DEPARTMENT OF AGRICULTURAL, FOOD AND NUTRITIONAL SCIENCE

MSc Thesis Seminar

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Date:	**Friday, January 24, 2020**
Time:	**1:30 pm**
Location:	**410C Agriculture/Forestry Centre**
Title:	**Assessment of rumen microbiota in beef heifers with different feed efficiency and managed under different feeding systems**

ABSTRACT

The linkage between rumen microbiota and feed efficiency has been studied widely in cattle managed under the drylot system, especially in the feedlot with high-grain diets. However, pasture based beef operations still dominate the beef production system around the world. In Alberta and other provinces of Canada, most cow-calf producers keep their cattle on summer pasture for lower labor and feed costs. Similarly, backgrounding beef cattle are mainly operated under the extensive feeding system, mostly on grazing. To date, very limited studies focused on the rumen microbiota of beef cattle under grazing system. To fill this knowledge gap, two studies were performed in this thesis. The first study investigated the effect of different feeding systems on rumen microbiota using beef heifers (n=16) under two different feeding systems, drylot vs grazing. The second study explored whether the rumen microbiota in heifers with divergent residual feed intake (RFI) (H-RFI, n=8; L-RFI, n=8) have different change patterns when the feeding system changed. Our results showed that no differences were detected in bacterial, archaeal, protozoal, and fungal population differences in the rumen of heifers under drylot compared to them under grazing feeding systems. However, H-RFI heifers had significant increased bacterial population and decreased protozoal population when they were shifted from drylot to grazing, while such shift was not observed for L-RFI heifers. Besides, this thesis also revealed that heifers with divergent RFI had different patterns of changes in microbial taxonomic composition. For example, the relative abundances of two predominant phyla *Firmicutes* and *Bacteroidetes* were significant increased and decreased, respectively, only in H-RFI heifers when feeding system changed from drylot to grazing. The results suggested that these inefficient heifers had more diverse rumen microbial communities than efficient heifers. In this thesis, microbial functions were also predicted using PICRUSt2 package. In total, 10 major MetaCyc pathways were predicted and 7 out of them significantly increased only in the rumen of H-RFI heifers when the feeding system changed. This indicated that L-RFI heifers have more stable rumen microbiota when the feeding system changed, which also suggests efficient heifers may remain their efficiency in different feeding system through maintaining feed efficiency related microbes and metabolic pathways. Outcomes of this thesis provide fundamental knowledge to understand the rumen microbiota of cattle under different feeding systems and support the development of potential methods to manipulate rumen microbiota to improve the feed efficiency of cattle.