

DEPARTMENT OF AGRICULTURAL, FOOD AND NUTRITIONAL SCIENCE

MSc Thesis-based Seminar

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Date: **Friday, October 20, 2017**
Time: **9 a.m.**
Location: **318J Agriculture/Forestry Centre**
Title: **Performance and methane emissions of RFI-selected cattle in drylot and under open range conditions**

ABSTRACT

Residual feed intake (RFI) is a moderately heritable trait that can be used to measure feed efficiency in beef cattle, and thereby reduce feed related costs. RFI has been primarily evaluated under drylot conditions where diet, feed intake and activity levels are controlled and foraging behaviour is eliminated. Although previous studies have tried to measure RFI on monoculture pasture, it is difficult to accurately determine individual feed intake. The objective of this study was to determine whether there is a difference in performance (change in weight, change in backfat, and pregnancy status) between cattle with molecular breeding values (MBVs) for high and low RFI while foraging under open range conditions. This research also examined differences in methane (CH₄) emissions and dry matter intake (DMI) of high and low RFI heifers with phenotypic RFI values derived in drylot. This research was conducted at the University of Alberta Mattheis Research Ranch. A total of 450 commercial Hereford/Angus cows, with predicted MBVs for RFI, were separated into groups of high, low and medium efficiency. High RFI cows were bred to high RFI bulls, low RFI cows were bred to low RFI bulls and medium RFI cows were bred to medium RFI bulls, where the bulls had their own phenotypes to produce groups of high, low and medium RFI calves. Production metrics, such as cow weight gain, change in backfat and pregnancy status, along with calf growth were collected for the 2015 grazing season. A subset of 60 replacement heifers, selected based on the MBVs of associated dams (30 high and 30 low RFI) were tested for actual feed intake and CH₄ production using GrowSafe and GreenFeed technologies, respectively. A smaller subset of 18 heifers were tested for individual feed intake and CH₄ production while grazing forage oat pasture using an open-path laser system to monitor emissions and a paired n-alkane methodology to predict feed intake. There were no significant differences in the change in weight, change in backfat or pregnancy status between high and low genomically predicted RFI (gRFI) cows. Additionally, high and low gRFI calves had similar growth over the grazing period. High RFIFAT (RFI corrected for backfat) replacement heifers had significantly greater DMI in drylot when compared to the low RFIFAT heifers. Despite differences in DMI, high and low RFIFAT heifers did not differ in growth while in drylot. Methane production in drylot was not significantly different, however low RFIFAT heifers had significantly greater CH₄ yields. On pasture, there was no significant difference in DMI or CH₄ production or yield between high and low RFIFAT heifers, although there was a trend towards high RFIFAT heifers having greater DMI and producing more CH₄. Ultimately the results indicate that selection for RFI in cow-calf herds on pasture will not compromise productivity of those cattle and it should not impact their ability to produce offspring. Additionally, selection is likely to reduce feed intake and CH₄ emissions on both pasture and in drylot.