



**ONTARIO
AGRICULTURAL COLLEGE**

DEPARTMENT OF ANIMAL BIOSCIENCES

MSc. Defence

On the Use and Disuse of the Wings in Domestic Egg Laying Chickens (*Gallus Gallus Domesticus*)

Renee Garant

Date: December 10th 2021 at 2:30pm

The MSc Defence for Renee Garant has been scheduled for December 10th, 2021 at 2:30pm. The defence will be held online via Teams: https://teams.microsoft.com/l/meetup-join/19%3ameeting_YTA4ZDY5NzMtMDZIYy00ZjU2LTk2ZDEtYTA3OWNiNzKmJBl%40thread.v2/0?context=%7b%22Tid%22%3a%22be62a12b-2cad-49a1-a5fa-85f4f3156a7d%22%2c%22Oid%22%3a%22fbdb28915-dda5-478f-8ecb-a3682dcf0c3a%22%7d

The exam committee will consist of:

Examining Chair: Dr. Andy Robinson

Advisor: Dr. Alexandra Harlander

Adv. Committee Member: Dr. Bret Tobalske

Additional Graduate Member: Dr. Dan Tulpan

Abstract:

Bones are a highly complex tissue capable of adapting to changes in muscle usage through specialized cells which respond to muscle strain. As such, the way in which birds utilize their wings has a direct impact on strain production of the flight muscles, and subsequently the keel bone to which the muscles anchor. Currently, adaptations of muscle and bone in response to a decrease in wing use is unknown in laying hens. Therefore, the first study (Chapter 2) sought to investigate if a loss of flight feathers (reduction to wing area) would reduce wing activity. Results of this study indicated that a loss to flight feathers reduced the amount of time hens spent at elevated resources, though white-feathered hens required a greater reduction to wing area than brown-feathered birds for this effect to occur. The second study (Chapter 3) then assessed if laying hens with damaged flight feathers showed flight muscle adaptations to a decrease in wing use, and an increased prevalence of keel bone fracture due to a decrease in flight muscle strain. Results showed that white-feathered birds adapted to wing use reduction with a decrease in pectoralis thickness and bodyweight, while brown-feathered hens showed no change. Keel bone fracture prevalence was not affected by wing use reduction. Finally, the third study (Chapter 4) sought to determine the effects of immobilization on wing use, flight muscle thickness, and keel bone deviation and fracture. Light immobilization (one wing immobilized in a sling) reduced the amount of time that brown-feathered hens spent at elevated resources, but not white-feathered hens. Severe immobilization resulted in reductions to pectoralis thickness and bodyweight in white-feathered hens, but not brown-feathered hens. The presence of keel bone fractures and deviations were not affected by either form of immobilization. Altogether, results of this thesis demonstrate that flight feathers are important for elevated resource access, especially for brown-feathered hens, and that white-feathered hens adapt to a decrease in wing usage. Decreased wing use did not affect the prevalence of keel bone damage in this thesis, more work is needed to ascertain the effects of muscle strain on the keel bone in laying hens.