

Ontario Johne's Program Report – 2010-2013

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The Ontario Johne's program commenced Jan 1, 2010 and concluded October 31st 2013.

Program Objectives:

1. Advance the reputation of Ontario's dairy industry as proactive in matters relating to animal health and product quality and safety.
2. Enhance producer-veterinary partnerships to improve on-farm disease prevention, specifically for Johne's, but also for other fecal-orally transmitted calf diseases (such as bacterial and viral calf diarrhea).
3. Encourage implementation of farm-specific changes for Johne's prevention and control
4. Demonstrate the use of a whole herd approach to testing and disease prevention.

Program activities:

About 52% (2153) of all Ontario herds fully completed the program with 247 participating and trained veterinary practitioners. Program components these herds achieved were one (or two) full herd Johne's ELISA tests, completion of the Johne's Risk Assessment and Management Plan (RAMP) with their vet and removal of High Titre (HT) cows identified on testing, within 90 days of testing.

Program Results:

Number of herds found with at least one test positive cow on the herd test = 563 (26%)

Number of tested herds with at least one High test-positive test (result of 1.0 or higher) = 112 (5%)

Johne's prevalence: The proportion of positive herds identified on the program is similar to what was expected from previous surveys. However with only approximately half of provincial herds voluntarily participating, there remains some uncertainty whether this is the "true" provincial picture. Research using bulk tank (BT) testing is underway to compare the prevalence of Johne's strongly positive bulk tanks among herds participating in the program to those not participating. While BT tests remain too insensitive for useful herd management information, the test will be useful to compare the rate of highly positive herds enrolled in the program to the rate of highly positives among those not in the program. We hope this will give us insight regarding the Johne's prevalence among non-participating herds and better understanding of the overall provincial Johne's picture. BT testing and results are solely for interpretation of the programs overall results.

High test-positive cows: High test-positive (HT) cows are those with milk or blood ELISA test results of 1.0 or higher. Extrapolation from a previous small survey suggested over 1000 might be found if 100% of herds participated, thus the finding of 147 HT cows was lower than expected. The lower rate

of HT's may be because some were removed prior to participation in this program or because the true rate of HTs was lower than predicted. Possibly the higher HT rate in the earlier surveys was because of increased participation by herd owners where Johne's problems had already been diagnosed. The lower rate of HT's is good news; however their movement among the Ontario herd population and to slaughter remains a concern producers should be aware of.

Not all HT cows were successfully removed for program reimbursement. A survey of producers with HT results revealed that some HT cows were kept for production or genetic reasons or because the owners doubted their risk or the test results. Producers whose herds had HTs identified and who did not remove cows to deadstock or burial, but retained them or shipped them for beef or dairy sales, were not reimbursed in any way by the program. This approach was strongly endorsed by producer participants in the program design team.

Johne's risks identified by Risk Assessment and Management Plan (RAMP) summary:

To date, early summaries have identified the following management practices as being associated with being a Johne's test positive herd for Ontario herd owners:

For Johne's introduction to the herd:

- Purchase of mature cattle

For spread of Johne's within the herd:

- Pooling of colostrum
- Group calving pens

Further analysis of RAMP data is underway and will be available in the winter of 2014. This information will be of importance in formulation of future extension materials and on-farm biosecurity programs.

Research generated in association with the Ontario Johne's program:

A major goal of the program was to stimulate research into Johne's itself and disease transmission more generally, that would be applicable to Ontario herd management systems. Research resulted from the Ontario Johne's program because important issues and questions arose as the program progressed. The generation of a large aggregate database of tested cows and herds through the program, combined with RAMP assessments, has allowed progression of organism, farm or provincial level projects. In addition, the provision of industry funds facilitated a great deal of successful matching with other research programs. Research projects are listed in Appendix 1.

Program Education/Extension and Technology Transfer:

An important component of the program was to provide relevant information to Ontario's dairy producers and veterinary practitioners. This was done via participation in numerous meetings and trade shows, as well as by publications in both lay and scientific sources. A list of educational

initiatives appears as Appendix 2 at the end of this report. See Appendix 4 for a poster containing Highlights from the program.

Conclusions to date:

The program achieved 52% enrolment of producers – less than the 75% optimistically budgetted for – however a remarkable achievement for the first attempt at a program like this in Ontario, and fully via voluntary participation by both producers and veterinarians. The Ontario program has been commended internationally.

Producer and veterinary partnerships have been strengthened and on-farm biosecurity (disease prevention) for calves and cows improved. New extension and teaching initiatives for enhancing the program's recommendations were successfully piloted in the Johne's Focus Farm project.

Ontario's dairy producers and their industry have successfully demonstrated their interest in better disease prevention and cattle health improvement with their funding, RAMP participation and test results. While MAP remains on the horizon as a risk to human health and a threat to the image of cows and dairy products, producers and vets have shown their willingness to take proactive preventive steps to mitigate this risk using the best available herd management information and technology.

Upcoming from the program:

Extension materials from the program will include "Testing Recommendations" and "Recommended Guidelines for Johne's Prevention" to be derived from program materials and delivered to all Ontario producers in December 2013.

Final program information will be shared in the December Milk Producer magazine where the program will be the featured "cover story".

In addition to OABP, A "Johne's wrap-up" session will be featured at the January 2014 Annual General Meeting meeting of the Dairy Farmers of Ontario. For producers, Dr. Mike Collins will again present at the DFO/DHI Joint Technical session of the January 2014 DFO AGM. Dr. Collins was well received in January 2010, and has been asked to provide his view on "Where next with Johne's?".

Appendix 1:

Research projects completed or currently underway include:

1. Risk assessment based calf management program for the control of Johnes disease.
Principle Investigator: David Kelton (University of Guelph)
2. Applying recombinant technologies to define the secretome of MAP for the discovery of potential immunogens and diagnostic reagents.
Principle Investigator: Lucy Mutharia (University of Guelph)
3. Integrating milk based cow and bulk tank test data, dairy cattle inventory data and GIS location data into the AHL surveillance capacity.
Principle Investigator: David Kelton (University of Guelph)
4. Measuring the impact of a participatory approach to accelerating the adoption of practices and procedures to control Johnes Disease on Ontario dairy farms.
Principle Investigators: Steven Roche, PhD candidate and David Kelton (supervisor) University of Guelph)
5. Transmission pattern profiling of MAP between and within Canadian dairy herds by fast and discriminating strain typing.
Principle Investigator: Herman Barkema (University of Calgary)
6. Focus Farms for Johnes: Using a participatory approach to accelerate the adoption of practices and procedures to control Johnes Disease (JD) on Ontario dairy farms.
Principle Applicant: George MacNaughton (Dairy Farmers of Ontario)
7. Equivalency for Strong Positive Serum ELISA Johnes Disease Test Results AND Interpretation of Repeated Testing for Johnes Disease in Ontario Dairy Herds.
Principle Investigator: David Kelton (University of Guelph)
8. Johnes ELISA prevalence and assessment of disease transmission risk on organic dairy farms in Ontario
Principle Investigators: Laura Pieper, PhD candidate and David Kelton (supervisor) University of Guelph
9. Development and applications of an amoeba-based pathogen-capture trap for detection of persisting and emerging microbial pathogens in farm and aquaculture environments.
Principle Investigator: Lucy Mutharia (University of Guelph)
10. Dairy herd health screening using bulk tank, herd pool, group pool and individual milk samples.
Principle Investigator: David Kelton
11. Antibody responses and modulation of fecal bacterial shedding during subclinical Johnes Disease in calves.
Principle Investigator: Brandon Plattner (University of Guelph)

Appendix 2

Presentations or trade show booths:

2009

Canadian Outdoor Farm Show – Woodstock
DFO Fall Policy Conference
CanWEST DHI seminars
Canadian MAP Research Workers Conference
Veterinary clinic meetings
Joint Dairy breeds information meeting

2010

DFO/DHI Joint Technical Session in January
County Milk Committee Meetings
Canadian MAP Research Workers Conference
Kemptville/Maxville dairy days
U of G Dairy Research & Communication Extension Event
Dairy Health Management Certificate Program
Southwestern Ontario Dairy Symposium
Western Canadian Dairy Seminar
Western Canadian Association of Bovine Practitioners
Conference
Ontario Veterinary clinic client meetings
Ontario Animal Health Forum
Ontario Association of Bovine Practitioners

2011

DFO/DHI Joint Technical Session in January
County Milk Committee Meetings
Canadian MAP Research Workers Conference
Kemptville/Maxville dairy days
U of G Dairy Research & Communication Extension Event
Southwestern Ontario Dairy Symposium
Western Canadian Dairy Seminar
Western Canadian Association of Bovine Practitioners
Conference
Ontario Veterinary clinic client meetings
Ontario Association of Bovine Practitioners Annual
Meeting

2012

International Colloquium on Paratuberculosis, Sydney
Australia
Paratuberculosis Forum, Sydney Australia
International Dairy Federation Standing Committee on
Animal Health and Welfare
DFO/DHI Joint Technical Session in January
County Milk Committee Meetings
Canadian MAP Research Workers Conference
Kemptville/Maxville dairy days
U of G Dairy Research & Communication Extension Event
Southwestern Ontario Dairy Symposium
Western Canadian Dairy Seminar
Western Canadian Association of Bovine Practitioners
Conference
Ontario Association of Bovine Practitioners Annual
Meeting
Animal Health Strategic Investment Fund Wrap-up Event
University of Guelph/OMAFRA Knowledge Translation
and Transfer Conference

2013

AABP conference, Sept 2013 presentations:
Association between Risk Assessment scores and milking
cow Johnne's ELISA results on Ontario dairy farms, Dr.
David Kelton
Role of the Veterinary Practitioner in Industry-led Dairy
Health and Quality Programs in Ontario, Dr. Kelly Barratt
Johnne's ELISA prevalence and assessment of disease
transmission risk on organic dairy farms in Ontario,
Canada, - Dr. Laura Pieper
Interpretation of Repeated Testing for Johnne's Disease in
Ontario Dairy Herds, Dr. Jim Fairles
Atlantic Dairy Research Collaboration Summit,
Charlottetown PEI
University of Guelph/OMAFRA Knowledge Translation
and Transfer Conference
U of G Dairy Research & Communication Extension Event
Southwestern Ontario Dairy Symposium
Ontario Association of Bovine Practitioners Fall Mtg.

2014

Dairy Farmers of Ontario, Annual General Meeting
Southwestern Ontario Dairy Symposium

Appendix 3 - Publications associated with the Ontario Johne's program include:

Magazine or Popular Press Articles:

2009

Godkin, A. 2009. Ready to Launch. Milk Producer. December, 2009

Godkin, A. 2009. Update on Ontario Johne's Program, Guernsey and Jersey newsletters.

2010

Dimmick, B. 2010. Conquering Johne's. Milk Producer. January, 2010

Godkin, A. The Johne's Test Decision. Ontario Dairy Farmer. January/February 2010

V. Perkins 2010. Johne's targeted: Identifying genes that contribute to disease resistance may lead to improved treatment. Milk Producer. February 2010.

Dimmick, B. 2010. Ontario takes leadership role with new Johne's program. Milk Producer. February 2010.

Perkins, N. 2010. Ontario Johne's Education & Management Assistance Program – Progress Report. DFO Spring Regional Meeting and Ontario Association of Bovine Practitioners Meeting

Godkin, A. 2010. Why remove high titre cows? Milk Producer. March, 2010

Perkins, N. 2010. Johne's program aids herds with high titre cows. Milk Producer. April, 2010

Perkins, N. 2010. Ontario Johne's Education & Management Assistance Program. Winchester Press. May 2010

Perkins, N. 2010. Johne's test results kept confidential. Milk Producer. May, 2010

Godkin, A., Perkins, N. 2010. Johne's dry cow testing optional. Milk Producer. June 2010

2011

Perkins, N. 2011. Take advantage of Johne's program to manage this dread disease. Milk Producer. Feb. 2011

Godkin, A. 2011. Buyer Beware: Johne's-positive cows showing up. Milk Producer. April 2011

Godkin, A. 2011. Ruminations: Johne's Control. Milk Producer. May 2011

Church, C. and Perkins, N. 2011. Ontario Johne's Program Update. OABP Newsletter. May 2011

Perkins, N. 2011. Ontario Johne's Education & Management Assistance Program. Winchester Press. May 2011

Godkin, A. 2011. Don't put your herd's future in jeopardy. Milk Producer. September 2011

Godkin, A and Perkins, N. 2011. The Ontario Johne's Dairy Program: High-Positive Cows – Don't let them scare you away! Ceptor Animal Health News. October 2011

Nelson, T. 2011. Johne's focus groups learning together. Milk Producer. November 2011

Perkins, N. 2011. The facts about high-titre (HT) cows. Milk Producer. November 2011

Godkin, A. 2011. Ruminations: What testing tells us. Milk Producer. December 2011

2012

Godkin, A, K. Zurbrigg and B. McEwen. 2012. Estimating Mycobacterium avium paratuberculosis Prevalence from Laboratory Testing. Ceptor Animal Health News. May 2012

2013

Godkin, A. 2013. Ontario Johne's Program – Last Chance for Participation. Ceptor Animal Health News. Vol. 21 Issue 1. Jan. 2013.

Godkin, A. 2013. The Johne's Program is Wrapping Up! Ontario Dairy Farmer. Jan. 2013

Keith, B. Veterinary Practice Project – Motivating clients to change transition cow facilities and management. Ceptor Animal Health News. Vol. 21 Issue 1. Jan. 2013.

Perkins, N. and A. Godkin. Update on the Ontario Johne's Program. Ceptor Animal Health News. Vol. 21. Issue 2. March 2013

Perkins, N. and A. Godkin. Ontario Johne's program ends this October. Milk Producer. May 2013

Godkin A. 2013. Are two tests better than one? Ceptor Animal Health News, June 2013.

Pieper, L., D. Kelton and N. Perkins. Johne's program study reveals benefits on Ontario farms. 2013. Milk Producer. September, pg. 14-15.

Refereed Publications:

2010

L.M. Mutharia, M.D. Klassen, J. Fairles, S. Barbut, C.O. Gill, *Mycobacterium avium* subsp. *paratuberculosis* in muscle, lymphatic and organ tissues from cows with advanced Johne's disease, International Journal of Food Microbiology, Volume 136, Issue 3, 1 January 2010

A. Skelding, F. Schenkel, B.Sharma, C.Verschoor, S. Pant, H. Boermans, N.A. Karrow 2010. Identification of single nucleotide polymorphisms in the bovine interleukin-12 and interleukin-23 receptor genes and their associations with health and production traits in Holstein cows. Journal of Dairy Science 93: 4860-71.

C. P. Verschoor, S. D. Pant, and N.A. Karrow, 2010. Unraveling the genetics of bovine Johne's disease: Lessons learned from human inflammatory bowel disease. Veterinary Immunology and Immunopathology. Eds. L. Neumann and S. Meier. NOVA Publishers, ISBN 978-1-61761-656-3.

C.P. Verschoor, S.D. Pant, Q. You, F.S. Schenkel, D.F. Kelton and N.A. Karrow 2010. Polymorphisms in the gene encoding bovine interleukin-10 receptor alpha are associated with *Mycobacterium avium* ssp. *Paratuberculosis* infection status. BMC Genetics 11: 23.

Sorge, US, Mount, J, Kelton, DF, Godkin, A 2010. Veterinarians' perspective on a voluntary Johne's disease prevention program in Ontario and western Canada. Canadian Veterinary Journal, 51:403-405.

2011

S.D. Pant, C.P. Verschoor, A.M. Skelding, F.S. Schenkel, Q. You, G.A. Biggar, D.F. Kelton, N.A. Karrow 2011. Bovine IFNGR2, IL12RB1, IL12RB2 and IL23R polymorphisms and MAP infection status. Mammalian Genome (EHP).

Plattner, BL and Hostetter JM. Review article: Comparative gamma-delta T cell immunology: a focus on mycobacterial disease in cattle. Veterinary Medicine International, *accepted*, vol. 2011. (Article ID 214384). <http://www.hindawi.com/journals/vmi/2011/214384/>

Plattner, BL, Chiang YW, Roth JA, Platt R, Huffman E, Zylstra J and Hostetter JM. Direct inoculation of *Mycobacterium avium* subspecies *paratuberculosis* into ileocecal Peyer's patches results in colonization of the intestine in a calf model. Veterinary Pathology. 48(3): 584-592, 2011. <http://vet.sagepub.com/content/48/3/584.long>

C.P. Verschoor, S.D. Pant, Q. You, F.S. Schenkel, D.F. Kelton, N.A. Karrow 2011. Single nucleotide polymorphisms alter the promoter activity of bovine MIF. Animal Biotechnology 22:143.

Sorge, US, Lissemore, KD, Godkin, MA, Jansen, J, Wells, S, Kelton, DF 2011. Changes in management practices and apparent prevalence on Canadian dairy farms participating in a voluntary risk assessment-based Johne's disease control program. Journal of Dairy Science, 94:5227-5237.

Sorge, US, Lissemore, KD, Godkin, MA, Hendrick, S., Wells, S, Kelton, DF 2011. Associations between paratuberculosis milk ELISA result, milk production, and breed in Canadian dairy cows. Journal of Dairy Science, 94: 754-761.

2012

Sorge US, Lissemore K, Godkin A, Jansen J, Hendrick S, Wells S, Kelton DF. Risk factors for herds to test positive for paratuberculosis with a commercial milk ELISA in Ontario and Western Canada. Can Vet J. 2012 Sept;53:963-970.

Facciuolo A, Kelton DF, Mutharia LM. Novel secreted antigens of *Mycobacterium paratuberculosis* as serodiagnostic biomarkers for Johne's Disease in cattle. Journal of Clinical Microbiology (Submitted May 2013).

Sorge US, Lissemore K, Godkin A, Hendrick S, Wells S, Kelton DF. Temporal repeatability of positive test results of *Mycobacterium avium* subspecies *paratuberculosis*-antibody milk ELISA-positive cows. Can Vet J (Accepted March 2012).

2013 (pending)