

Johne's Disease: The Ontario Program - Experiences from 2005 to 2011

Ann Godkin

Disease Prevention Veterinarian, Ontario Ministry of Agriculture, Food and Rural Affairs,
Elora ON N0B 1S0

Email: ann.godkin@ontario.ca

■ Take Home Messages

- ▶ The Ontario Johne's Disease Education and Management Assistance Program is a good tool for veterinarians and producers to use to review calf health programs on dairy farms.
- ▶ The Program relies on whole herd milk ELISA testing to estimate MAP transmission risk (MAP shedding) on a farm.
- ▶ "Test and cull" alone is not effective.
- ▶ Implementation of practical and effective management changes to young stock production is the key to success.

■ What is Johne's Disease?

Johne's disease is a bacterial disease of cattle caused by *Mycobacterium avium paratuberculosis* (MAP). Young calves catch it by ingesting the MAP bacteria shortly after birth. Some can be born already infected. The course of MAP infection is slow, taking years to progress from the start of infection to the actual sickness, called Johne's disease (JD). Most infected cattle don't live long enough nor progress to the final disease state. Unfortunately, even though not visibly sick (they are subclinically infected), as MAP infected cows advance in age they are increasingly likely to shed MAP in their manure, milk and colostrum. These bacteria then can infect young stock and amplify the infection cycle in the next generation of replacements on the farm.

For most of an infected animal's life MAP infection is subclinical, meaning the only way to know an animal has MAP is to use a test. The tests for evidence of MAP infection are notoriously insensitive during the subclinical phase of the infection. However, as the cattle age and MAP infection advances, the detection rate of the tests improves considerably.

The main emphasis of the Johne's programs already proven to be successful

is the protection of young cattle from MAP. Breaking the chain of infection on a farm by preventing MAP infection of the next generation is the most important strategy to employ.

■ **Why Do We Need Johne's Disease Control Programs Now?**

The main "drivers" for the start of the Ontario Johne's program are as follows.

Infection with MAP Is Increasing

Surveys comparable in methodology, done in the US done 10 years apart, have shown that while in 1996 21% of dairy herds had at least 10% of cows test positive for MAP on individual cow blood testing, by 2007 67% of surveyed herds were positive by environmental culture (deemed comparable to at least 10% of cows testing positive) (NAHMS 1997, USDA 2008).

MAP Infection and Johne's Disease Are Associated with an Increase in Herd Size

US and Danish studies have shown that a very high proportion of larger herds have MAP infected cattle and more of them (Tavornopavich et al., 2008; Jakobsen et al., 2000.)

Larger herds need better contagious disease control programs than smaller herds. Consider the following simplified mathematical example that illustrates the impact of herd size on the spread of a contagious disease like JD. In a herd of 40 cows roughly four cows will calve monthly. If one of the four cows is shedding MAP and maternity pen contact with calves occurs, then she potentially can infect her own calf plus the calves from the other three cows that calved at roughly the same time. The odds are that only two of the four calves will be heifers and while MAP seems to be very infective, even if all the calves exposed to the one shedding cow are infected, this will only double the rate of MAP infection in the herd. Additionally, not all these MAP exposed heifers will make it to their first calving and many will be culled after only one calving or during their first lactation. At this rate of transmission it's likely that in a herd of 40 cows MAP will remain a sporadic infection or will die out. On the other hand if the herd has 200 cows it means that about 15 or so cows calve monthly. Now the one MAP infected cow is potentially exposed to many more calves via maternity pen contact. With greater numbers, there is a greater chance that multiple, infected heifers will survive to calve not just once, but some multiple times, meaning that the number of MAP infected cattle has the potential to amplify each cycle. Johne's disease then can become a persistent, or even an epidemic, herd problem.

All provinces in Canada have shown an increase in the average herd size of their dairy herds over the last 20 years. It's time to get disease prevention programs in place that are suitably effective for larger herds.

MAP Infection Lowers Milk Production

In the 2005 to 2007 Ontario pilot project, where visibly healthy dairy cows were tested on their routine DHI test days for JD using the milk ELISA test, test positive cattle had 3 kg less milk on test day than their comparable test negative herd mates. A similar or greater production loss in subclinical cows has also been shown in US, Danish and Australian data (Smith et al., 2009; Aly et al., 2010; Nielsen et al., 2009).

The Testing System for JD (CanWest DHI) Makes It Easy

The available tests may not have changed much in performance over the years but cost has come down and a much more utilitarian testing system is in place. Using already collected DHI test day samples means the test simply has to be requested. The identity of cows tested and their results can be tracked via the DHI system. Electronic reporting of results means that information can be permanently stored and herd trends evaluated much more easily. This practical information system means that larger numbers of cows can be tested and tests can be done more often or according to a routine schedule.

Other Countries and Provinces Have JD Prevention Programs

Worldwide virtually every major dairy jurisdiction has, or is putting in place, a JD prevention program. We need to keep up.

Prevention Is Not Difficult

The Ontario pilot project, which ran from 2005 to 2007 and involved 100 dairy producers and their herd veterinarians, proved that prevention of calf infection could be easily achieved. The recommendations made by the veterinarians were not extraordinary. They centred on good calf management practices which not only protected calves from JD but from other more immediate, manure-transmitted, calf hood diseases such as diarrhea. The vets made recommendations about colostrum and milk feeding that protected against JD but also improved feeding programs and brought them up to date for today's well bred calves. Producers found unique and clever ways to achieve the objectives of the recommendations. The JD Risk Assessment and Management Plan (RAMP) herd visits highlighted that it was high time to have a thorough calf feeding and management discussion on all these farms. Other jurisdictions such as Denmark and the US have shown that risk

assessment based calf management improvement programs work (Kudahl et al., 2008). For example in 2008, research was published that showed the evaluation of a program similar to Ontario's that had been run for eight years in Minnesota. The program had enrolled 1663 producers (30.8% of all Minnesota producers). After one year in the program, the prevalence of test positive cows was reduced by an average of 1.1% per herd, after 2 years by 2.6% and after three years by 4.0% (Wells et al., 2008).

Dr. Ulrike Sorge's assessment of 226 herds who started in the Canadian pilot programs (in Ontario and the four western provinces) and who followed up with a second herd test and RAMP consultation at least two and a half years later, showed that the overall prevalence of test positive cattle dropped from 5.4% to 4.2% by the time of the 2nd herd test. More importantly the prevalence of positive two year olds, the cattle born and raised after the initial herd consultation, among all herds decreased from 1.2% to 0.5% ($p=0.03$). Among the subset of JD positive herds the prevalence of test positive two year olds dropped from 8.3% to 1.8% ($p < .0001$) (Sorge, 2010a).

Johne's Disease Could be a Threat to Dairy and Beef Product Safety

Consumer fears of MAP because of its potential association with Crohn's disease in people are unquantifiable. No one knows for sure if MAP is a risk for people. No one knows if cattle in any way will prove to be a source of MAP for people (Grant et al., 2005). Canada has the highest rate of reported cases of Crohn's disease in the world (Bernstein et al., 2006). In 2007 a Health Canada report stated that "Although data regarding the sources of MAP are limited, it can be concluded that Canadians are likely being exposed to this organism through the food supply" (Mihajlovic et al., 2007). It is impossible, and it would be foolhardy, for the cattle industries to ignore this concern.

■ The Ontario Johne's Disease Education and Management Assistance Program

From 2005 to 2007 an on-farm pilot project for JD was conducted in Ontario. Based on the information from that project and information from other programs around the world the components for the Ontario Johne's Education and Management Assistance Program were developed. The Ontario Johne's Industry Working group successfully obtained enough funding to allow the program to begin in January 2010.

The program has four components – ongoing educational initiatives relevant to the program, on-farm producer-vet consultations, optional herd testing and

removal of high titre cows.

Education about MAP, JD and the implementation of management procedures to prevent MAP infection is ongoing. Many meetings and workshops have been held for breed organizations, veterinary practices, DHI, DFO and OMAFRA. More formal educational initiatives such as the Johne's Disease Focus Farms project are also underway. The major barrier to JD prevention on most farms is not lack of research – often times we know what could and should be done on a farm – it's getting the needed changes made in a timely fashion (Sorge et al., 2010b; Wraight et al., 2000; Ridge et al., 2005 and 2010). The Focus Farm project involves eight management groups of 10 to 15 producers, led by a veterinary practitioner trained as a facilitator, working together on how changes can be made on the group's "focus farm". The intention is to use the small group experiences and findings to help other producers with similar circumstances. While the long term goal is JD prevention, the expected, immediately measurable outcome is better overall calf health and performance.

The second component is the joint veterinarian-producer consultation. The consultation uses a one page "checklist" plus written recommendations called the Risk Assessment and Management Plan (RAMP) to walk vets and producers through all sectors of the dairy herd. While all sectors are included, the greatest emphasis is on animal introduction, maternity pen management and the care and feeding of milk-fed calves. Scoring of all areas of management encourages discussion and allows areas of concern to be highlighted. Recommendations for change are made as a team. Implementation is up to the producer.

The third component, voluntary herd testing, allows producers to be reimbursed for testing all lactating cows in their herd on a single occasion using either the milk or blood ELISA test. The goal of this testing is allow herd owners to begin to determine the herd's status for JD – is it a low, medium or high prevalence herd?

The final component is the permanent removal of any high titre cows (HTCs) found on the herd test to on-farm compost or burial, or to dead stock for rendering, and is required for reimbursement of testing costs. HTCs are the small proportion of test positive cows that have an ELISA score of 1.0 or higher (or equivalent on blood testing). Removal of these cows, but not to someone else's herd or the food chain, is a requirement because these cows are actively shedding MAP. Producers who dispose of HTCs can receive some additional financial assistance to help them implement immediate changes to prevent further MAP spread.

■ Key Messages For The Ontario Johne's Disease Program To Deliver

There are clear and concise messages the Ontario program strives to deliver.

- The Ontario program is “management assistance” – the first goal is to have each producer have a calf raising consultation with their own herd vet, in the context of JD prevention. It is not a regulatory program – only the producer and their vet know the herd's JD status
- Calf raising must keep all manure (and MAP) out of calves' mouths.
- The milk ELISA testing is best used to identify MAP shedding cattle and is not expected to identify all infected cattle (Nielsen, 2008).
- The test of the whole lactating cow herd on a single test day is used to estimate the herd's JD status as low, medium or high to put the subsequent management consultation in perspective (Hendrick et al. 2005). Dry cows are not tested in the program. A single negative herd test does not mean the herd is “free” of JD (Sorge, 2010b).
- Test positive cattle that aren't HTC's need to be managed appropriately – culling is not always the best approach (Kudahl et al., 2008). “Appropriately” depends on the owner's management skills, the herd's test positive prevalence and the herd's facilities.
- HTC's need to be terminated – these cows are shedding MAP. No one can manage these safely (Lu et al., 2008).

■ Summary

Ontario embarked on a province wide Johne's disease program for dairy herds in January 2010. The program was developed by an industry working group. The program is primarily funded and lead by members of the Ontario and Canadian dairy industry organizations. The intent is to do one on one, farm specific JD extension by linking each producer with a trained veterinarian. Veterinarians have been trained in JD test interpretation and conducting the on-farm RAMP, and provided with additional JD and prevention information.

Given the intense interest in MAP from the human health standpoint, the evidence that calf health programs are not suitable for today's enlarging herds and evidence that MAP infection is spreading, how could any responsible dairy industry do less?

Johne's disease may not be eradicable but it certainly is manageable.

Ontario's dairy producers and their veterinarians have proven this to be true.

Details about the Ontario program can be found on the program's website at www.johnes.ca

The results of the first year of the program will be provided during the presentation.

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