



**PROJECT 2013-2018**

# CANADIAN BOVINE MASTITIS AND MILK QUALITY RESEARCH NETWORK



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**Number of students trained (MSc, PhD, Post-Doc):**

**15**

**TOTAL BUDGET**

**\$1,693,083**

**INVESTMENT PARTNERS**



## OBJECTIVE:

The Canadian Bovine Mastitis and Milk Quality Research Network (CBMQRN) coordinated 11 research projects under three topics: Animal, Pathogen and Environment. The overall aims were to decrease the national average somatic cell count (SCC) in bulk milk, to decrease losses from culling due to mastitis and to optimize management practices and antimicrobial use for better animal health and milk quality.

## KEY OUTCOMES:

- Quarter-based selective dry cow therapy could be applied without negative impacts on udder health. This management strategy could be implemented on farm to further reduce use of antimicrobials on dairies. Antibiotic usage at dry-off could be reduced by 60% on average when applying quarter-based selective dry cow therapy.
- Important risk factors for clinical mastitis recurrence were identified, these included: parity (i.e. higher risk in older cows), a higher milk production, pathogen species involved in the preceding case, and whether a bacteriological cure was observed following the preceding case.
- 16 custom reference spectra, which cover 10 different species of Coagulase-Negative Staphylococcus (CNS), are available for use by both diagnostic laboratories and researchers that are adopting MALDI-TOF Mass Spectrometry for bovine mastitis microbial identification and are improving the accuracy of mastitis diagnosis in Canada and around the world.
- Research-validated spectroscopy-based diagnostic methods improved the species-specificity and accuracy of pathogen diagnosis.
- Antibiofilm molecules produced by CNS were characterized and could represent a new and innovative tool to control/treat bovine mastitis caused by staphylococci and other Gram-positive mastitis pathogens.
- Bedding management can have a profound impact on cow hygiene and bacterial concentrations in the bedding substrates, which in turn may affect mastitis risk.



- Antimicrobial resistance (AMR) in non-aureus staphylococci (NAS) is associated with systemic, but not intramammary use of antimicrobials. Selective dry cow therapy was not associated with prevalence of resistance in NAS.
  - AMR prevalence varied substantially among non-aureus staphylococci (NAS) species. There was a positive association between systemic herd-level AMU (recorded using inventory of empty containers compared to on farm treatment records – note that 2.20 times more treatments were observed using the inventory than the records) and AMR in NAS isolated from dairy cows, with the association differing among antimicrobials.
  - An economic model was developed and incorporated in a mobile application that can be used by dairy producers and dairy practitioners across Canada to estimate mastitis costs on their farm, using their own data, and to investigate the benefits that would result from improvements to udder health management.
- The economic model developed for the costs of mastitis on Canadian dairy farms indicated substantial losses due to mastitis with median costs of \$662/cow/year. Total costs for Canadian dairies using year 2014 demographic data were estimated at \$665 million.
- Provided a benchmark for milking management practices used across the country's dairy farms. The research highlighted opportunities in knowledge translation in mastitis prevention and milking management.
  - Demonstration that a chitosan hydrogel infusion could prevent new intramammary infection at drying-off by stimulation of mammary gland immunity. A research agreement with an option of license has been signed with a company to further develop the chitosan hydrogel technology.

## LINKS TO SPECIFIC MASTITIS PROJECTS AND KTT-RELATED TOOLS:

[Prevention of infection at drying-off by stimulation of mammary gland immunity](#)

[Quarter-based selective dry-cow treatment using on-farm diagnostic tool](#)

[Pathogen and cow characteristics associated with recurrence of clinical mastitis](#)

[Predicting persistence and clinical expression of \*S. aureus\* infections using molecular characterization](#)

[Validation of MALDI-TOF diagnostic equipment for CNS speciation and development of intramammary infection risk models](#)

[Antibiofilm molecules active against \*S. aureus\* and coagulase-negative staphylococci isolates](#)

[Novel treatment for staphylococci intramammary infections](#)

[What type of housing systems provide the most suitable environment for cow comfort as well as udder health](#)

[Impact of management practices on antimicrobial resistance](#)

[Obstacles to adoption of better management practices](#)

[Economic impact of mastitis control practices](#)

CBMQRN website: [mastitisnetwork.org](http://mastitisnetwork.org)

