UNIVERSITY of GUELPH

ONTARIO AGRICULTURAL COLLEGE

DEPARTMENT OF ANIMAL BIOSCIENCES

PhD Defence

Methionine Utilization in Lactating Sows

Cierra Kozole

Date: **Wednesday July 8, 2026 at 1:00 pm (EST)**

The PhD Defence for Cierra Kozole has been scheduled for Wednesday July 8, 2026 at 1:00pm. The defence will be held **online via Teams and in room ANNU 141**: https://teams.microsoft.com/meet/213676125685916?p=LUPg1ATv1m9xh1G9k5

Examining Chair: Dr. Ming Fan

Advisor: Dr. Lee-Anne Huber

Advisory Committee Member: Dr. John Cant

Additional Member: Dr. Michael Steele

External Examiner: Dr. Rajavel Elango - UBC

Abstract:

Beyond its role in protein synthesis, methionine (**Met**) is a key precursor for metabolic pathways, including its function as a methyl group donor in transmethylation reactions and its contribution to transsulfuration for the synthesis of cysteine and further metabolites. Current Met feeding recommendations for lactating sows (NRC, 2012) are based on older empirical data, which do not consider Met use beyond nitrogen (**N**) retention. Thus, given the push for productivity in modern hyper-prolific sows, it is important to update Met requirement models for lactation while considering both protein synthesis and non-protein fates. Nitrogen balance studies, offspring growth performance, and a stable isotope infusion were used to assess Met utilization for protein retention, protein synthesis, and non-protein metabolic fates, while simultaneously evaluating the utilization of different Met sources during lactation in primiparous sows. The level of dietary standardized ileal digestible (**SID**) Met required to maximize milk N output in early and peak lactation were greater than those estimated by the NRC (2012) lactating sow model, with the greatest discrepancy during peak lactation when feed intake and productivity were high. These results suggest that piglet daily protein deposition and lipid deposition over lactation can be improved by increasing maternal SID Met intake. Both crystalline DL-Met and the hydroxy analog of Met supported comparable whole-body N retention and milk N output when supplied at 0.20 to 0.23% SID Met with supplemental cysteine-HCl (0.25% SID cysteine).

Both Met sources supported comparable whole-body protein synthesis and transmethylation fluxes when supplemented equimolarly to reach 0.30% SID Met, above estimated Met requirements. Therefore, either source can be used to increase maternal SID Met supply to support litter growth (milk production), maternal whole-body protein synthesis, and transmethylation. Unlike neonatal piglets, however, in lactating sows Met partitioning toward transmethylation appears to be preserved when dietary Met supply is low, suggesting that feeding recommendations to maximize protein retention should also be sufficient to support transmethylation. In conclusion, Met factorial requirement models should be updated to reflect the stage of lactation, sow feed intake, and productivity of modern sows but accounting for Met partitioning toward transmethylation is not likely necessary.