UNIVERSITY of GUELPH

ONTARIO AGRICULTURAL COLLEGE

DEPARTMENT OF ANIMAL BIOSCIENCES

PhD. Defence

Hypothalamic-Pituitary-Adrenal Axis Activity and Robustness: Working Towards Better Breeding of Canadian Turkeys

Emily Leishman

Date: December 8th 2021 at 9:00am

The PhD Defence for Emily Leishman has been scheduled for December 8th, 2021 at 9:00am. The defence will be held online via Teams: https://teams.microsoft.com/l/meetup-join/19%3ameeting_Nzc5ZWU3ZGEtODRlNC00NzQ5LTk4MzctZDViZGU3YjM3OTIw%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. Jennifer Ellis

Advisor: Dr. Christine Baes

Adv. Committee Member: Dr. Alexandra Harlander

Additional Graduate Member: Dr. Gregoy Bedecarrats

External Examiner: Dr. Henrike Glawatz

Abstract:

Animal robustness is essential in the poultry industry because of its consequences for animal health, wellbeing, and industry profitability. Strategies to improve animal robustness can include quantifying environmental sensitivity or direct selection for robustness-related traits, however, these have come with limited success. An alternative approach is to investigate the genetics of the hypothalamic-pituitary-adrenal (HPA) axis as intense selection for production traits is believed to result in a reduced HPA axis response and ability to respond to perturbations leading to physiological and behavioural problems. The glucocorticoid hormone corticosterone (CORT) is one of the main end-products of the HPA axis. Quantifying CORT in feathers (FCORT) provides an opportunity for a less invasive measure that represents average circulating level of CORT over time compared to traditional methods. Robustness-related issues are prevalent on commercial turkey farms and perturbations can impact meat quality through HPA axis activity. Therefore, the objective of this thesis was to investigate novel phenotypes (e.g., FCORT) related to HPA axis activity that could act as indicators of robustness in domestic turkeys. We developed a reliable method for quantifying FCORT in turkey feathers and characterized feather growth patterns to provide context to these measurements. Changes in energy balance are reflected in FCORT measurements which provides validation for its use as a marker of HPA axis activity. Most importantly, our findings suggest that HPA axis activity, measured via FCORT, is a heritable trait in domestic turkeys and is negatively correlated with production traits (e.g., breast yield) but positively correlated with livability traits (e.g., walking ability). Although further investigation into the relationship between FCORT and other robustness traits is required, this thesis provides exciting avenues for improving robustness, health, and wellbeing in domestic turkeys through genetic selection.