FORAGES AND PASTURES

PSXII-12 Heritage Raramuri Criollo Cattle Production as a Potential Strategy for Conservation of Black Grama in the Chihuahuan Desert. Shelemia Nyamuryekung’e, Richard Estell, Darren James, Matt M. McIntosh, Sheri Spiegel, Santiago Utsumi, Animal and Range Science Department, New Mexico State University, USDA-ARS Jornada Experimental Range

Abstract: The Chihuahuan desert ecosystem has experienced a decrease in black grama (Bouteloua eriopoda), a perennial grass species with high ecological value, alongside a subsequent increase in mesquite (Prosopis glandulosa). This trend is thought to be due to several management- and environment-related factors. We compared diet selection of a heritage Raramuri Criollo (RC) vs. Angus-X-Hereford (AH) cattle, typical of the region, using fecal DNA metabarcoding conducted by a commercial laboratory to determine the proportion of black grama and mesquite in samples. RC and AH cows grazed two adjacent pastures (~1,100 ha) separately, switched at the mid-point of each period. Rectal fecal samples were collected from 10 cows/ breed/ pasture/ period. The study was replicated across seasons (growing and dormant) for three consecutive years (240 total fecal samples) in a completely randomized design. Relative abundance of plant species was ranked over the entire study and by season. The MIXED procedure of SAS 9.4 was used to analyze the proportions of black grama and mesquite in fecal samples by breed, season, year, and all interactions. Black grama was a more important forage resource than mesquite (ranked 8 vs. 11), particularly during dormancy (ranked 3 vs. 7). When examined by breed, AH fecal samples had twice the percentage of black grama vs. RC (P< 0.05) and even more so during the dormant season (P< 0.05). In contrast, RC fecal samples tended to contain a greater percentage of mesquite (P=0.05). Adjustments for BW differences between breeds (545 vs. 350 kg mean BW for AH vs. RC respectively) suggest that AH consumed 3.09-fold more black grama while RC consumed 1.59 times more mesquite. Differences in diet composition appear to support the hypothesis that RC cattle could impose a lighter grazing pressure on black grama populations, potentially serving as a conservation management tool on Chihuahuan Desert rangelands.

Keywords: black grama, Criollo cattle, diet selection

PSXII-9 Application of Machine Learning Algorithms to Estimate Tropical Pasture Biomass Based on Satellite Images. Marcia H. Fernandes, Jalme Fernandes, Ricardo Andrade Reis, Luis O. Tedeschi, Sao Paulo State University (UNESP), Sigfarm Intelligence, Department of Animal Science, Texas A&M University

Abstract: The proper quantification of forage allowance for ruminants in grass-based production systems has always been challenging. At the field scale, pasture management based on ground-level measurements, such as clipping or plate meter, is labor intensive and hampers the assessment of spatial and temporal variability. On the lookout for a solution, this study aimed to estimate marandu palisade grass forage mass based on satellite images using two machine learning (ML) algorithms, Multiple Linear Regression (MLR) and Artificial Neural Network (ANN). The experimental area comprised Marandu palisade grass pasture (Brachiaria brizantha ‘Marandu’), summing 33 paddocks (42 ha), receiving or not N fertilization. Pastures were managed under continuous stocking to maintain grazing height fixed at 25 cm during the growing season, using the put-and-take methodology with young beef bulls. Field dataset collection (total forage mass and morphological composition) and satellite images were assessed from Dec/2015 to Mar/2019 during the growing or wet season. The satellite images (Landsat-8 and Sentinel-2) were downloaded from US Geological Survey (USGS, http://earthexplorer.usgs.gov). Six spectral bands (Bd) and five vegetation indices (VI, Table 1) were used as input variables to MLR and ANN models. Datasets were randomly divided into a training set (80%) and a testing set (20%). Analyses were run in Python 3 (version 3.7). ML models are generally data-driven and require a large amount of data for better performance, and the best accuracy was achieved by using all Bd and VIs as input variables for both models (Table 1). In general, ANN produced better estimates than MLR models. Bd+VI better predicted leaf mass than total forage mass. Our results show that remotely sensed observations, based on satellite images, are a promising and effective tool for tropical grassland monitoring and management under continuous stocking rates. Sao Paulo Research Foundation (FAPESP) (grant #15/16631-5; 17/18750-7; 20/14367-7).