

Feature Research Project

Controlling the spread of Johne's Disease

Halting the spread of Johne's Disease (JD) is the goal of simultaneous efforts by government, industry and researchers across Canada. The driving urgency behind this collective effort is the climbing economic cost of the disease to beef and dairy sectors and the move in some countries towards a requirement for JD-free verification certification for imported cattle. Canada's capacity to successfully market beef, milk and live cattle could be compromised if a hard link is established between Crohn's disease in humans and consumption of JD-contaminated products such as beef and milk.

Johne's Disease, caused by the bacterium *Mycobacterium avium* subspecies *paratuberculosis*, or MAP for short, is often difficult to detect as clear symptoms of the disease are not always obvious and current tests fall short for early stage diagnosis. MAP can survive in the environment (manure, soil, water) for long periods of time and is difficult to destroy. This persistence increases the risk of infecting additional animals and further exacerbates attempts to eliminate it from the farm. Therefore, effective means to detect and eradicate JD in Canadian beef and dairy herds are needed. Dr. Denis Krause, University of Manitoba microbiologist and animal scientist, working closely with researchers from across western Canada, are addressing the MAP problem on two fronts – destroying the MAP bacterium in dead animals and developing accurate early-stage diagnostic tests.



Denis Krause describes pathogen research at a field day.

Does composting dead-stock destroy MAP?

What happens to a JD-infected animal that has been euthanized? It cannot be sold into the food chain and simple burial results in risk to ground water. Carcasses cannot be rendered either because of specific risk material regulations. Dead-stock composting is one alternative Krause and colleagues recently evaluated. An MRAC study completed this fall investigated the suitability of a biosecure carcass composting system, designed at the AAFC Lethbridge Research Station by Tim McAllister's group, for destroying MAP. "Going into this study, we knew from Tim McAllister's previous work that composting destroys certain bacteria, but what we didn't know was whether or not carcass composting would destroy MAP, which can be very persistent," says Krause, lead investigator. "Turns out MAP isn't eliminated with field composting, and survives even under long term exposure to temperatures as high as 80°C in the lab," says Krause of their findings. "We were really surprised that this bug can survive such high temperatures". They concluded that if there was ever a Public Health need to dispose of JD-infected animals, composting would not be a preferred solution, at least not the system they used.

Natural history of Johne's disease and developing tests for early-stage identification of Johne's

There is surprisingly little known about the disease process in the gut once MAP infects an animal. Krause and his colleagues at the University of Saskatchewan (Steve Hendricks) and the University of Calgary (Herman Barkema and Jeroen De Buck) are involved in two experiments in which calves are being naturally infected with MAP. The purpose is to find out which other bacteria are involved in the infectious process, and whether they can be used in diagnosis of the disease. This is an important goal because it is difficult to detect MAP-infected cattle. The gold standard is to culture MAP from feces, but it takes at least 12 weeks for the MAP to grow. Blood or milk assays that detect antibodies to MAP are routinely used but their sensitivity and specificity is a problem. This study is funded by MRAC and coordinated through the Manitoba Cattle Producers Association.

Future directions

Canada is in the process of implementing a nationwide JD control program. A key component of any program is to be able to correctly classify a herd as JD positive or not. Correct herd classification is the single largest problem due to impractical and high cost large-scale testing. Krause and the colleagues are in the process of obtaining funding approval to see if environmental sampling of beef and dairy herds is sufficient to correctly classify herds as JD positive or not.

Research team: Denis Krause, Kim Ominski, Kees Plaizier, Kathy Buckley (AAFC-Brandon), Tim McAllister (AAFC-Lethbridge)

Instant Update

Agricultural byproducts processing facility funding to spur innovative research and on-farm technology adoption

September 14 - Nearly \$1 million in funding under the Canada-Manitoba Economic Partnership Agreement will create the **NCLE Agricultural By-products Processing Research and Demonstration Facility**, in partnership with the Manitoba Pork Council. The new facility will enable innovative R&D supporting on-farm processing and utilization of liquid and solid agricultural by-products, as well as new value-added opportunities to improve the competitiveness and sustainability of the agriculture industry. The facility will support multiple users and a full range of activities from research to technology transfer and training. Learn more about the facility and the multi-disciplinary research team at http://umanitoba.ca/afs/ncl/By-products_facility_backgrounder.pdf.



Management team for the Bruce D. Campbell Farm and Food Discovery Centre in place

September 16 - The Faculty of Agricultural and Food Sciences is pleased to announce the appointment of Guy Robbins as visitor services manager and Lorrie Koroscil as assistant manager of the newly constructed Bruce D. Campbell Farm and Food Discovery Centre, expected to officially open in spring 2011. Learn more about the Discovery Centre at <http://umanitoba.ca/afs/ncl/discoverycentre.html>.

Research Update

New Reports:

Use of on-farm composting to dispose of Johne's infected cattle. [Read](#) the final report. **Summary:** The composting system evaluated in this study was insufficient to destroy *Mycobacterium avium* subspecies *paratuberculosis* (MAP) which causes Johne's Disease. MAP was very persistent, surviving even under long term exposure to temperatures as high as 80°C. Contact Denis Krause (denis_krause@umanitoba.ca) for more information. MRAC funded.

Evaluation of extant feed consumption model for nutrient management planning. Project lead Ermias Kebreab. **Summary:** In evaluating the rigor of this Quebec-developed model under Manitoba conditions, this study found the model predicted phosphorus excretions for standard sow diets better than for diets with phytase and overestimated land requirements for manure spreading. They recommend refinement of the model to reflect local conditions and to revise the model when microbial phytase is used to reduce P intake and output. [Read](#) the final report. MLMMI funded.

Thesis defense:

Graduate students with Mario Tenuta, soil ecologist and greenhouse gas emissions specialist, successfully defend.

Aaron Glenn, PhD. - Greenhouse gas fluxes and budget for an annual cropping system in the Red River Valley, Manitoba. Aaron continues his research with Mario with a post-doctoral fellowship. Read the [summary](#).

Siobhan Stewart, MSc. - Perennial legume phase and annual crop rotation influences on CO₂ and N₂O fluxes over two years in the Red River Valley, Manitoba. Siobhan will spend the next year on a hog farm in Germany.

Extension & Outreach Update

Manitoba Grazing School 2010 - December 7 & 8

Mark your calendar and plan to attend the 12th annual **Manitoba Grazing School** on December 7 & 8th at the Victoria Inn in Brandon! Read up on the keynote speakers [here](#). Follow the [link](#) for program details and to register or contact Pam Iwanchysko with MAFRI (phone: (204) 648-3965 or email: pamela.iwanchysko@gov.mb.ca)

Texas Farm Bureau to stop by NCLE on 2010 Canada tour

October 20 - Following a productive visit in 2009, NCLE will again host the TFB, this time a delegation of their young farmers, sharing knowledge and experiences. The TFB group will continue their day with a round table discussion with representatives of KAP young farmers.