SOUTH DAKOTA– Developing Real-Time Forage Quality & Quantity Predictions

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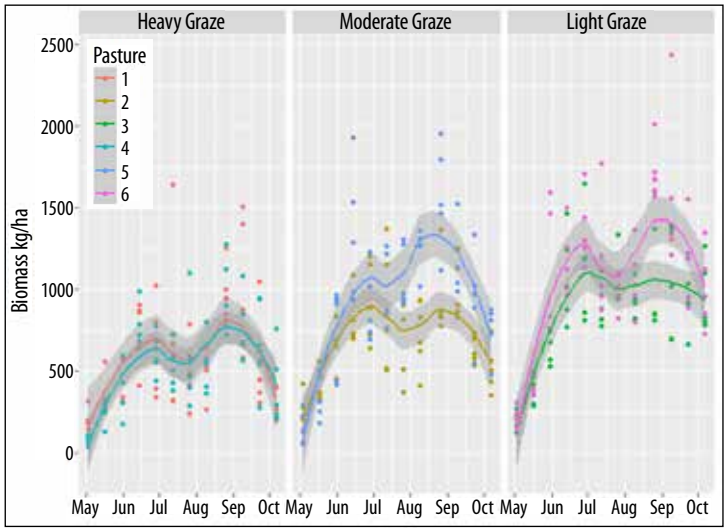
A limitation in livestock grassland production systems is the ability to efficiently monitor and measure forage resources. Effective monitoring plans inform appropriate stocking rates, minimize overgrazing effects, enable greater resilience to climate variability, and promote healthy grasslands. Grassland monitoring often requires data collection by hand, which is time and labor prohibitive for livestock producers operating on extensive landscapes. Tools which provide real-time data on growing conditions and forage production can help inform producer decisions on when to rotate pastures, forecast available forage, aid in drought planning, and improve profitability.

A project was initiated in June 2020 to leverage big data analytics to predict forage quality and quantity at individual pasture scale. Forage samples were collected every 2 weeks during the 2020 growing season (June-October) from the Brookings Cow Calf Research and Education Facility and the Cottonwood Field Station. Samples were processed for biomass, CP, NDF, and ADF to estimate forage quality and quantity through time. Using Google Earth Engine cloud computing, weather and satellite imagery data were extracted for each pasture to make predictions. Overall, there was a strong relationship between actual and predicted forage quality and quantity for all metrics in 2020. Sampling collection (April-October) was expanded in 2021 to include 6 pastures at the Cottonwood Research Station assigned to 3 levels of long-term grazing intensity (stocking rate: low, moderate, high) resulting in pastures in low-fair, good, and excellent condition. See forage growth curves at Cottonwood Station (Figure 1). Samples from the Brookings site were also collected in 2021. Processing of 2021 field season samples is ongoing.

Figure 1. Forage biomass (kg/ha) and 95% confidence interval (gray) during summer 2021 at Cottonwood. Pastures 1 & 4 are heavily grazed; 2 & 5, moderately grazed; and 3 & 6, lightly grazed.



Stocking rate is generally the most important variable in grazing management. Adaptive management strategies considering real-time primary productivity changes may be better suited for calculating sustainable stocking rates than estimating multi-year averages. Incorporating near real-time and pasture-scale data into management decisions can help improve grassland sustainability by minimizing overgrazing effects.