

# Research Link

## Genome sequencing completed of bacterium causing Johne's disease

U.S. Department of Agriculture (USDA) and University of Minnesota scientists have sequenced the genome of the bacterium that causes Johne's disease,

*Mycobacterium paratuberculosis*.

"This represents a major research breakthrough that could speed the development of new ways to detect and ultimately eliminate Johne's disease," says Joseph Jen, the undersecretary for

research, education and economics. He chairs the U.S. Interagency Working Group on Domestic Animal Genomics.

Johne's is a chronic and potentially fatal intestinal disorder that brings about severe diarrhea and weight loss in

infected cattle. According to a USDA news release, it is found in 8% of beef herds and 22% of dairy herds in the United States.

The sequencing was achieved at two locations: the Agricultural Research Service (ARS) National Animal Disease Center (NADC) in Ames, Iowa, under microbiologist John P. Bannantine, and at the University of Minnesota's Advanced Genetics Analysis Center under the leadership of its director, Vivek Kapur, faculty member of the university's medical school and College of Veterinary Medicine.

Kapur says several genes discovered during the sequencing may help differentiate *M. paratuberculosis* from other closely related bacterial species. Availability of the genome sequence, he says, "will provide a much needed boost to research toward the detection of the disease, the development of vaccines and the ultimate eradication of the disease."

The slow growth of *M. paratuberculosis* impedes both the diagnosis of infected animals and lab-based research on the microbe. "The genome sequence may enable us to not only understand why this pathogen grows so slowly, but to identify it more rapidly," Bannantine says.

## TB test is easy, inexpensive

A test developed by ARS scientists for detecting bovine tuberculosis (TB) may be very timely. The new blood-based assay for detecting the disease in animals is important because it is applicable for most, if not all, species of mammals and requires only a single blood sample. That means animals are handled just once.

A patent application for the test has been submitted by the USDA on behalf of the inventors, NADC veterinarians Ray Waters and Mitch Palmer.

The assay detects nitrite — as an indication of nitric oxide production — in blood-sample cultures. Mammals produce nitric oxide as a natural response when fighting TB.

According to Waters, the test is an inexpensive and easy process for diagnostic laboratories and regulatory agencies. It will likely be used on other livestock species, such as sheep and goats, and on wildlife such as deer, bison and elk.

Currently, the only government-approved TB-detection method is a skin test that causes a reaction that is measured 72 hours later. Handling the animal a second time can lead to injury and stress, Waters says.

Eradication efforts started by the USDA in 1917 almost eliminated bovine TB. But recent developments, including outbreaks among white-tailed deer in Michigan, dairy cattle in California and feeder cattle in Texas, show that the disease is still active in the United States.

The new, still-unnamed test can detect all three types of TB — human, avian and bovine, Palmer says. He notes that another test, an interferon gamma assay already in use for livestock, is based upon the same blood-culture principle as their procedure. However, it can't be used on other species and can only be applied in conjunction with the skin test.

Visit [www.ars.usda.gov/is/AR/archive/nov02/tuber1102.htm](http://www.ars.usda.gov/is/AR/archive/nov02/tuber1102.htm) for more information.

#### **Cattlemen, McDonald's partner to help research BSE**

Contracts are being finalized that will help bring the subject of bovine spongiform encephalopathy (BSE) into clearer focus. The research is being funded through \$1.1 million in beef checkoff funds and a \$500,000 grant from McDonald's Corp.

The project is being coordinated for the Cattlemen's Beef Promotion and Research Board (CBB) and state beef councils, by the National Cattlemen's Beef Association (NCBA) Research and Knowledge Management staff. CBB oversees the \$1-per-head beef checkoff.

Members of the BSE Scientific Working Group reviewed 17 proposals received from research organizations across the United States. These proposals were generated through a "request for proposal" process that identified the specific goals the working group wanted to accomplish. The group's five topic areas consisted of basic research, diagnostics, Beef Quality Assurance (BQA) Best Management Practices, eradication and rendering technologies.

Topics of final proposals ranged from basic research of prion proteins to chronic wasting disease (CWD) in deer and CWD relationships to transmissible spongiform encephalopathies (TSE). Twelve-month contracts with investigating bodies are expected to be finalized by the end of the year, with results available by early 2004.

#### **Montana cattlemen asked to participate in study**

Montana cattle producers taking cattle to their local auction market may be asked to participate in a study for anaplasmosis and bluetongue, according to the Montana Stockgrowers Association. Samples for the study will be collected at participating auction markets around the state. Participation is voluntary, and results will be confidential.

The three-year study is a joint venture between the Montana Department of Livestock and the Alberta Cattle Feeders Association. It was designed to sample yearling cattle with two summers' residence in Montana for evidence of exposure to anaplasmosis and bluetongue as they were processed in Canadian feedlots. Last year, 5,000 animals out of the 120,000 feeders exported to Canada

were sampled. The first-year results showed very low levels for both diseases.

This year, because of the drought and lack of feed in Canada, there is little movement to the Canadian feedlots. The backup plan was to continue the study by sampling bred heifers at Montana's livestock auctions.



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