Johne’s Disease (JD) is a contagious and costly disease affecting many dairy and beef cattle herds in Michigan. It is caused by the bacterium *Mycobacterium avium* subspecies *paratuberculosis* (MAP). This bacterium grows in the small intestine of ruminants and causes the intestinal wall to thicken. This thickening makes it difficult to absorb nutrients, and the disease eventually can lead to diarrhea, weight loss and death.

Johne’s Disease is transmitted primarily through manure, colostrum and milk from infected adult cows to calves less than 1 year of age. Following infection, there is a long incubation period and clinical signs do not typically occur until several years after infection. Adult cattle infected with MAP can shed large numbers of the bacterium in their feces, even when the animals show no clinical signs. Once shed into the environment, MAP has been shown to survive for more than 1 year. Methods to control JD have focused on minimizing the exposure of calves to MAP, thereby preventing new infections and identifying and managing infected cows.

The National Animal Health Monitoring System (NAHMS) study in 1996 estimated the prevalence of dairy herds infected with JD in the US was about 21.6%. Other estimates range from 21 to 93% depending on region and testing method used to classify infected herds. The most recent estimate of JD prevalence in Michigan suggested that 64% of dairy herds were infected with JD. This study was conducted in 1994 and used serology to identify infected herds.

Taking advantage of the large numbers of bacterium shed from infected cows and the long-term survivability of the bacterium in the environment, “targeted” environmental sampling and culturing of manure storage areas and high-traffic cow areas has been shown to be greater than 70% effective in identifying herds infected with MAP. This approach has been accepted as an approved method for entry-level testing into the USDA’s and Michigan Voluntary Bovine Johne’s Disease Control Program. Environmental sampling has the advantage over other herd screening methods in that it does not require the handling and testing of individual animals and is less expensive. This method of testing can be used easily to screen an individual herd for JD or to determine the prevalence of JD at the herd level in a geographical region of interest. Knowing what the herd prevalence of JD is in a state or region is useful information for monitoring large-scale disease control programs, such as the Michigan Voluntary Johne’s Disease Control Program.

The objective of the 2006 study reported here was to use targeted environmental sampling and culturing for MAP as a cost effective method for estimating the prevalence of JD at
the herd level in Michigan. This method could then be repeated periodically to monitor the state level disease prevalence and progress in disease control programs.

Sampling

During the summer of 2006, the Johne’s Disease Herd Prevalence Study was conducted to estimate the number of Grade A dairy herds infected with Johne’s disease throughout Michigan. A subset comprising 120 Michigan Grade A dairy herds was selected randomly using statistical procedures. Herds were stratified according to herd size and agricultural district in order to give an accurate representation of the dairy herd population across the state. Out of these 120 herds, 94 agreed to participate in the study. From these farms, two environmental manure samples were collected. One sample was collected from the primary manure storage area (for example, lagoon, solid pile, or slatted floor pit), while the other was collected from a common area (for example, holding pen, return alley, or free stall alley) used frequently by a number of cows in the herd. In all cases, the sample was taken from areas primarily representing adult lactating cows. No individual cow samples were collected. These two samples were submitted to the Diagnostic Center for Population and Animal Health (DCPAH) at Michigan State University for culturing using the liquid culture system. If either of the samples was determined to be positive for MAP, the herd was classified as infected with Johne’s Disease. In addition to the sample collected, information was gathered about any previous history of JD in the herd.

Study Results

Results of the study are summarized in Table 1. Thirty-eight (40.4%) of 94 herds were classified as positive for JD. When adjusted for the less than 100% sensitivity of the screening test used, it was estimated that the true prevalence of JD at the herd level was 48.1%. There was no difference in the prevalence of JD based on geographical location within Michigan. MAP was found in all herds (n = 15) with greater than 200 lactating cows. Herds that were tested for JD (regardless of result) or farms that had purchased cattle in the previous 5 years were 6.2 and 4.6 times, respectively, more likely to be infected than herds that had not.

Summary

Johne’s disease remains a prevalent disease in Michigan Grade A dairy herds with nearly one-half of all herds being infected. Larger herds are more likely to be infected than smaller herds. Farms that purchased cattle within the last 5 years were nearly 5 times more likely to be infected with MAP. This supports other research that has identified purchasing cattle as a significant risk factor for the presence of JD in dairy herds. All of these findings support continued importance of JD in Michigan dairy herds and the need to implement JD prevention and control programs.

The environmental sampling protocol used in this study is an economically attractive alternative to individual cow testing for monitoring the progress of JD control programs at the state or national level, as well as the individual herd level. Implementation of such a program would aid states in monitoring JD control program progress and help to guide changes over time.

For more information on Johne’s disease and the Michigan Voluntary Johne’s Disease Control Program, please visit our web site at <http://cvm.msu.edu/extension/johnes>. Additional references also are available from the authors upon request.

References


Table 1. Study Results: Herd level apparent and true Johne’s Disease prevalence by herd size.

<table>
<thead>
<tr>
<th>Herd Size</th>
<th>Herds Tested</th>
<th>Herds Positive</th>
<th>Apparent Prevalence (%)</th>
<th>True Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-99 Cows</td>
<td>65</td>
<td>19</td>
<td>29.2</td>
<td>34.8</td>
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<tr>
<td>100-199 Cows</td>
<td>14</td>
<td>4</td>
<td>28.6</td>
<td>34.0</td>
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<td>200-499 Cows</td>
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<td>6</td>
<td>100.0</td>
<td>100.0</td>
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<tr>
<td>&gt;499 Cows</td>
<td>9</td>
<td>9</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total Herds Tested</td>
<td>94</td>
<td>38</td>
<td>40.4</td>
<td>48.1</td>
</tr>
</tbody>
</table>