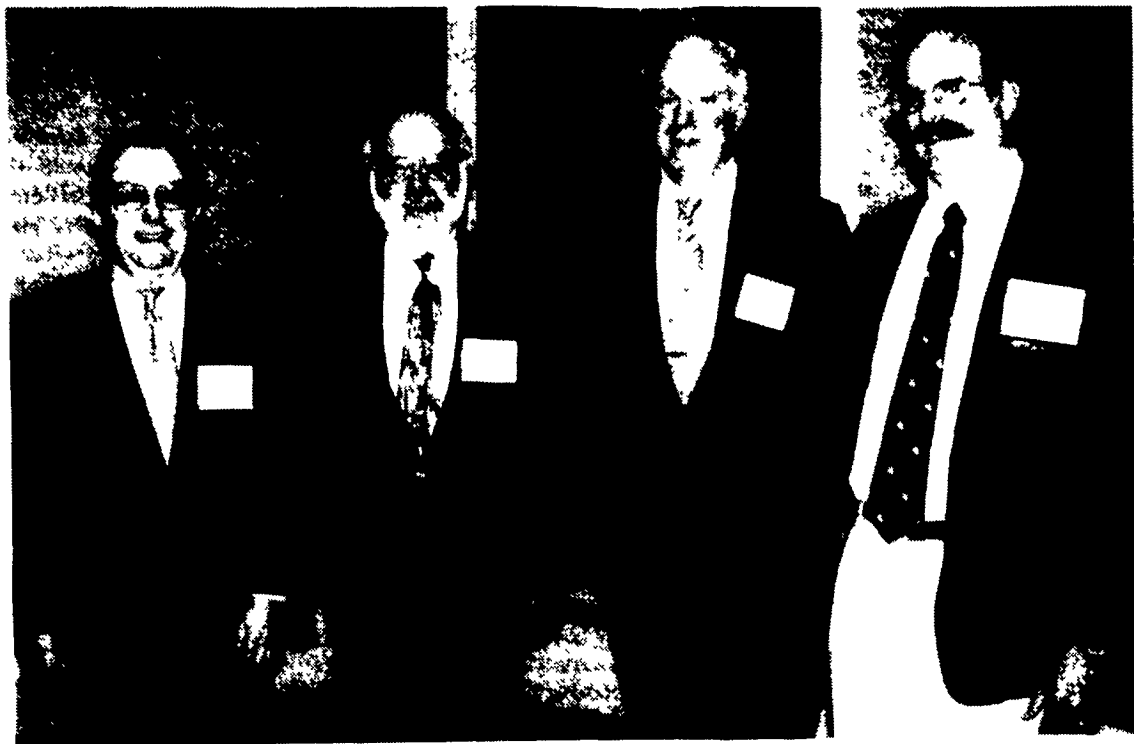
- Newer methodologies including the detection of microbial DNA sequences and functional genomics are available and should be applied in the search for a microbial etiology of Crohn's disease. A wide net should be cast. Characterization of microbial "communities" associated with this disease should be sought. Comparison with the completed genome sequences of the related species *M. tuberculosis*, *M. leprae*, and *M. avium* may provide clues to the genetic basis of the pathogenesis of MAP.

- Good animal models for CD do not exist and should be sought. The development of additional genetically engineered mouse strains or primate models may be worthwhile, since current models do not develop much of the pathology associated with CD. Large animals, including sheep and cattle that get Johne's disease from MAP should be treated with vigorous antimicrobial, anti-inflammatory, and immunosuppressive treatment (typical of what is used in humans) in conjunction with molecular characterization of associated microbial populations and strains.

- If MAP is proven to be a human pathogen, there is the potential for an enormous impact on human health due to the prevalence of this organism on the farm and in water. Further study of MAP as a food and/or waterborne pathogen should be conducted. Viable MAP should be sought in commercial milk and other dairy products as well as in meat. Conclusive studies of the effectiveness of pasteurization using commercial equipment and process rather than laboratory simulations should be performed. In order to conduct the above, standard methods for the concentration, detection, and in vitro culture of Map should be developed and used by participating researchers. Federal agencies with regulatory authority over the food supply should consider conducting such research in cooperation with relevant food production industries and academic researchers.

Dr. Robert Whitlock, professor of the school of veterinary medicine at the University of Pennsylvania New Bolton Center, spoke about Johne's disease in cattle and how important control efforts are.

When asked about the possible connections of drinking raw, unpasteurized milk, Whitlock noted that he drank it as a child himself. But for those who drink it, the risk of ingesting Johne's is



Day two of the conference featured speakers, from left, Theodore Bayless, professor of medicine, head of gastroenterology, Johns Hopkins University; Ron Schultz, professor and chair of pathobiological sciences, School of Veterinary Medicine, University of Wisconsin; Robert Whitlock, professor, School of Veterinary Medicine, University of Pennsylvania New Bolton Center; and Dave Galligan, section chief of animal health, economics, and nutrition, School of Veterinary Medicine at University of Pennsylvania New Bolton Center.



Speakers at the Pennsylvania Agriculture in the 21st Century included, from left, Kenneth Bailey, associate professor of ag economics, Penn State; Dave Galligan, section chief of animal health, economics, and nutrition, School of Veterinary Medicine at University of Pennsylvania's New Bolton Center; Steve Watrin, director of dairy business services, Land O'Lakes, St. Paul, Minn.; Dave Pyburn, director of veterinary medicine, National Pork Producers Council; Julie Funk, extension food safety specialist, North Carolina Extension Service; Eugene Gantz, president, AgRisk Strategies Inc., Millersburg; Dan Ferber, free-lance science journalist, Urbana, Ill.; Ron Schultz, professor and chair of pathobiological sciences, School of Veterinary Medicine, University of Wisconsin; Ron Roberts, Sterling, Scotland; and Don Bell, poultry specialist, University of California.

"very, very, very small."

Also, the bacterium will not survive the pilot commercial pasteurization methods with their short-term, high temperatures, Whitlock noted.

However, dairy producers must learn to focus more on eradication programs, including culling the older, higher-shedding animals first and creating a program that is economically viable to protect the more valuable young stock.

Johne's is a chronic bacterial infection that begins in the young calf and can take a long time — as long as 10 years — to be clinically evident. But most animals on the farm that have it "don't show any clinical signs," Whitlock said.

Usually if the herd animal identified at the top is shedding and has clinic signs, there could be 15-20 animals infected that aren't showing any clinical signs. They look "perfectly normal," he said.

Also, cows in the summertime cooling off in a farm stream or pond can infect other cows readily.

Other animals, including dairy goats and deer are even more susceptible to it. Whitlock noted that the connection between the two diseases could be made. These were the conclusions from the workshop summary available on the Website www.niaid.nih.gov/dmid/crohns.html:

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