# Proposed Study - Cattle Health Surveillance System (CHeSS): Monitoring major infectious diseases and antimicrobial resistance in the Western provinces

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## Background

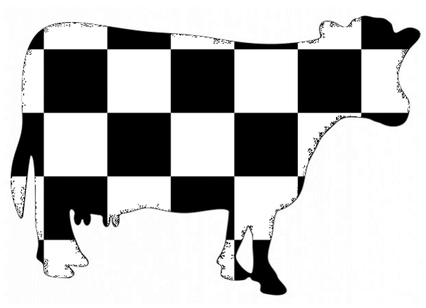
- Significant investments have been made to understand endemic infectious disease control in Canadian dairy.
- However, most projects have focused on the control of one specific disease over a limited time period.
- These projects have demonstrated that the prevalence of important diseases varies widely among herds.
- By focusing on the surveillance and control of multiple important infectious diseases and antimicrobial resistance (AMR), this program will provide practical and performance-based standard operating protocols that could be adapted to the dairy industry as a whole.

Table 1. Estimated cattle health and economic impacts of listed disease in CAD

| Disease | Impact cow health | Yearly losses (per 100 cows) |
|---|---|---|
| Johne's disease | Culling, production losses | $5,482 |
| Leukosis | Immunosuppression, reduced longevity | $2,421 |
| Contagious mastitis | Mastitis, high SCC, production losses | $62,100 |
| Neosporosis | Abortion | $4,608 |
| Leptospirosis | Abortion | Unknown |
| *Salmonella* Dublin | Calf mortality, abortion, productions losses | $710 - $4,720 |

## Objectives

1. Determine Western Canadian (BC, AB, SK, MB) dairy farm prevalence of:
   - *Staphylococcus aureus*
   - *Streptococcus agalactiae*
   - *Mycoplasma bovis*
   - Leukosis
   - Leptospirosis
   - Neosporosis
   - Johne's disease
   - *Salmonella* Dublin



2. Develop control measures for each infectious disease on a subset of infected farms, increasing the understanding of farm-specific risk factors for infectious diseases.
3. Determine how to improve producer motivation for disease control and understand drivers and barriers towards adopting biosecurity measures.
4. Economically evaluate each disease control program
5. Determine AMR prevalence in mastitis-causing pathogens and its relationship to antimicrobial use in AB and BC dairy.

## Materials and Methods

### 1. Prevalence

- Herd prevalence: 4 bulk tank samples, all farms
  - Contagious mastitis: Multiplex PCR
  - Leptospirosis, neosporosis, leukosis, *Salmonella* Dublin: Milk ELISA
- Within-herd prevalence: 30 cow samples
  - Leptospirosis, neosporosis, leukosis: Milk ELISA

### 2. Control Measures

For Leptospirosis, neosporosis, leukosis, Johne's disease

- Develop farm-specific standard operating protocols
- Redetermine within-herd prevalence
  - Leptospirosis, neosporosis, leukosis: Milk ELISA
  - Johne's disease: 3 environmental samples: PCR

### 3. Biosecurity

Determine effect of adopting biosecurity measures

- Assess farm biosecurity and potential risk factors
- Understand motivation and attitude of producers
- Information dissemination days
  - Two times during study period (2-3 locations/province)

### 4. Economic evaluation

- Partial budget analysis adapted for each infectious disease control program to further understand a realistic and practice-oriented approach

### 5.Antimicrobial Resistance

- Herd and within-herd prevalence of AMR in milk
  - Milk samples from CM (~30 cases) and high somatic cell count cows (40) on 80 herds in Alberta and BC
  - Culture & sensitivity of bacteria grown (Sensititre)
- Implement:
  - Selective treatment of clinical mastitis, 30 farms
  - Selective dry cow therapy, 30 farms
- Monitor unintended side effects (i.e. CM incidence, milk production, SCC after calving)
- Redetermine AMR

## Communication Plan

- Outreach throughout all stages:
  - On-farm training
  - Peer-to-peer learning on demonstration farms
  - Knowledge Transfer (KT) meetings
  - Annual reports of prevalence estimates, biosecurity evaluations and risk factor assessments
- Industry publications and social media
- Collaboration with herd advisors
- Scientific journal publications and conferences

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