

## NSERC Collaborative Research and Development in Bacterial Diseases of Dairy Cattle

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### NSERC CRD Overview

The Natural Sciences and Engineering Research Council of Canada (NSERC) promotes and supports discovery research and fosters innovation by encouraging organizations to participate and invest in postsecondary research projects. One of the ways they do this is through Collaborative Research and Development (CRD) grants, to create mutually beneficial collaborations between Canadian universities and private/public sector partners. Objectives include fostering dynamic interaction between discovery-based and innovative research and training of graduate students.

### CRD in Bacterial Diseases of Dairy Cattle

Dr. Jeroen De Buck is a professor of bacteriology at the University of Calgary and was recently awarded an NSERC CRD grant for a research program in bacterial disease of dairy cattle. Dr. De Buck's research focuses on bacterial pathogenesis and host-pathogen interactions in order to improve current vaccination strategies and to find new diagnostic targets, particularly in Johne's disease, mastitis and digital dermatitis. Dr. De Buck has worked collaboratively with Dr. Herman Barkema, the NSERC Industrial Research Chair in infectious diseases of dairy cattle for a number of years. Through this NSERC CRD grant, he will continue to collaborate on research and training of graduate students with Dr. Barkema and the research team at the University of Calgary.

### Research Direction

This NSERC CRD grant covers a 5-year term. The grant was awarded in late 2019 and the research direction for this grant was recently announced. The current partners for this CRD are NSERC, Alberta Milk, SaskMilk, Dairy Farmers of Manitoba, PBD Biotech, Boehringer Ingelheim, and Lactanet. The CRD research program will focus on 3 main areas:

**Mastitis:** mastitis costs the dairy industry over \$400 million annually, with non-aureus staphylococci (NAS) being the most common intramammary infection. Research on this topic will include identifying why *S. chromogenes* causes most NAS infections and higher SCC, designing a probiotic NAS strain with protective potential against mastitis, and the development and validation of a mastitis biosensor for convenient detection of sub-clinical mastitis on-farm.

In addition, the development of a cow-side diagnostic platform for biomarkers of mastitis, milk fever, failure of transfer of passive immunity and bovine leukemia virus is under way.

**Digital Dermatitis:** DD is the 2<sup>nd</sup> most common health problem in dairy cattle, with 15% of cows and 94% of herds in Alberta infected. Future work in this area will include identifying reservoirs of *Treponema spp.* involved in DD, development and characterization of DD infection models, and identifying weakness in *Treponema spp.* involved in DD.

**Johne's Disease:** Johne's disease costs the dairy industry around \$90 million annually and has the potential to spread to humans. Future research projects will work to understand the protective immune response generated by live attenuated vaccines and to improve tests for detection of early immune response to Johne's disease.

## Progress on Proposed Projects

### Mastitis

- Designing a probiotic NAS strain with protective potential against bovine mastitis
  - Development of a probiotic preventative treatment for mastitis as an alternative to antibiotics

### Digital Dermatitis

- Gaining insight into *Treponema* infections in digital dermatitis
  - a better understanding of *Treponema* will result in more targeted treatments of DD
- Identifying contributing bacteria of digital dermatitis
  - a better understanding of what bacteria contribute to DD for better disease management

### Johne's Disease

- Effective and economic Johne's disease control using new early disease detection assays
  - development of a new control program to work towards eradication of Johne's disease
- Developing and testing a Johne's disease vaccine
  - development of a cost-effective and convenient vaccine

### Other

- Rapid detection of antibodies against bovine leukosis with a test located on the surface of bacteria
  - development of a commercially available on-farm tool to diagnose BLV



### Interested in finding out more about Dr. De Buck's research?

- List of [scientific publications](#)
- "How many types of MAP are on Canadian dairy farms and how do they spread?" – [DRECA research summary](#)
- UCVM [bio and contact](#)