

Evaluating Supplementation Programs for Growing Calves Grazing Bermudagrass Pastures

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Introduction

Bermudagrass and other warm-season grasses can be low in digestibility because of the accumulation of fiber which is highly lignified. Even though protein levels can be moderate to high, digestibility and thus dietary energy can be limiting to performance of growing cattle. Thus, supplementation programs designed for grazing systems based on native prairie or similar forages may not be of benefit for summer stockers grazing bermudagrass pasture.

Operational time constraints limit producer's ability to manage supplement delivery, thus self-limiting supplements have become popular over time. Additional benefits from self-limiting supplements are the reduced operator inputs associated with equipment and fuel costs of delivering supplements. There has been little research investigating self-limiting supplementation programs in comparison to hand-feeding supplements in many production situations. Thus this research was designed to determine supplementation responses in a bermudagrass based stocker system.

Objective

To test the effects of hand-feeding a byproduct based supplement vs a self-fed molasses tub either season long or during the late summer only on stocker performance and return on investment.

Study Site

- University of Arkansas Livestock & Forestry Research Station (35°50'N, 91°48'W)
- Batesville, AR in North Central Arkansas
- Common bermudagrass (*Cynodon dactylon*) pastures May 30 to August 30, 2019
- 20, 0.8-ha silt loam pastures
- Fertilized with 67 kg/ha N from ammonium nitrate in May and July.
- Stocked with 3 steers and 2 heifers/pasture
- BW ± SD = 247 ± 24.6
- Value of gain = \$2.14/kg based on OK markets from 2009 to 2018

Treatments

2 x 2 + 1 Factorial arrangement of treatments.

- Control (CON—free choice access to mineral mixture (6% Phos Complete Mineral, Ragland Mills, Neosho MO) only.
- Hand-Fed (HF) - 1.13 kg/d corn gluten feed/soybean hull supplement + free choice mineral
 - 15% CP and 85% TDN
 - Cost \$0.23/kg (US Dollars)
 - offered all summer (AS) or only late summer (LS).
- Self-Fed (SF) – molasses based tub supplement + free choice mineral
 - PVM Cattle Tub (Positive Feed Ltd., Sealy, TX)
 - 21.6% CP
 - Designed for 0.23 to 0.45 kg/d intake.
 - Cost \$0.82/kg (US Dollars)
 - offered AS or only LS.

Forage mass and nutritive quality of bermudagrass during the summer of 2019

Item	Date				
	May 30	June 20	July 11	August 8	August 29
Forage mass, kg/ha	2,244	2,125	2,077	2,704	2,826
Crude protein, % DM	13.8	13.3	15.0	13.4	14.0
Acid detergent fiber, % DM	34.9	37.0	36.9	34.7	34.6
Neutral detergent fiber, % DM	60.8	65.9	68.2	69.2	71.6
Total digestible nutrients, % DM	62.5	59.74	60.7	60.8	58.2

Methods

- Steers were implanted with 40 mg trenbolone acetate and 8 mg estradiol with tylosin (Component TE-G with Tylan, Elanco Animal Health, Greenfield, IN).
- Heifers were not implanted
- Calves were gathered at 0800 and weighed without shrink
 - Before turnout to pastures on May 30
 - At the mid-point of summer grazing season – July 15
 - At the end of the summer grazing season – August 29
- Mineral and SF supplements were weighed on platform scales.
 - When placed in pastures.
 - Weekly intervals
 - Daily consumption was based disappearance of feedstuff from the container and the number of head-days for each period.
- Forage mass was assessed monthly during the grazing season.
 - Calibrated rising plate meter.
 - 20 plate readings per pasture.
 - 1 clipped calibration sample per pasture
 - Clipped to 2.5 cm height
 - Dried at 50° C
 - Predicted forage mass determined by regression of clipped forage mass on disk meter height.
 - Forage nutritive quality estimated by hand-plucking forage to mimic forage selected by grazing calves.
 - Dried at 50° C
 - Ground to pass a 2-mm screen
 - CP, NDF, ADF, TDN estimated by NIRS

Results

- Forage mass and protein levels were adequate for calves to gain BW during this grazing season.
- High fiber content limits digestibility and subsequently calf performance.
- Calves offered SF supplement had no increase in performance compared with Control.
- Calves in HF had...
 - 56% greater performance in the early summer than unsupplemented calves or calves offered SF-AS.
 - Tended to have greater ADG than Control or SF treatments in late summer.
 - Season-long performance was improved with HF-AS compared with other supplementation programs.
 - HF supplements produced 0.28 kg gain per kg supplement fed in early summer and from 0.16 to 0.22 kg per kg fed in late summer.

Effect of Hand-Fed (HF) or Self-Fed (SF) supplementation programs offered all season (AS) or only during the late summer (LS) on performance of growing steers and heifers grazing bermudagrass pastures.

Item	Treatment					SE	P-value
	Control	HF - AS	HF - LS	SF - AS	SF - LS		
BW, kg/head							
May 30	244	245	245	247	246	2.2	0.74
July 15	265 ^a	282 ^b	268 ^a	270 ^a	273 ^{ab}	3.8	0.03
August 29	269 ^a	297 ^b	281 ^a	279 ^a	281 ^a	6.0	0.05
ADG, kg							
Early Summer	0.52 ^a	0.83 ^b	0.53 ^a	0.54 ^a	0.59 ^a	0.057	0.01
Late Summer	0.11 ^x	0.36 ^y	0.29 ^{xy}	0.19 ^x	0.19 ^x	0.068	0.09
Season-long	0.31 ^a	0.60 ^b	0.41 ^a	0.36 ^a	0.40 ^a	0.054	0.02
Gain:supplement, kg							
Early Summer	-	0.28	-	0.09		0.096	0.21
Late Summer	-	0.22	0.16	0.20	0.52	0.216	0.64

^{a-c} Least-squares means within rows with differing superscripts differ (P < 0.05).

^{x-y} Least-squares means within rows with differing superscripts tend to differ (P < 0.10).

Costs and Returns on Investment from supplementing growing calves grazing bermudagrass either season-long or during the late summer only.

Item	Treatment			
	HF - AS	HF - LS	SF - AS	SF - LS
Supplement cost, \$/head	23.52	11.76	30.61	9.34
Value of added gain, \$/head	54.62	18.43	9.26	9.03
Returns to supplementation, \$/head	31.10	6.67	-21.35	-0.31

Conclusions

- Hand Feeding a byproduct based supplement increased ADG during both the early and late summer.
- Self-fed supplement designed for low protein forages did not improve performance of calves grazing bermudagrass during either the early summer or late summer.
 - Forage protein adequate for microbial growth and fiber digestion.
- Hand feeding supplements resulted in ROI of 1.3 over feed costs.
 - Labor and supplement delivery costs should be considered
 - Self-fed supplements had a negative ROI