Forage-based beef cattle systems management: traditional conversations and new perspectives

M.K. Mullenix*, W.B. Smith, S.L. Dillard and
J. Pereira

Department of Animal Sciences
Auburn University

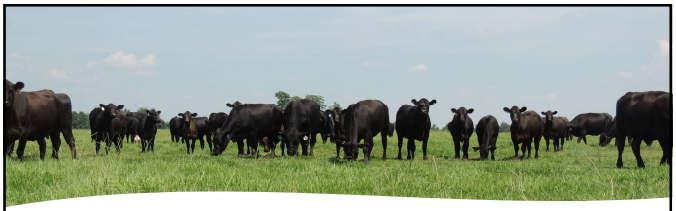
October 11, 2024

1

Outline

- Defining Our Management Practices
- Traditional vs. Sustainability View of Practices
- Research and Extension – Next Steps

2



Sustainability

How do forage-based beef cattle systems in the Southeast influence sustainability?

3

Farm-Level Practices and Goals

- Managing total production costs – recognizing winter feeding as ½ or more of annual carrying costs (Prevatt et al., 2018; Lancaster and Larson, 2022)

4

Optimizing Grazing Days to Reduce Stored Forage Needs

INCREASING GRAZING DAYS PER YEAR

STOCKING STRATEGIES

STRATEGIC HAY AND SUPPLEMENTAL FEEDING STRATEGIES

Prevatt et al., 2018

5

Strategies for increasing the grazing season length

6

Increasing the grazing season length
Stockpiling – traditional view

- Candidate species in the Southeast: tall fescue, bermudagrass, bahiagrass, limpograss (Allen et al., 2000; Wallau et al., 2015; Rushing et al., 2019; Fancher, 2023)
- Deferred use of forage during a period of low grazed forage availability (Lemus et al., 2008; Troxel et al., 2014)
- Duration: 30 to 80 days (Bivens et al., 2016; Beck et al., 2020)
  - Dependent on stockpiling initiation date, fertilizer inputs, weather conditions, grazing method and stocking strategy

7

Increasing the grazing season length
Stockpiling – sustainability view

- Allows for other pastures to rest while grazing stockpile
- Land utilization – less reliance on "sacrifice paddock" concept
- Plant litter remaining post-grazing
- Nutrient distribution of grazing animals

Google Scholar:
Articles on stockpiled forage with integrated nutrient cycling aspects – 5 of first 12 papers since 2020

8

Increasing the grazing season length
Overseeding – traditional view

- Annual ryegrass – widely planted and something familiar for farmers (Lemus et al, 2021; White et al., 2023)
- Small grain/ryegrass blends – increases grazing window by 30 to 60 days; Annual clovers often a component (Beck et al., 2005; Mullenix et al., 2012; Marchant et al., 2019)
- Animal performance outputs per acre increase with extended grazing
  - ADG, total gain per acre – stockers (Myer et al., 2008; Beck et al., 2011; Dillard et al., 2018)
  - Weaning weight, percentage of cow body weight weaned compared to hay system (Hoveland et al., 1978)

9

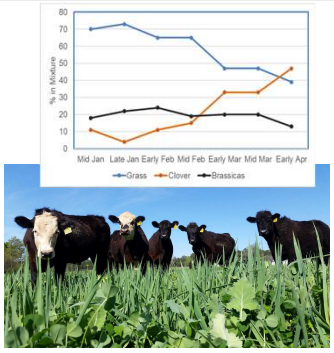
Increasing the grazing season length
Overseeding – sustainability view

- Year-round management systems and their effects on soil C and N stocks – Silva et al., 2021
- Quantifying nutrient return from cattle and biological N fixation value of diverse forage mixtures – Rouquette et al., 2010
- Long-term effects on cow-calf performance and longevity in the herd (Rouquette and Smith, 2022)

10

Increasing the grazing season length
Multi-species mixtures – traditional view

- Adding quality and/or length to the grazing window (Dillard et al., 2018)
- Animal performance outputs per acre increase with extended grazing
  - ADG, total gain per acre – stockers (Carrell et al., 2022)



Crowell et al., 2022; Carrell, 2022

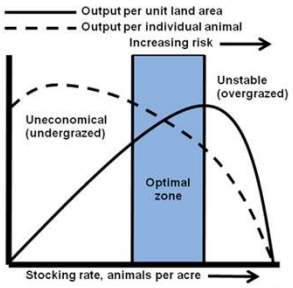
11

Increasing the grazing season length
Multi-species mixtures – sustainability view

- **Example:** Moving from separate to integrated, year-round systems – cattle and row crops
- Risk management (Chapagain, 2020; Jaramillo et al., 2021)
- Nitrogen fixation, water infiltration, compaction (Sollenberger et al., 2019)
- Methane reduction (Dillard et al., 2018; Carrell, 2022)

12

Increasing the grazing season length
Optimizing stocking strategies – traditional view



13

Increasing the grazing season length
Optimizing stocking strategies – sustainability view

- Soil C and N stocks
- Forage use efficiency – less waste/degradation of the system
- Weed management – healthy forage stands can outcompete weeds

Franzluebbers and Stuedemann, 2009, Other citations

14

Reducing hay and supplemental feeding period duration – traditional view

- Optimization view
  - Hay waste
  - Hay quality
  - Supplement type and quality

Moore et al., 1999; Panhans et al., 2020; Berry, 2021; Poore, 2022

15

Reducing hay and supplemental feeding period duration – sustainability view

- A combination of thoughts in the scientific literature – some replicated research trials, some more anecdotal
  - Nutrient cycling through the animal
  - Distribution of nutrients across pastures
  - Value of remaining plant residue on soil?
  - Fertilizer-feed cost dynamics

Bachler, 2019; Berry et al., 2021

16

Strategic Supplementation Traditional View

- Meeting a nutrient deficiency
- Consider associative effects with forage-based diets
- Prioritizing cost per pound of nutrient – generally choosing the lowest cost option

17

Strategic Supplementation Sustainability View

Contract Grazing Study - Steers

Treatment	N Fertilizer Level	Clover?	Supplement?
N Fertilizer	100 lb N/acre	None	None
Crimson Clover	50 lb N/acre	Crimson	None
Arrowleaf Clover	50 lb N/acre	Arrowleaf	None
Dried Distillers Grains	50 lb N/acre	None	0.65% BW Daily
Whole Cottonseed	50 lb N/acre	None	0.65% BW Daily

Gunter et al., 2019 – Applied Animal Science

18

Strategic Supplementation
Sustainability View

Item	100 lb N Per Acre	Crimson Clover	Arrowleaf Clover	Dried Distillers Grains	Whole Cottonseed
Average Daily Gain (lb/d)	3.3 a	2.8 b	2.8 a	3.3 a	3.2 a
Total Gain (lb/acre)	389 a	289 b	277 b	398 a	388 a
Stocking Density (Steers/acre)	1.5 a	1.2 b	1.2 b	1.4 a	1.4 a
Grazing Season Length	125 a	102 b	98 b	121 a	123 a
Cost of Gain ($/lb)	0.49	0.50	0.41	0.28	0.30

Source: Gunter et al., 2019

19

Strategic Supplementation
Sustainability View
Feed-Through Fertilization in Perennial-Based Systems

- Tall fescue systems with or without red clover
  - N fertilized tall fescue
  - Tall fescue + red clover
  - Tall fescue + supplementation on pasture with byproduct feeds
- Response variables
  - Forage production, nutritive value, and botanical composition
  - Fecal collection (in field)
  - Soil sampling
  - Blood samples

Smith et al. – Funded by Southern SARE

20

Strategic Supplementation
Sustainability View

Table 1. Mineral intake (ounces/animal/day) of stocker calves grazing mixed cool-season annual pastures in Shorter, AL from January to April 2022.

Soil quality impacts from mineral intake/utilization in animals?

Can stacking practices support greater stocking rates, while improving nutrient return and pasture productivity?

Example: Cool-season annuals + supplementation on pasture + free-choice mineral with ionophore

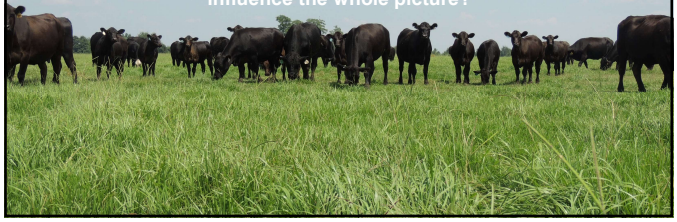
21

Research and Extension – Next Steps

22

Leading Research Initiatives with the "Big Picture"

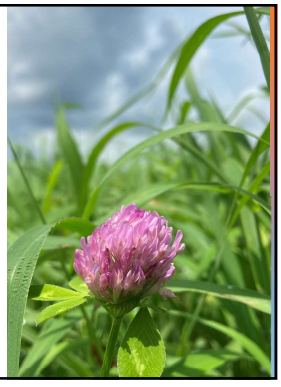
How do forage-based beef cattle systems in the Southeast influence the whole picture?



23

Forages - Balancing Potential

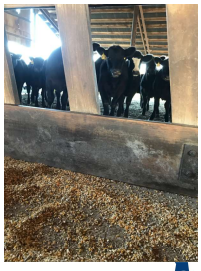
- Perennial grass-based systems provide the forage base in the region and are traditionally supported by external inputs
- Forage breeding efforts:
  - Focus on N use efficiency while maintaining quality aspects
  - Adaptation to inherent soil conditions in the region
- Management
  - Compatibility of species in mixtures – growth habit, growing season length, etc.



24

Hay and Supplemental Feeding

- Continue to promote hay use efficiency, but quantify nutrient return aspects of waste.
- Develop scenarios which compare N fertilization costs vs. legumes and/or supplements as partial or full replacements in the system.
- Better quantify the shifting nutritive value of our locally-available byproducts.
- We should be prepared for if and when these resources become unavailable. What are the alternatives?



25

Opportunities
How Do We Value "Secondary" Benefits?

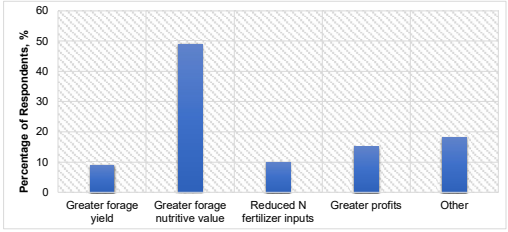


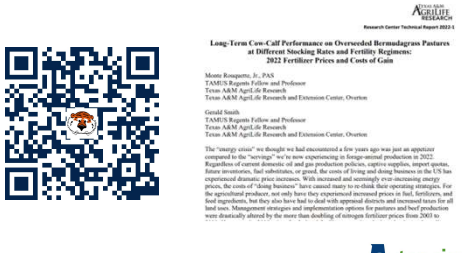
Figure 1. Opportunities identified by forage-livestock producers (n = 171 respondents) regarding alfalfa establishment and management in the Southeast US.

Adapted from Silva et al. (2021)

26

More Prescriptive Management, Rather than Individual Practices

- Consider carrying capacity of grass-based systems with shifts in fertilizer inputs, supplement, and stacked practices.



Research Center Technical Report 2022-1

Long-Term Cow-Calf Performance on Overseeded Bermudagrass Pastures at Different Stocking Rates and Fertility Regimens: 2022 Fertilizer Prices and Costs of Gain

Monte Rouquette, Jr., PAS
TAMUS Regents Fellow and Professor
Texas A&M AgriLife Research
Texas A&M AgriLife Research and Extension Center, Overton

Gerald Smith
TAMUS Regents Fellow and Professor
Texas A&M AgriLife Research
Texas A&M AgriLife Research and Extension Center, Overton

The "energy crisis" we thought we had encountered a few years ago was just an appetizer compared to the "servings" we're now experiencing in forage-animal production in 2022. Regardless of current domestic oil and gas production policies, captive supplies, import quotas, future inventories, fuel substitutes, or greed, the costs of living and doing business in the US has experienced dramatic price increases. With increased and seemingly ever-increasing energy prices, the costs of "doing business" have caused many to re-think their operating strategies. For the agricultural producer, not only have they experienced increased prices in fuel, fertilizers, and feed ingredients, but they also have had to deal with appraisal districts and increased taxes for all land uses. Management strategies and implementation options for pastures and beef production were drastically altered by the more than doubling of nitrogen fertilizer prices from 2003 to

27

For more information, visit:

ALABAMA Beef Systems

FORAGES ▸ NUTRITION ▸ MANAGEMENT

Alabama Cooperative Extension System

www.alabamabeefsystems.com

AUBURN

Extension

28