DEPARTMENT OF AGRICULTURAL, FOOD AND NUTRITIONAL SCIENCE

MSc Thesis Seminar

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Date:	**March 16, 2018**
Time:	**8:30 a.m.**
Location:	**318J Agriculture/Forestry Centre**
Title:	**Rangeland Habitat Use and Activity of Cattle with Divergent Molecular Breeding Values for Residual Feed Intake**

ABSTRACT

Residual feed intake (RFI) is a heritable trait that can be used to measure feed efficiency in cattle and serve as a tool for managing beef operation costs. Past research on RFI has primarily been evaluated under drylot conditions where animals are on a standardized diet with variation in foraging behaviour minimized. Evidence suggests that cattle on rangelands are highly selective while foraging, a phenomenon that applies across multiple spatial scales ranging from individual feeding stations to landscape locations. This is further affected by temporal variation in forage quality and quantity across the grazing season. Our study used GPS collars and pedometers on 30 commercial Hereford-Angus cows at the University of Alberta Mattheis Research Ranch. Our objective was to explore whether habitat use and activity in an extensive pasture based system differed between cattle with divergent predicted MBV for RFI. Production metrics (cow weight and back fat gain, calf weight) were collected at the beginning and end of the grazing season to help quantify how cattle behaviour through the grazing season affects performance and if predicted RFI can help explain those relationships. Neither predicted RFI group (low vs high) or individual animal MBV score were found to explain cattle movement rates, resting time, or habitat use. Instead, timing of grazing (early, middle and late growing season grazing), pasture type (native mixedgrass, tame, or wetland plant community types), forage metrics (quantity and quality) and distance to water were the factors regulating cattle activity, habitat use, and performance. Cows had significantly higher activity levels (greater movement rates and lying bout frequency, less time spent lying down) early in the grazing season ($P \leq 0.05$). Lying time decreased with increasing pasture size across all pasture types ($P < 0.05$) and in native grasslands alone ($P < 0.001$). Native forage metrics, particularly forb quality and quantity, were found to vary significantly over the grazing season and across topographic position ($P \leq 0.03$). Further study of the relationship between cow activity and forage metrics found that better forb quality and quantity was generally associated with greater activity levels in cattle ($P \leq 0.01$). Cow weight, back fat gain, and calf weaning percentage were not impacted by MBV for RFI, or most of our habitat metrics studied during the growing season. However, cows spending less time within 200 m of water in native pastures were found to wean larger calves ($P=0.05$), and over all pastures, gain more back fat ($P = 0.05$) over the grazing season. Trends in cattle performance explained by activity also found that cows that spent more time lying down tended to gain less weight and back fat. We conclude that improving pasture-based cow/calf production through selection for low RFI requires more research into genetic markers that better predict RFI in these complex environments. Our research shows that changing environmental conditions have effects on animal activity and habitat selection, and this consequently affects their performance. These results support that it may be necessary to identify MBV markers unique to extensive production systems to improve cow/calf production through selection using RFI.