UNIVERSITY of GUELPH

ONTARIO AGRICULTURAL COLLEGE

DEPARTMENT OF ANIMAL BIOSCIENCES

PhD Defence

Methionine utilization in primiparous gestating sows

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Date: Tuesday July 15, 2025 at 1:00pm

The PhD Defence for Cristhiam Jhoseph Munoz Alfonso has been scheduled for July 15, 2025 at 1:00pm. The defence will be held online via Teams and in room 141: https://teams.microsoft.com/l/meetup-join/193ameeting_Mjg4MmI3MGItMGJhOS00ZDc2LTkxM2YtZDdhYmM1NTU1OWUw%40thread.v2/0?context=%7b%22Tid%22%3a%22be62a12b-2cad-49a1-a5fa-85f4f3156a7d%22%2c%22Oid%22%3a%22dfbebf32-99ae-4022-a68f-422f93e11c7f%22%7d

Examining Chair: Dr. Wendy Pearson

Advisor: Dr. Lee-Ann Huber

Advisory Committee Member: Dr. John Cant

Additional Committee Member: Dr. Marcio Duarte

External Examiner: Dr. Lee Johnson

Abstract:

Amino acids (AA) requirements for gestating sows are critical for optimizing health and performance. The NRC (2012) gestating sow model estimates AA requirements based on protein retention and AA profiles in various pools including fetuses, mammary tissue, placenta and fluids, uterus, and maternal body. However, these recommendations, particularly for sulfur AA like methionine (Met) and cysteine (Cys), are based on limited empirical data from outdated studies that do not reflect the demands of modern sow genetic lines or non-protein uses of AA. Nitrogen balances, isotope infusion studies, and growth performance of the offspring were used to assess Met requirements for protein retention and to explore non-protein uses of Met in primiparous gestating sows. The current standardized ileal digestible (SID) Met feeding recommendations are likely insufficient to maximize whole-body nitrogen retention of primiparous sows at all stages of gestation in current production conditions. The supply of SID Met might also influence Met utilization for metabolic fates beyond protein retention in the primiparous sows. Also, dietary Met levels significantly impact key metabolic fluxes in primiparous sows; higher Met intake leads to increased rates of protein synthesis, transsulfuration, and Met turnover, highlighting the importance of dietary Met in supporting both protein accretion and other metabolic functions. Finally, it was evidenced that primiparous sows have a remarkable ability to buffer dietary AA imbalances during late gestation. This ensures that fetal development and subsequent growth performance remain unaffected, even when the maternal intake of sulfur AA is substantially above or below the recommended levels. Therefore, Met feeding guidelines for gestating sows should be updated in order to enhance both maternal and offspring performance, while the broader metabolic roles of Met beyond protein synthesis should be considered for the current and future performance of both sows and offspring.