

Variable Adrenal Responding Sheep, Which Were Selected on the Basis of Their Cortisol Response to Systemic *Escherichia Coli* Lipopolysaccharide (Lps) Endotoxin Challenge, Have Unique Behavior and Pituitary Responses to Psychological Stress

Marshman M, You C, Duncan I, Karrow NA. Centre for the Genetic Improvement of Livestock, Dept Animal & Poultry Science, Ontario Agricultural College, University of Guelph.

Presenter: Melissa Marshman – This section completed but overall program ongoing

The hypothalamic-pituitary-adrenal axis (HPAA) is activated during microbial infections to restore physiological homeostasis. This, in part, involves regulating the host inflammatory and immune responses via the secretion of adrenal glucocorticoids such as cortisol. The HPAA is also activated during psychological stress, and variation in HPAA function has been associated with a number of psychological diseases of humans. Given that HPAA function is a heritable trait, we previously selected high (H), middle (M), and low (L) adrenal responding ewes from a population of 110 sheep by measuring their cortisol response to systemic *Escherichia coli* lipopolysaccharide (LPS) endotoxin challenge- a model of bacterial infection. These sheep have subsequently been used in a breeding program to generate variable stress responding lines for future genetic research. In this study, the pituitary (adrenocorticotrophic hormone) and behavior responses to combined transportation and isolation (T+I) stress, and behavior response to predator stress were assessed in the F0 generation ewes to determine if their response to psychological stress paralleled their response to stress associated with bacterial infection. The pituitary response of these ewes to T+I stress was group specific with H > L responders ($p=0.04$) and M > L responders ($p=0.03$). Likewise, the behavioral response to predator stress, as determined by hoof stomping, was group specific with L > M responders ($p=0.08$) and L > H responders ($p < 0.01$). These results demonstrate that ewes with variable adrenal responsiveness to LPS also have unique pituitary and behavior responses to psychological stress.