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Voluntary Johne's Disease Control Program

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Johne's disease costs Pennsylvania's agriculture industry more than \$6 million a year; nationwide, the losses may exceed \$1.5 billion, according to Dr. Robert Whitlock, associate professor of medicine at the School. "The disease is caused by *Mycobacterium paratuberculosis*, a bacterium related to the human tuberculosis organism. The clinical disease is usually not obvious until two to three years after exposure to the organism, but may not become apparent until five to eight more years following initial infection." The bacteria settle in the intestine where their presence causes a thickening of the intestinal lining, leading to malabsorption and loss of protein from the bloodstream into the gut. Signs of the disease include low fertility, repeated mastitis infections, unthriftiness, reduced milk production, and diarrhea. The bacteria are contained in the manure and thus spread in the herd. Newborn calves and young animals are particularly vulnerable. Therefore, the newborn calves need to be separated from the adult cattle as soon as possible after birth and reared in clean, uncontaminated facilities. Calf hutches and separate heifer barns facilitate separating young stock from the adult cattle that often serve as the source of infection.

In a recent study by Dr. Raymond W. Sweeney, assistant professor of medicine, it was shown that in utero transmission of the disease can occur in heavily infected cows, thus in some cases the calf may be born with the infection.

The state implemented a Johne's disease control program in 1973 to reduce the prevalence of Johne's disease and to provide farmers with the means to control the disease through management techniques and diagnostic support. Despite these efforts a comprehensive study by Dr. Whitlock, Dr. Sweeney and the Pennsylvania research team showed that about 25% of the 15,000 dairy herds in the state may be infected.

The program emphasized control of the disease in a herd through eradi-

cation of afflicted animals. Studies have shown that removal of animals exhibiting clinical signs is not enough to eliminate the disease. "If you have one or two cows with clinical signs in a herd, it is likely that at least 15 to 25 others are infected. ●f those infected animals only 25 - 50% can be detected with the current tests," explained Dr. Whitlock. "Thus the removal of stock with detectable symptoms does not help to control the spread of the disease."

Now the state has launched a new, voluntary Johne's certification program. "The major objective of the program is to certify herds 'Test-negative' for the Johne's disease rather than focus the diagnostic efforts on known infected herds," said Dr. Whitlock. "The certification program involves a number of tests and guidelines for herd management that must be followed. Farmers need to be able to purchase herd replacements that are at very low risk of infection rather than purchase cattle with an unknown Johne's status."

The first step in obtaining paratuberculosis test-negative certification is completion of a cooperative agreement involving the farmer, the herd veterinarian and the Pennsylvania Department of Agriculture. Those herds for which the herd owner and veterinarian can state to the best of their knowledge the herd has not had any clinical cases in the past five years nor any laboratory evidence of paratuberculosis would be certified test negative after two negative herd tests. All other herds would require three negative whole herd tests with the last test to be based on fecal culture rather than serology. If each test is negative, then the herd would be certified as test negative. To maintain certification, the herd must be tested every 10 to 14 months. Only animals over two years of age need to be tested.

The initial test is an ELISA screening test. If an animal is positive, then a fecal culture is performed within 21 days. This test takes about 12



A cow with bottle jaw. Bottle jaw is a non-specific yet typical sign of advanced Johne's disease.

weeks. If the fecal culture is negative, the animal is considered to be test negative.

Another requirement for herds undergoing certification is that additions to the herd must come from progeny born and raised in the herd, or be animals from a certified free herd. If animals from another, non-certified, herd are added, these must be kept isolated and must be ELISA tested within 15 days. Animals in a certified herd also may not be vaccinated of Johne's disease as this would give a positive ELISA reading.

Farmers agree to provide separate stalls or calving areas for cows nearing parturition, to remove the calves from their dams within 24 hours of birth, and to rear them separately from the adults until one year of age.

The cost of the testing is borne by the Department of Agriculture. The herd owner does have to pay the veterinarian for the herd examination and for diagnostic sample collection.

"Dairy cattle are an important commodity for Pennsylvania agriculture," said Dr. Whitlock. "Not only in terms of milk production, but also for export to other states and other parts of the world. But only healthy animals can be exported, thus it is in the industry's best interest to increase the number of Johne's certified-free herds."

In addition to Dr. Whitlock and Dr. Sweeney from Penn, Dr. Lawrence T. Hutchinson from Penn State, and Dr. Max Van Buskirk from the Bureau of Animal Industry were the primary developers of the paratuberculosis test-negative certification program.

While this program is under way, research is continuing to develop faster test methods and to refine the existing tests. The Penn team has been able to decrease the fecal test time from 16 weeks to 12 weeks by employing special centrifuging techniques that concentrate the sample. Dr. Sweeney is now looking to test milk for the presence of the antibody to the Johne's organism as an early indicator of infection. He is developing filtration techniques for large volumes of milk to concentrate the sample. Because *M. paratuberculosis* is such a slow growing organism, bacteria need to be present at a certain concentration before they will become evident in culture.

Johne's disease is not only a threat to agriculture, it also affects other



Herrold's egg yolk media with the typically appearing colonies for Mycobacterium paratuberculosis. The Johne's organism often requires 10-12 weeks to appear visible on the media surface.

ruminants such as endangered species in zoos. A National Task Force on Johne's Disease has been formed to combat the disease. Dr. Whitlock was appointed, along with Dr. Max Van Buskirk. On a historic note, the disease was first identified to be present in the USA by Dr. Leonard Pearson, in 1905. Dr. Pearson served as the third dean of the School, from 1897 to 1909.

LMAH Moves to New Quarters



Steve Rosenthal

Dr. Donald Abt, Robert R. Marshak Term Professor of Aquatic Animal Medicine, is an old hand at moving laboratory facilities from one building to another. "I was at the School when we moved offices and laboratories into the Rosenthal Building. I moved again when VHUP opened," he said. "This current move was a joy. We now have ample excellent research and service space on the second floor of the brand new Marine Resources Center (MRC), the latest addition to the Marine Biological Laboratory (MBL) in Woods Hole."

The space has been designed specifically for the research, service and teaching programs of the Laboratory for Marine Animal Health (LMAH) and AQUAVET® in addition to providing the MBL with essential new space for their mariculture research efforts. The facilities include special holding tanks for maintaining and culturing healthy marine organisms and isolation tanks appropriate for research on diseased organisms. The one-of-a-kind seawater life support system in the MRC simultaneously can provide up to eight tailor made marine environments to the animal holding tanks.

The LMAH is staffed by four veterinary scientists with specialty training in microbiology, pathology and epidemiology and a part-time par-

asitologist, based at the main campus in Philadelphia. The professional staff are supported by three technicians and a secretary.

The LMAH provides diagnostic veterinary services for laboratory animal needs of the Marine Biological Laboratory, the Woods Hole Oceanographic Institution, and the Northeast Fisheries Research Center of the National Marine Fishery Service. The research effort of the LMAH is primarily focused on naturally occurring diseases of marine animals used as laboratory animals. In addition, numerous research projects arise from health problems encountered by investigators seeking to culture a given marine organism in the artificial environment of the research laboratory or within a commercial aquaculture facility.

Examples of current research projects include studies on: the life cycle of a shark cestode (tapeworm); ocular diseases in captive pinnipeds; mortalities in juvenile seed oysters; dinoflagellate infection of oysters; *Pseudomonas* infections in skates and a parasitic infection of annelid worms.

