The Effects of Supplementation and Forage Source on Performance of Steers During Fall Backgrounding

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Story in Brief

Fertilization of bermudagrass pasture during late-summer has the potential to reduce input costs and improve animal performance when stocker calves are purchased during late summer and backgrounded until winter annual pasture is available. Six-hundred nineteen beef steers were purchased during August, processed, and backgrounded for a 30-d period before being assigned to one of four treatment combinations. Main effects in this 2X2 factorial design were two forage sources and two levels of supplement. Forage sources were bermudagrass hay and stockpiled bermudagrass forage. Levels of supplement included 4 lb per head per day of a 14% protein supplement and no supplement. Average initial forage availability in mid-September ranged from 4,850 to 7,555 lb per acre. Stockpiled bermudagrass nutritive value was generally higher during the early part of the grazing period and declined through the fall months. Consequently, steers grazing stockpiled bermudagrass forage gained at a faster rate during the early part of the grazing period compared to steers consuming hay. However, forage source did not influence weight gains later in the study or overall. Supplementation resulted in a significant improvement in weight gain during each weigh period and overall, regardless of forage source. Supplemented cattle gained an average of .74 lb more per day compared to nonsupplemented cattle. Stockpiled bermudagrass is a viable alternative to feeding hay to steers after weaning or receiving and prior to winter grazing.

Key Words: Fertilized Stockpiled Bermudagrass, Grazing, Hay, Supplementation, Stocker Steers

Introduction

Considerable work has been conducted over the past several years at the Noble Foundation and at Oklahoma State University indicating that late-summer fertilized bermudagrass forage can be used to extend the grazing season for beef cows (Wheeler et al., 1999 a; Wheeler et al., 1999 b; Johnson et al., 2001 a). Little information is available evaluating this management system as a grazing alternative for growing cattle. Therefore, the objective of this experiment was to determine performance of beef calves consuming hay or grazing stockpiled bermudagrass forage with or without supplement.

Methods

This experiment was conducted over a 3-yr period at the Noble Foundation's Pasture Demonstration Farm, located west of Ardmore, OK. Approximately 200 steers were purchased during August each year. Processing upon arrival included mass medication, individual identification, weighing, castration, dehorning, branding, deworming, vaccination for clostridial and bovine respiratory diseases, and implanting. The cattle were fed hay and 2 lb per head per day of a 14% CP supplement during the 30 d receiving period.

Steers were randomly allotted to 12 experimental groups (4 treatment groups with 3 replications each). Treatments included the main effects of supplement and forage source. Levels of supplement included no supplement (NS) or 4 lb per day of a commercial pelleted feed (14% CP) (SUP). Forage sources included bermudagrass hay (HAY) or fall fertilized bermudagrass pasture (PAS). Treatments were initiated on September 16, September 17, and September 19 and terminated on December 2, December 15, and December 2 in 2002, 2003, and 2004, resulting in experimental periods of 77, 89, and 74 d, respectively.

Pastures were grazed during May, June, July and August each year to ensure a maximum of approximately 3,000 lb per acre of residual forage was available at the time of late-summer fertilization. During mid-August each year, pastures were fertilized with 50 lb of actual N per acre.

Six groups of HAY-fed cattle were randomly assigned to six drylot pens with three receiving SUP and three receiving NS. Hay was sampled prior to feeding and samples were composited before being submitted to a commercial laboratory for determination of crude protein (CP) and acid detergent fiber (ADF) concentrations. Acid detergent fiber concentration has been shown to be negatively correlated to digestibility of forages in ruminant animals.

The PAS groups were turned out to graze in six pastures with three receiving NS and three receiving SUP. The PAS groups were rotated through the six pastures on a weekly basis to minimize the possibility of pasture effects on performance. Clip samples were collected weekly to determine forage availability and subsamples of the clipped forage were dried, ground and submitted to the commercial laboratory for chemical analysis. Average forage availability and chemical composition within each month are presented.

Steers were gathered at daylight and weighed at 28-d intervals and at the termination of the experiment.

The data were analyzed as a 2 X 2 factorial design using the Mixed model procedures of SAS. Supplement, forage source and the interaction were included in the model as fixed effects and year was included as a random effect. Pen or pasture was considered the experimental unit.

Results and Discussion

Average CP and ADF concentration of hay fed is shown in Table 1 and fertilized, stockpiled bermudagrass forage CP and ADF concentrations are shown in Figures 1 and 2, respectively. Hay nutritive value was similar during each year of the experiment. Protein concentration averaged within month ranged from 13.6 to 9 percent. A 500 to 600-lb steer gaining 2 lb per day has a dietary CP requirement of 12 to 13 percent. Consequently, at times, the stockpiled, fertilized forage would have had adequate protein to meet the dietary requirement, while weight gain would have been limited by forage protein concentration at other times. In general, ADF concentration in the stockpiled forage increased over time, suggesting that forage digestibility would have limited growth of steers to a greater extent later in the experiment. Average initial forage availability each year was quite variable at the initiation of the experiment, ranging from 7,555 to 4,850 lb per acre. Forage availability declined over time.

Table 1. Average crude protein and acid detergent fiber concentration of bermudagrass hay by year, DM

	basis	
Year	Crude Protein, %	ADF, %
2002	11.5	39.2
2003	12.3	39.8
2004	11.9	38.6

Figure 1. Stockpiled bermudagrass protein concentration.

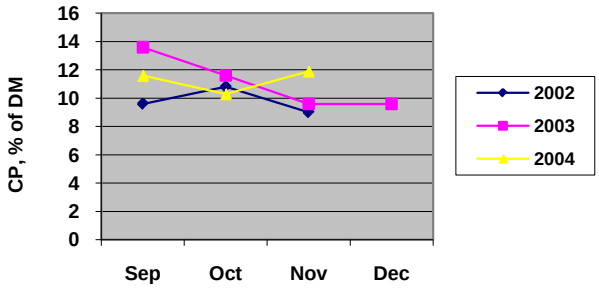

Figure 2. Stockpiled bermudagrass ADF concentration.

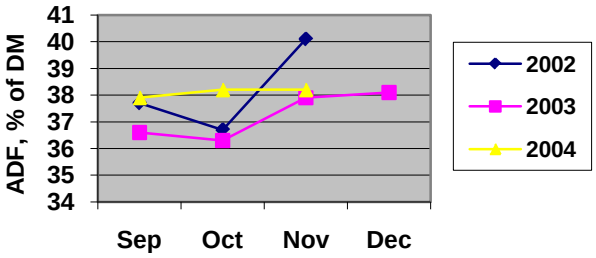

Figure 1. Stockpiled bermudagrass forage availability, lb/acre.

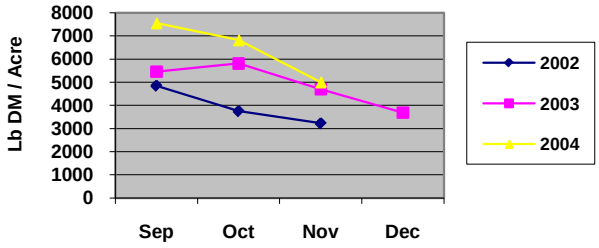

Table 2 shows the effects of fall backgrounding forage source and supplementation on the performance of stocker steers. There was no forage source by supplement treatment interaction; therefore, the least squared means of the main effects (forage source and supplement) are shown. During the initial 28-d period, the PAS steers gained at a faster rate compared to the HAY steers. However, performance during the subsequent periods was similar between the two forage sources. As a result, final weight and cumulative ADG was similar among the two forage sources.

Table 2. Effects of fall backgrounding forage source and supplementation on performance of stocker steers during backgrounding and wheat pasture grazing.

Item	Stockpiled Bermudagrass	Hay	Not Supplemented	Supplemented	SE
No. of steers	310	309	309	310	
No. of pasture groups (3 yr)	18	18	18	18	
Weight, lb					
Mid-Sep	468	462	466	464	3
Mid-Oct	521a	506b	507a	520b	3
Mid-Nov	544	528	516a	555b	7
Dec	554	543	520a	577b	7
ADG, lb					
Period 1	1.8a	1.51b	1.4a	1.9b	.10
Period 2	.76	.69	.30a	1.12b	.19
Period 3	.34	.71	.15a	.90b	.20
Cumulative	1.05	1.01	.66a	1.40b	.07

[a,b] Means within a treatment with uncommon superscripts are different (P<.05)

Steers receiving SUP outperformed NO SUP steers during each weigh period. In fact, both forage sources provided only a maintenance level of nutrient intake in the absence of supplement during the latter two weigh periods. Supplement efficiency (lb of supplement per lb of additional weight gain) was 5.4. Consequently, if value of additional weight gain was $.55 or $.60 per lb, the breakeven value of the supplement would be $203.80 and $222.40 per ton, respectively. When cost of similar feed supplements is less expensive than these values, the supplementation program would be profitable. However, additional research is necessary to determine whether additional weight gain due to supplementation during the backgrounding period is lost during the winter grazing period.

Literature Cited

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