

# Alfalfa Nutrient Preservation, Utilization & Cycling in Sustainable Southeastern Livestock Systems

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This project was part of an Agricultural Research and Extension NIFA AFRP project with combined efforts from two universities in the Eastern region (University of Georgia, and Auburn University). Alfalfa use in the southeastern US can provide a high-quality input for livestock production, while providing secondary ecosystem benefits to the longevity of forage-based systems through sustainable agricultural intensification (USDA Science Blueprint, 2021). While alfalfa integration into warm-season grasses have been successful in the South, adoption is still slow and additional research is needed to refine management applications and translate system benefits to producers to enhance use and sustainability in southern forage-livestock operations. The objective of this specific project in the grant was to evaluate the effects of forage type on in-vivo digestibility and nutrient balance in southern beef cattle systems. Treatments evaluated were bermudagrass hay, alfalfa baleage, and alfalfa-bermudagrass baleage supplied to four fistulated steers (~412.34 kg +/- 41.25 kg) with a calculated daily forage allowance based on intake, body weight and feed refusals. Each animal received each diet across three periods with the same diet fed to all animals during each period to avoid spoilage of baleage products. Each period had a 21d adaptation timepoint followed by a 5d collection period to analyze total fecal excretion, feed intake, feed refusal, total urine output, and rumen fluid dynamics. Data were analyzed using R Core Team (2023) and the GLIMMIX procedure of SAS version 9.4. There were significant differences in dry matter digestibility (DMD) between diets ( $P < 0.0015$ ) in that alfalfa-bermudagrass baleage had a 9% less DMD than bermudagrass hay ( $P < 0.0088$ ) and alfalfa baleage had a 7% greater DMD than bermudagrass hay ( $P < 0.025$ ). Results indicate that alfalfa baleage provides the most nutrient use efficiency. Alfalfa based products are a potential option for beef cattle producers in the Deep South to diversify feeding strategies and use nutrient-rich forage additives to increase digestibility thus increasing returns to their operation. This preliminary data gives justification for a need for further evaluation in the use of alfalfa for beef production systems in the Deep South.