



MSc. Defence

Mathematical Modelling to Predict B-Vitamins Supply in Dairy Cows

Vicki Brisson

Date: August 29th 2022 at 9:00am

The MSc Defence for Vicki Brisson has been scheduled for August 29th, 2022 at 9:00am. The defence will be held online via Teams and room 141: https://teams.microsoft.com/l/meetup-join/19%3ameeting_MDZiNDUxMmYtMGI0Ni00OTY3LWI4YTctNjBhM2M1ZDk2YTY5%40thread.v2/0?context=%7b%22Tid%22%3a%22be62a12b-2cad-49a1-a5fa-85f4f3156a7d%22%2c%22Oid%22%3a%22fbd28915-dda5-478f-8ecb-a3682dcf0c3a%22%7d

The exam committee will consist of:

Examining Chair: Dr. Vern Osborne

Advisor: Dr. Jen Ellis

Adv. Committee Member: Dr. Christine Girard

Additional Graduate Member: Dr. Katie Wood

Abstract:

B vitamins are co-enzymes involved in key metabolic reactions, and mathematical models can support the development of their better-defined adequate intake, supply and requirements for dairy cows. The objective of this thesis was to develop empirical models to describe B-vitamin apparent ruminal synthesis and supply to the cow and develop a mechanistic cobalamin sub-model to follow cobalamin (B_{12}) in the rumen of the dairy cow. Both models were developed based on a unique database where B vitamins were not supplemented, and B-vitamin concentrations were analyzed post-hoc. The empirical models identified similarities and differences between B vitamins and the key factors related to their apparent ruminal synthesis and post-ruminal flow (**PRF**). These models guided the development of a mechanistic B_{12} sub-model, which yielded mean B_{12} PRF predictions similar to the observed mean but cannot yet capture the full variation reported in the database. Ultimately, these models represent the first attempt at modelling B-vitamin supply in dairy cows.