different ($P \geq 0.13$) by treatment. Grazing MaxQ rather than KY-31 SS pastures resulted in no improvements in cow/calf performance under the conditions of our experiment.

Key Words: beef cattle, cow/calf, fescue toxicosis, novel endophyte-infected fescue, summer stockpiled fescue

430 Platform Speaker: Forage quality assessment for large diverse landscapes. C. Moffet, *USDA-ARS, Southern Plains Range Research Station, Woodward, OK, United States*

My objective is to review methods for making meaningful forage quality assessments in large diverse landscapes to improve livestock management and to propose new assessment approaches. Livestock in regions where climate, soil, or both make forage crop cultivation impractical graze vegetation that's composed of mixtures of native and introduced plant species on large and diverse land units. While the term forage quality can include many aspects of nutritional values, here I limit it to digestibility and protein content. Forage quality on extensive landscapes can vary significantly in spatiotemporal dimensions and depends on such factors as plant species composition, soils, topography, management history, weather, and the species of grazer. Through grazing site, plant, and plant part selection a grazer's diet can be markedly different in quality—typically greater—than the aggregate of available forage. From a grazing management perspective, forage quality assessment is used to 1) identify time periods when animals, through selection alone, are not able to meet nutritional requirements, 2) identify areas where sufficient forage quality levels are exceeded and possibly underutilized, and 3) characterize long-term quality trends that may, for example, be related to changes in species composition, climate, or range condition. The factors that effect spatiotemporal forage quality patterns should be considered when making quality assessments. Methods for assessing forage quality include vegetation sampling and forage analysis, remote sensing, fecal sampling, animal performance, and modeling. In this presentation, I will review the strengths and weaknesses of current methods and introduce recent animal sensor developments that provide forage quality insight. Finally, I propose methods for combining the animal sensor data with other datasets, for example resource maps, satellite imagery, and weather data, to develop landscape specific models to estimate forage quality now and weeks into the future.

Key Words: remote sensing, forage quality, animal sensors

431 Managing grazing land ecosystems for multiple ecosystem services. M. Silveira[1], E. Boughton[2], H. Swain[2], R. Boughton[3], *[1]University of Florida, Ona, FL, United States, [2]Archbold Biological Station, Highlands County, FL, United States, [3]University of Florida, Gainesville, FL, United States*

Grazing lands are a significant sink for long-term carbon sequestration and play an important role in mitigating global climate change. Because of the vast area of grazing lands throughout the world, small changes in the amounts of carbon storage in this ecosystem can have significant consequences to the global carbon cycle and atmospheric CO2 levels. Carbon sequestration is strongly influenced by climate, topography, soil type, and management. Current grazing land management strategies are often aimed at increasing forage production, however, management can also promote carbon storage in the soil. Research has demonstrated that most techniques used to improve forage production promote carbon inputs to the soil and increase soil carbon sequestration. Fertilization, irrigation, grazing management, fire regimen, introduction of legumes, and use of improved grass species are management practices that can increase plant productivity while promoting soil carbon sequestration. However, management practices may also lead to unintended environmental consequences such as elevated greenhouse gas emissions, water quality problems, reduction in biodiversity, and changes in community composition. Opportunities for increasing soil carbon sequestration using land management practices are ecosystem specific and vary in intensity. Careful consideration should be given to site-specific characteristics and potential counter effects on other ecosystem services. Adoption of management practices that favor carbon inputs and minimize decomposition can also have significant positive impacts on the overall soil quality and can potentially contribute to the sustainability of grazing land ecosystems in the USA.

Key Words: soil carbon, ecosystem services, perennial pastures, native rangelands, southeastern

432 A Systems Perspective on the Hydrological Aspects of Sustainable Livestock Production. D. Boyer, *West Virginia University, School of Public Health, Morgantown, WV, United States*

Sustainable livestock production is dependent on the ability to provide the resources and energy suitable for efficient growth and healthy maintenance of plant and animal life with minimal ecosystem disruption and