Abstract citation ID: skad281.694

PSXI-8 Comparison of Spectral and Motion Sensing for Grazing Behavior Determination in Extensive Systems. Ryan Wright, Charleez Simcik, Robin R. White, *Virginia Tech School of Animal Sciences*

Abstract: There is a need to classify eating behaviors of grazing animals to better understand time budgets and intake levels of extensively managed livestock. The objective of this work was to compare spectral and motion-based sensing for classification of animal grazing versus standing behaviors within extensive production systems. The sensor was an open-source setup with a TTGO-T-Beam microprocessor (Shenzhen Xin Yuan Electronic Technology Co, China), soldered with an AS7265x Spectral Triad (SparkFun Electronics, Niwot, CO) and generic 9 degree of freedom inertial motion unit. The sensors were attached to a mesh face mask and placed on 5 horses for 10 minutes of data collection. Within the data collection period, animals were allowed to graze for 5 minutes, and required to stand for 5 minutes. The order of grazing and standing was randomized among animals. Data were collected by the microprocessor at 100 hertz and averaged over a 20 second period. Average data were transmitted via long range radio (LoRa) to a base station. Data were matched by timestamp to ground truth observations of animal standing vs grazing behaviors. A random forest algorithm was used to explore predicting animal grazing versus standing behaviors based on motion data (average pitch, yaw, and roll of animals over the experimental period) individually, based on the top features selected from the spectral data individually, or based on all collected data together. The model using the motion data only returned an out of bag estimated error rate of 26.5%. The model using the top features selected from the spectral data yielded a much lower out of bag estimated error rate (8.82%), which was not improved by leveraging all data together. By comparing the spectral data with GPS coordinates attached to each observation, we were able to clearly distinguish the spatial area used for grazing compared with that used for standing. One potential impact of this preliminary exploration is in low-cost, low-power, more precise behavioral classification for grazing livestock. Because the spectral sensed data generated more reliable ability to distinguish grazing and standing behaviors, we may be able to rely on lower frequency observations, or lower data acquisition rates to achieve acceptable classification accuracies. Similarly, given the success of NIR in analyzing feed composition values, there is likelihood

that spectral sensing could be used not only to identify grazing, but to character forage quality grazed.

Keywords: behavior, grazing, sensing