UNIVERSITY of GUELPH

ONTARIO AGRICULTURAL COLLEGE

DEPARTMENT OF ANIMAL BIOSCIENCES

PhD Defence

IMPLICATIONS OF ENDOMETRIAL RESPONSIVENESS TO INTERFERON-TAU AND OMEGA-3 FATTY ACID SUPPLEMENTATION ON FERTILITY OF DAIRY CATTLE

Guilherme Madureira

Date: August 28th 2024 at 9:00am

The PhD Defence for Guilherme Madureira has been scheduled for August 28th, 2024 at 9:00am. The defence will be held online via Teams and in room 141: https://teams.microsoft.com/l/meetup-join/19%3ameeting_N2QyODZlMTUtMzIyNi00MTIzLWEwYmEtNDQxODIxM2RhZjc5%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

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Abstract:

The objectives of this thesis were to 1) evaluate the endometrial responsiveness of dairy heifers to an intrauterine infusion of recombinant bovine interferon-tau (**rbIFN-τ**) and to associate endometrial responses to rbIFN-τ with subsequent reproductive performance of dairy heifers, and 2) evaluate the impact of supplementing omega-3 (**n3**) fatty acids (**FA**) using calcium salts of fish oil (**CaFO**) in the early postpartum and breeding periods on inflammation, performance, and reproductive biology of dairy cows. Regarding objective 1, an intrauterine infusion of a fixed low dose of rbIFN-τ demonstrated that responses are variable between individuals and associated with their subsequent fertility. In addition, the endometrium of dairy heifers classified as subfertile presented altered expression of genes associated with extracellular matrix and cell signaling and metabolism, which could impair the endometrial receptivity to pregnancy. Regarding objective 2, a low inclusion of CaFO in the postpartum diet altered the profile of FA in circulation, but did not affect milk production efficiency of dairy cows. Supplementing CaFO during the early postpartum period appeared to modulate uterine inflammatory responses, favoring uterine involution and associated tissue repair and remodeling. As a result, short-term CaFO supplementation (limited to the postpartum period only) enhanced embryo development and fertility outcomes in the subsequent breeding period. However, these benefits were lost when supplementation was extended into the breeding period, likely due to endometrial and ovarian responses to prolonged exposure to higher concentrations of n3 FA. In fact, extending CaFO supplementation into the breeding period triggered activation of genes and pathways in the endometrium linked to immune cell activity and inflammatory responses, which might be detrimental to pregnancy establishment.