

PhD Defence

In Vitro and In Vivo Investigations of Inflammatory and Morphometric Consequences in
Overweight Equines

Anna Garland

Date: August 9th 2024 at 3:00pm

The PhD Defence for Anna Garland has been scheduled for August 9th, 2024 at 3:00pm. The defence will be held online via Teams and in room 141: https://teams.microsoft.com/l/meetup-join/19%3ameeting_YTcwMWNjNGYtODc4Ny00MjFILTg3ZGI0OGUxOGVmNmNkYzY1%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:

Chair: Dr. Elijah Kiarie

Advisor: Dr. Wendy Pearson

Advisory Member: Dr. David Mutch

Additional Member: Dr. Jennifer Monk

External Examiner: Prof. Cathy McGowan

Abstract:

Equine obesity affects up to 70% of the domesticated population and increases the risk for chronic inflammatory conditions. The purpose of this thesis was to investigate morphometric changes and associated inflammatory consequences in overweight horses undergoing weight loss. Four studies were conducted. Study #1 investigated an *in vitro* organ culture model of inflammation to determine effects of inflamed and non-inflamed adipose tissue (AT) on cartilage responses to an inflammatory challenge. Cartilage explants were cultured for a total of 192h in either culture media or media pre-conditioned with AT, and stimulated for 48h directly with LPS, or indirectly with AT-LPS conditioned media. Media samples were analyzed for PGE2, NO, GAG, and RvD1. The inflamed AT elicited a greater inflammatory response from cartilage explants than direct LPS stimulation. Study #2 characterized morphometric changes in horses undergoing a 16-week weight gain program to determine how individual subcutaneous AT (SAT) depots are affected by weight gain. Horses underwent 14 measurements {body weight [BW; weight tape and bioelectrical impedance analysis (BIA)], cresty neck score, whole body condition score (BCS), 8 individual BCS (neck, shoulder, leg, withers, ribs, back, haunches, tailhead), and fat mass (BIA; % and kg)}. Morphometrics showed non-uniform increases across the SAT depots and over the 16-weeks of weight gain, with the greatest increase in BCS in the tailhead depot. Study #3

investigated morphometrics in overweight horses undergoing one of three weight loss programs (daily exercise, feed restriction, and feed restriction plus daily exercise), or a weight-maintenance group. During weeks 1, 5 and 10, horses underwent 14 measurements (as described for study #2). Exercise-based programs produced greater reductions in morphometrics than the feed restriction alone program. Study #4 investigated the inflammatory consequences of each weight loss program to a standardized exercise test (SET; Weeks 1, 5, 10). Blood plasma and synovial fluid were collected at -48h prior to the SET, 1, 8, and 12h after cessation of the SET. Samples were analyzed for PGE₂, NO, and GAG. Exercise-based programs increased the inflammatory response to the SET in the articulating joint, while feed restriction alone reduced the response.