PSV-A-12 The Influence of Calcium Dose and Olive Meal on in-Vitro Rumen Fermentation Characteristics. Huey Yi Loh¹, Briana V. Tangredi¹, Meghan P. Thorndyke¹, Octavio de Almeida Guimaraes Bisneto¹, Devin Osborne¹, Sophie M. Zuchegno¹, Miranda L. Zuvich¹, Courtney M. Athens¹, Jerica A. Engle¹, Ryan J. Gifford¹, Terry E. Engle¹, ¹Colorado State University, Department of Animal Sciences

Abstract: Rumen fluid from three beef steers (480 ± 10 kg), fitted with rumen canulae, were used to investigate the impact of Ca dose and olive meal on in vitro rumen fermentation characteristics. Steers were fed a high concentrate finishing diet for 21d, and rumen fluid was collected from each steer 2h post-feeding. A 2 x 4 factorial arrangement of treatments was used for this experiment. Factors included: 1) 0 or 5% olive meal and 2) Ca dose: 0, 0.02, 0.04, and 0.08% Ca from CaCl₂. A McDougall's buffer-rumen fluid mixture (1:1; 30 mL) was added to conical tubes containing 0.5g of the ground basal diet and incubated at 39°C for 0, 4, 8, and 12h (5 replicates per treatment per time point). After incubation, supernatant was removed for VFA analysis and the remaining digesta was dried to determine DM disappearance (DMD). At 4 and 8h post incubation digestion tubes containing 0.04% Ca had greater (P < 0.001) DMD when compared to all other Ca doses. At 12h post incubation, DMD was greater (P < 0.001) in digestion tubes containing 0.02% and 0.08% Ca compared to all other Ca doses. At 8h post incubation, molar proportions of acetic acid were greater (P < 0.03) in digestion tubes containing olive meal compared to no olive meal and were greater (P < 0.001) in digestion tubes containing 0.08% Ca compared to all other Ca doses. At 12h post incubation, isobutyric acid (P < 0.01) and butyric acid (P < 0.02) were greater in digestion tubes containing 0.02% and 0.04% Ca compared to all other Ca doses. Butyric acid was lesser (P < 0.02) with olive meal inclusion at 12h. Total VFA concentrations were similar across treatments. These data suggest that Ca and olive meal can impact in vitro fermentation characteristics.

Keywords: calcium, olive, fermentation characteristics

PSV-A-10 Single-Cell Atlas of Bovine Skeletal Muscle Identifies Mechanisms Regulating Intramuscular Adipogenesis and Fibrogenesis. Leshan Wang¹, Chaoyang Li¹, Qianglin Liu¹, Yuxia Li¹, Peidong Gao¹, Xujia Zhang¹, Matthew Welborn¹, Xing Fu¹, ¹Louisiana State University

Abstract: Human and mouse studies have shown that fibro/adipogenic progenitors (FAPs) are a major source of intramuscular fat (IMF) and extracellular matrix (ECM) proteins. IMF and ECM proteins directly influence the palatability of beef, suggesting an essential role of FAPs in beef quality determination, which is still largely unexplored. We performed single-cell RNAseq (scRNAseq) using cells isolated from full blood Wagyu and Brahman cattle and Wagyu/Brahman cross cattle, which identified 21 cell clusters representing FAPs, several endothelial cell types, vascular smooth muscle cells, satellite cells, muscle fibers, and multiple immune cell types. More abundant FAPs were identified in the muscle of Brahman cattle, while a larger number of endothelial cells were identified in the muscle of Wagyu cattle. Further analysis of FAPs identified multiple FAP subpopulations with distinct gene expression profiles and anatomic locations. GSEA analysis revealed adipogenic and fibrogenic FAP subpopulations. A comparison of FAP subpopulations among different breeds showed higher complement system activity in the adipogenic FAP subpopulation of Wagyu cattle. Forced activation of the complement system in FAPs enhanced their adipogenic efficiency in vitro. In addition, cell-cell communication analysis identified active interactions between FAPs and other cell types through direct contact and secreted factors, many of which may affect FAP activities. In conclusion, our study revealed the single-cell atlas of bovine skeletal muscle and identified mechanisms regulating bovine intramuscular adipogenesis and fibrogenesis.

Keywords: cattle, fibro/adipogenic progenitors, intramuscular fat