

## PhD Defence

Effects of growth trajectories on sexual maturation and their relationship with  
the rearing environment in laying hens

Mohammad Bahry

Date: September 19th 2024 at 1:00pm

The PhD Defence for Mohammad Bahry has been scheduled for September 19th, 2024 at 1:00pm. The defence will be held in room 101 and online via Teams: [https://teams.microsoft.com/l/meetup-join/19%3ameeting\\_ODNhYzI0NWItYzY0OC00NzM1LWE3YjItN2IxYjRhYjJhMzI4%40thread.v2/0?context=%7b%22Tid%22%3a%22be62a12b-2cad-49a1-a5fa-85f4f3156a7d%22%2c%22Oid%22%3a%22fd28915-dda5-478f-8ecb-a3682dcf0c3a%22%7d](https://teams.microsoft.com/l/meetup-join/19%3ameeting_ODNhYzI0NWItYzY0OC00NzM1LWE3YjItN2IxYjRhYjJhMzI4%40thread.v2/0?context=%7b%22Tid%22%3a%22be62a12b-2cad-49a1-a5fa-85f4f3156a7d%22%2c%22Oid%22%3a%22fd28915-dda5-478f-8ecb-a3682dcf0c3a%22%7d)

Examining Chair: Dr. Dan Tulpan

Advisor: Dr. Gregoy Bedecarrats

Advisory Committee Member: Dr. Elijah Kiarie

Additional Committee Member: Dr. Eduardo Ribeiro

External: Dr. Sami Dridi

**Abstract:**

Egg production in chickens is regulated by various physiological pathways involving the hypothalamus, pituitary gland, gonads, and liver. Traditionally linked to photoperiod changes, recent studies suggest metabolic triggers can independently stimulate maturation. This study investigated how different growth trajectories influence body weight (BW) and body composition (BC), thereby influencing sexual maturation and egg production in two strains of laying hens: Lohmann LSL Lite (W) and Lohmann Brown Lite (B).

Hens were subjected to three feeding treatments from 8 weeks of age (woa): *ad libitum* (AL), target (T), and feed-restricted to achieve 20% below target BW (R). Key parameters, including BW, BC, hormone profile, egg production, age at first egg (AFE), BW at first egg, and gene expressions in key organs such as the hypothalamus, pituitary gland, and liver were assessed. The findings highlighted the significant effects of the feeding regimen on BW and BC. Hens under AL conditions exhibited higher fat deposition crucial for maturation onset, resulting in earlier AFE, elevated estradiol (E<sub>2</sub>) levels, and increased ovarian follicle numbers. Conversely, feed restriction delayed maturation, underscoring the importance of reaching specific BW and fat thresholds for reproductive readiness. The growth trajectory significantly affected gene

expressions related to reproductive hormones and metabolic processes. Feed restriction reduced the expression of follicle-stimulating hormone receptor B and progesterone receptor in the pituitary gland and vitellogenin and apolipoprotein receptors (ApoB, APOV1) in the liver.

Furthermore, the second phase of this study compared conventional cages (CC) to three aviary styles (AV) in terms of BW, BC, and reproductive performance in W and B hens. Monitoring until 23 woa revealed CC systems promoted higher BW, with strain-specific fat deposition differences affecting maturation and bone health.

In conclusion, these findings highlight the metabolic regulation of reproductive physiology in laying hens, emphasizing the critical role of BC in managing egg production efficiency. Moreover, they reveal the interaction between metabolic status, hormonal regulation, and reproductive physiology, emphasizing the importance of optimal growth conditions. Finally, the study emphasizes the fundamental role of housing systems in shaping physiological outcomes crucial for the welfare and productivity of laying hens