Evaluation of Warm-Season Annual Grasses for Southeastern Forage-Finished Beef Systems

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Introduction

- Southeastern forage-finished beef producers often face a lack of high-quality forages during the summer.
- Warm-season annual grasses, such as pearl millet, have been shown to exhibit increased nutritive values and favorable agronomic traits compared to common warm-season perennials in the Southeast.
- Soybean hull supplementation increases ruminal cellulase production, thus increasing digestibility of and animal performance on forage-based diets.

Objectives

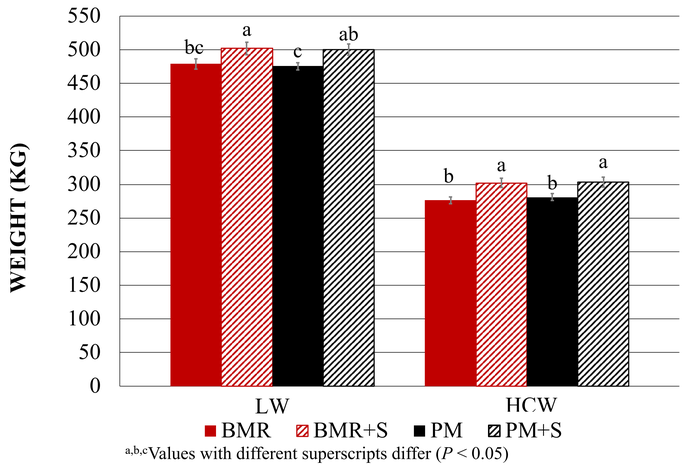
- Evaluate two varieties of a warm-season annual grass, pearl millet: 'Tifleaf 3' (PM) and 'Exceed Brown-Mid-Rib' (BMR), each with (+S) and without supplementation of soybean hulls, for use in a forage-finished beef production system in the Southeast across a 3-yr grazing trial in central Georgia.

Materials and Methods

- Sixteen 0.81-ha paddocks were blocked by previous land management and randomly assigned to 1 of 4 treatments with 4 replications. Treatments included PM, PM+S, BMR, and BMR+S which were planted in mid to late spring of each year.
- Thirty-two previously stockered Angus crossbred steers were blocked by weight and randomly assigned to treatment paddocks.
- Paddocks were split in half and rotational grazing was initiated when forage sward height was 45-60 cm and terminated in September. All steers were weighed after an 8-h fast at the beginning, mid-point, and end of the grazing period, and average daily gain (ADG) and total bodyweight gain (BWG) were calculated.
- Steers were slaughtered under USDA inspection in September of each year.
- Carcass quality and yield data were collected 24-h post-mortem.
- Data were analyzed using PROC GLIMMIX (SAS v9.4) and means were separated using the PDIFF option at $\alpha = 0.05$.
- Paddock served as the experimental unit with steers and carcasses as the observational units. Treatment served as a fixed effect while paddock and year were included as random effects.

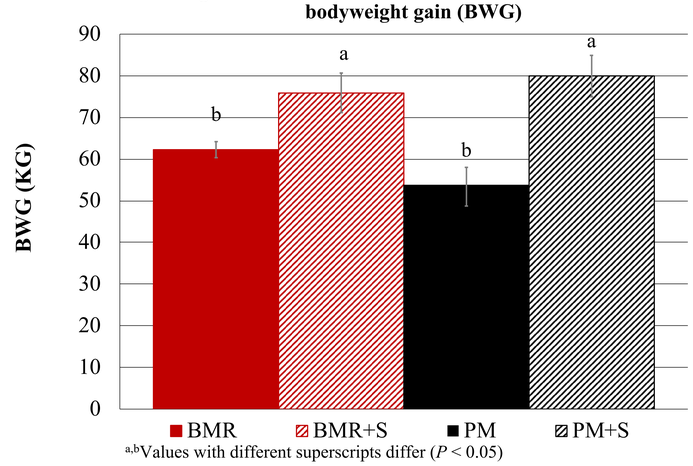
Results

Figure 1: Least squares means for the effect of treatment on live weight (LW) and hot carcass weight (HCW)



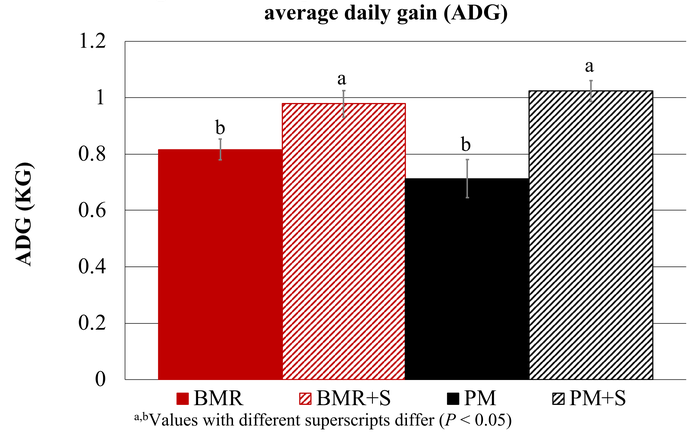
[a,b,c]Values with different superscripts differ ($P < 0.05$)

Figure 2: Least square means of treatment effects on bodyweight gain (BWG)



[a,b]Values with different superscripts differ ($P < 0.05$)

Figure 3: Least square means of treatment effects on average daily gain (ADG)



[a,b]Values with different superscripts differ ($P < 0.05$)

Table 1: Estimates of least squares means (SEM) for the effect of treatment on carcass yield characteristics

	Treatments			
Trait	BMR	BMR+S	PM	PM+S
DP, %	57.7[b] (0.49)	60.2[a] (0.46)	59.2[ab] (0.95)	60.5[a] (0.58)
REA, cm^2	70.3 (1.23)	73.6 (2.59)	73.7 (2.94)	74.6 (2.52)
KPH, %	2.1[c] (0.13)	2.6[a] (0.16)	2.3[bc] (0.09)	2.5[ab] (0.11)
FT, cm	0.60[b] (0.06)	0.91[a] (0.08)	0.62[b] (0.06)	0.84[a] (0.07)
YG	2.3[b] (0.09)	2.8[a] (0.18)	2.3[b] (0.15)	2.7[ab] (0.13)

DP: Dressing Percentage; REA: Ribeye Area; KPH: Kidney-Pelvic Heart Fat; FT: Adjusted Fat Thickness; YG: Yield Grade.
[a,b,c]Values with different superscripts differ within columns ($P < 0.05$).

Table 2: Estimates of least square means (SEM) for the effect of treatment on carcass quality characteristics

	Treatments			
Trait	BMR	BMR+S	PM	PM+S
Marbling[1]	401 (18.62)	388 (14.11)	363 (25.12)	386 (19.13)
Lean Maturity[2]	206[a] (9.47)	198[a,b] (7.04)	211[a] (9.99)	186[b] (6.61)
Skeletal Maturity[2]	176 (15.61)	172 (12.10)	174 (14.17)	175 (13.21)
Lean Color[3]	4.6[a] (0.23)	4.4[a,b] (0.25)	4.9[a] (0.16)	3.9[b] (0.29)
Fat Color[4]	2.6 (0.23)	2.8 (0.26)	2.3 (0.27)	2.7 (0.22)

[1]300 = Slight, 400 = Small.
[2]100 = A-maturity, 200 = B-maturity.
[3]Lower values are lighter and brighter red.
[4]Lower values are whiter, larger numbers are more yellow.
[a,b]Values with different superscripts differ across rows ($P < 0.05$).

Table 3: Estimates of least square means (SEM) for the effect of treatment on fat and lean objective color (L*, a*, and b*)

	Treatments			
Trait	BMR	BMR+S	PM	PM+S
Fat L*	80.89 (0.41)	80.86 (0.41)	80.94 (0.32)	80.35 (0.44)
Fat a*	9.09 (0.44)	8.51 (0.27)	8.48 (0.25)	8.65 (0.32)
Fat b*	24.81 (0.10)	24.04 (0.53)	23.13 (0.95)	23.39 (0.67)
Lean L*	38.62[a,b] (0.50)	39.04[a,b] (0.92)	37.77[b] (0.71)	40.75[a] (0.90)
Lean a*	29.68[a,b] (0.55)	29.91[a,b] (0.38)	29.06[b] (0.48)	30.47[a] (0.41)
Lean b*	21.17[a,b] (0.61)	21.74[a,b] (0.38)	20.68[b] (0.57)	22.35[a] (0.48)

L*: higher values indicate more white; a*: higher values indicate more red; b*: higher values indicate more yellow.
[a,b]Values with different superscripts differ across rows ($P < 0.05$).

Conclusions

Data indicates pearl millet is a viable summer forage for southeastern forage-finished beef systems. Additionally, soybean hull supplementation can increase animal performance over forage alone.

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