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The Distribution of Mycobacterium avium paratuberculosis in the Environment and its Association with Infected Herds of Minnesota Dairy Farms

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Paratuberculosis or Johne's disease is a chronic and progressive intestinal disease in ruminants caused by *Mycobacterium avium* subsp. *paratuberculosis* (MAP). The usual route of infection is fecal-oral, with young cattle becoming infected by exposure to infected adults or their environment. The disease becomes manifest in adulthood and results in economic losses due to premature culling, reduced milk production, and loss of body weight in cattle sold for slaughter. The bacterium survives for months in extreme environmental conditions. The objectives of this study were to characterize the distribution of MAP in the environment of Minnesota dairy farms and to assess the association between infected dairy herds and their environments.

One hundred and eight Minnesota dairy herds were sampled during the summer of 2002, including 80 herds known to be infected from previous testing, which participated in the Johne's Disease Control Program (JDCP) of the Minnesota Board of Animal Health (MBAH), and 28 herds known to be uninfected based on previous testing, which participated in the Voluntary Johne's Disease Herd Status Program (HSP) of the MBAH. Fecal samples were obtained from up to 100 cows in each herd and were cultured in pools of five cows based on age order. Environmental samples were obtained from each farm, with up to 2 samples from each of the following locations: calving area, dry cow area, cows alleyway, manure storage, fields near cows area, edge of streams where cows have access or water runoff from the parlor, preweaned calves, postweaned calves and sick cows pen. Fecal pools and environmental samples were tested using bacterial culture for MAP at the Minnesota Veterinary Diagnostic Laboratory.

Sixty-four of the 80 JDCP herds had at least one-pool positive; 16 did not have any positive pools. The environment around the farm was found to be contaminated on 61 of the 64 herds with positive pools and in one of the 16 herds with only negative pools. The most common areas found to be contaminated on the farms were cows alleyways (77% of herds with positive pools) and manure storage (68%). Other infected areas were the calving area (21%), sick cows pen (18%), water stream edge and water runoff (6%), and post weaned calves area (3%). In 91% of these herds, at least one sample from cows alleyway or/and manure storage was positive to MAP. Twenty-six herds of the HSP herds (n=28) were found to be negative, with no positive pools; 2 herds had one positive pool each. The environment among these herds was found to be contaminated in one herd, which had a positive pool as well.

The association between infected herds and their infected environment emphasize the critical importance of farm management strategies for the control of Johne's disease in order to reduce environmental MAP contamination and exposure to cattle. In addition, targeting common contaminated areas in the farm environment suggest a promising alternative strategy for herd screening and Johne's infection status assessment. This strategy has the potential of saving significant economical resources in terms of cost and time.