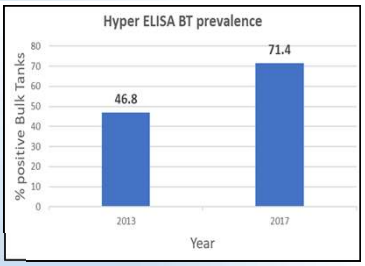
# Management practices associated with Johne's bulk tank milk ELISA positivity

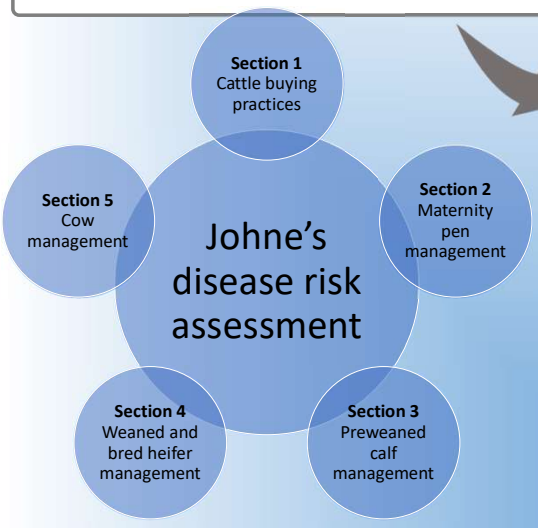
Jamie Imada, David Kelton, Steven Roche, Cathy Bauman

*Department of Population Medicine, Ontario Veterinary College, Guelph ON Canada*

## Background

- Testing and culling, and management changes are the most common Johne's disease control strategies
- Johne's risk assessments are used to identify farm management practices that may increase the risk of Johne's disease
- Ontario had a province wide program (2010-2013) to promote testing and removal of positive animals as well as on-farm changes through risk assessment and management plans
- To understand the program impact, province wide bulk tank milk testing was performed directly after (2013) and 4 years later (2017)
- Risk assessments were completed as part of the province wide program and were repeated in 2019 on 180 farms to help understand the changes to management practices that occurred since the end of the program




## Methods

**Data transformation**
- Questions were transformed into categorical variable
- Section and risk assessment total scores were modelled as both a continuous variable and a categorical variable

**Univariable analysis**
- 95 variables (questions and section scores, bulk tank ELISA results from 2013)

**Multi variable model building**
- Built using backwards stepwise elimination with AICc and LRT methods

**Model checking**
- Hosmer-lemeshow test of fit

## Results

- Two logistic regression models were developed
- Outcome for both models was successful Johne's control
  - **Model 1** used risk assessment questions as predictors
    - model was built using 18 variables
    - 6 variables made it to the final model
    - 2 variables with significant OR's
  - **Model 2** used section scores and cumulative risk assessment scores as predictors
    - model was built using 11 variables
    - 2 variables made it to the final model
    - 1 variable with significant OR's

**Final Models:**

Logistic regression model 1:
- Farms were ~ **3.0** times **less likely** to have successful JD control if they had more than one cow in the maternity pen compared to those who never had more than one cow calving in the maternity pen at one time
- Farms were **2.8** to **4.8** times **more likely** to have successful JD control if their cows calved outside of dedicated maternity areas compared to farms who only had cows calve in dedicated maternity areas

Logistic regression model 2:
- With every 10 units of increase in the section 4 score a farm is **1.96** times (*P*-value: 0.01, 95%CI 1.02-1.13) **more likely** to have failure of JD control.

## Discussion and Conclusion

- Out of the 95 variables in the dataset only 8 made it to the final models. This may be due to the challenges in the temporality of the survey answers and the progression of disease.
- Both the management of the maternity area (whether multiple cows calved in this environment at a time), and the management of calvings (the amount of calvings that occurred outside of calving pens) were significant in the first model.
- Farms which had more than one cow at a time in the maternity pen were more likely to be ***unsuccessful*** in Johne's disease control. Interestingly, farms that had cows calving in places other than designated calving areas were more likely to have ***successful*** Johne's control.
- This result suggests that the cleanliness of the environment in which calves are born is just as important as ensuring they are in an area dedicated to calving.
- The second model indicated that the cleanliness of weaned and bred heifers has an important role in Johne's disease control, with farms scoring higher section 4 scores having an increased odds of unsuccessful Johne's control (positive bulk tank in 2017) than those with lower section 4 scores.

**It is not enough to say cows should be calved in designated maternity pens. The management of these pens is critical in minimizing exposure of newborn calves to infectious material thereby reducing risk of JD transmission.**

**While our youngest calves remain the most susceptible, the risk does not disappear after they leave the maternity area.**

**As management practices change over time it is important for herd veterinarians and advisors to perform frequent risk assessments to gather an accurate and up to date assessment of a herd's JD risk.**

**CONNECT:**

imadaj@uoguelph.ca

@jamieimada

linkedin.com/in/jamieimada

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