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SUPPLEMENTAL PROTEIN FOR SIMMENTAL-CROSS AND BRAHMAN CALVES GRAZING BERMUDAGRASS

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SUMMARY

Twenty-eight weaned, fall-born Simmental crossbred steers (n=12) and heifers (n=16), and twenty fall-born Brahman steers were allotted to bermudagrass pasture with free-choice salt/mineral (PAS), or bermudagrass pasture plus a 35.8% crude protein (CP) supplement containing Menhaden fishmeal and monensin (FMR). Forage availability was maintained at a level to allow selective grazing, while pasture samples intended to represent that forage selected by the animals averaged approximately 12.5% CP and 67% neutral detergent fiber (NDF). Since all calves had adequate forage to graze selectively and forage quality was similar across all groups, differences in animal performance were attributed to the animal's respective pasture treatment and breed type. All calves which received the FMR supplement had higher ($P<.01$) average daily gains (ADG) than calves assigned to PAS. Brahman steers and Simmental crossbred steers performed similarly ($P>.10$) on PAS; however, the FMR supplemented Simmental sired steers had greater ADG ($P<.05$) than the FMR supplemented Brahman steers. The Simmental crossbred steers and heifers gained liveweight at a similar ($P>.10$) rate on PAS; however, Simmental steers gained faster ($P<.06$) than heifers when supplemented with FMR. Supplemental feed and supplemental CP was converted to extra live weight gain very efficiently which suggested an increase in forage utilization. It is thought that the efficient feed to gain ratios in this trial were probably in response to a greater intake of forage which may supply more nutrients to the animal.

INTRODUCTION

Bermudagrass is the primary summer forage in the humid South, and is characterized by moderate quality in late spring with rapidly decreased digestibility and CP content during mid- to late-summer due to low rainfall and high temperatures. Protein supplementation to

ruminants has been reported to increase voluntary intake of low quality diets and increase daily live weight gain. The objective of this grazing study was to determine the influence of bermudagrass pastures and supplemental protein (fishmeal) on live weight gain of purebred and percentage Brahman calves.

PROCEDURE

Twenty-eight weaned, fall-born Simmental crossbred (1/2 Simmental x 1/4 Hereford x 1/4 Brahman) steers (n=12) and heifers (n=16), and twenty weaned, fall-born purebred Brahman steers were blocked by breed and allotted by weight and visual condition score (VCS) to bermudagrass pasture plus a free-choice salt/mineral mix containing a coccidiostat (PAS), or PAS plus a 35.8% CP dry supplement containing a specially selected low solubility fishmeal and monensin (FMR). The ingredient formulation of the FMR supplement is presented in Table 1. There were two replicates of each breed type on each treatment. Replicate pastures of Brahmans contained five steers each; whereas, replicate pastures of Simmental crossbred calves contained three steers and four heifers.

All calves were weaned in mid-June (7-day drylot period), and allowed a 10-day pasture adjustment period to adapt to their respective pastures and supplements, and to reduce the influence of rumen fill on live weight gain. Calves were weighed directly off-pasture at approximately 28 day intervals to monitor average daily gain (ADG) throughout the grazing period. Average daily supplement consumption (ADC) of FMR was estimated by weighing orts weekly and replacing with fresh supplement. It became necessary to change the formulation of the supplement fed to the Brahman steers periodically to maintain intake; therefore, daily supplement intake was converted to daily intake of CP (lb/day). Incremental gain (IG) was calculated to measure the level of increased ADG by a FMR supplemented group over the ADG of calves on PAS within the same breed/sex grouping. The ADC:IG ratio was calculated to measure the feed efficiency for extra gain. The ADC:IG ratio was calculated for daily supplement intake as well as daily intake of CP. The ADC was assumed equal for steers and heifers within the individual replicates of FMR supplemented Simmental

crossbred calves.

Forage available for consumption was measured by clipping four, 1-foot square areas to ground level at 28-day intervals. Forage samples for quality analysis (% CP and % NDF) were taken at 14-day intervals by visually selecting and hand-picking portions of the sward which closely represented forage selected by the grazing animal.

Statistical analysis of animal performance was by a linear contrast procedure.

RESULTS

Forage allowance (lb DM/100 lb BW) of pastures grazed by Brahman calves receiving PAS and FMR averaged 184 and 99 lb, respectively (Table 2); whereas, forage allowance of pastures grazed by Simmental crossbred calves assigned to PAS and FMR averaged 293 and 323 lb, respectively (Table 3). Selected pasture samples representing forage consumed by the Brahman calves on PAS and FMR averaged 13.8 and 12.4% CP, and 67.6 and 69.4% NDF, respectively (Table 2); while samples collected from pastures grazed by Simmental crossbred calves on PAS and FMR averaged 12.3 and 11.9% CP, and 64.7 and 66.3% NDF, respectively (Table 3). Forage quality, therefore, was similar in all pastures. Although forage allowance was greater in the pastures occupied by the Simmental crossbred calves, there was adequate forage available in all pastures for ad libitum intake. Sufficient forage was available to allow for selective grazing.

The ADG (lb/day) of Brahman steers receiving FMR (1.32) was higher ($P<.01$) than that of Brahman steers assigned to PAS (.63) (Table 4). The ADG of Simmental crossbred steers receiving FMR supplement (1.66) was higher ($P<.01$) than Simmental crossbred steers on PAS (.80). Similarly, the ADG of FMR supplemented Simmental crossbred heifers (1.33) was higher ($P<.01$) than heifers on PAS (.88 lb/d). Both breed types and both sexes assigned to PAS performed similarly ($P>.10$). Simmental crossbred steers receiving FMR gained live weight faster ($P<.05$) than Brahman steers on FMR. Simmental crossbred steers and heifers performed similarly ($P>.10$) on PAS; however, FMR supplemented Simmental crossbred steers gained faster ($P<.06$) than heifers.

The ADC (lb/day) of the FMR supplement by Simmental sired calves and Brahman calves was 1.35 and 1.15, respectively, which converts to a daily CP intake of .49 and .35 lb, respectively (Table 4). The ADC:IG (supplement) was 3:1 for the Simmental crossbred heifers and less than 2:1 for both breed type groups of steers. The ADC:IG ratios for steers tended to be very similar; whereas, heifers tended to be less efficient in converting daily supplement or CP to extra gain. The daily CP intake was positively related ($r>.88$) to ADG for calves in individual replicates of PAS and FMR in the Brahman steer and Simmental crossbred steer groups.

DISCUSSION

Forage allowance tended to be higher in pastures occupied by the Simmental crossbred calves than for pastures occupied by Brahman calves; while forage quality (CP and NDF) tended to be similar across all groups. According to Rouquette et al. (1984), levels of available forage less than 100 lb DM/100 lb BW will probably support maximum ADG. Therefore, since all calves could graze selectively and the forage from which they selected was relatively equal in quality, differences in animal performance were probably due to supplement and breed type of calf, rather than forage quality or quantity. All breed/sex groups receiving supplemental protein (FMR) had a higher rate of gain ($P<.01$) than calves in their respective breed/sex grouping on PAS. Since feedlot calves normally convert a high energy diet to live weight gain at a ratio of approximately 7:1, the efficient ADC:IG (supplement) ratios in this trial suggested an increase in forage utilization, i.e., intake, digestibility, or both.

Zebu type cattle are well adapted to the southern United States and can survive and produce on low quality forages (Turner, 1980). This may partially explain why the Zebu type (Brahman) steers performed similarly ($P>.10$) to the European type (Simmental crossbred) steers on PAS. However, the FMR supplemented Simmental sired steers gained live weight faster ($P<.05$) than the Brahman steers.

LITERATURE CITED

1. Rouquette, F. M., Jr., L. D. Roth, M. J. Florence, and W. C. Ellis. 1984. Live weight gains of weaned calves from four levels of available forage. Forage Research in Texas CPR 4253. p. 56. Texas Agric. Exp. Stn. College Station.

2. Turner, J. W. 1980. Genetic and biological aspects of Zebu adaptability. J. Anim. Sci. 50:1201.

TABLE 1. COMPOSITION OF THE PROTEIN SUPPLEMENT FED TO CALVES GRAZING BERMUDAGRASS

Ingredient	Percent of Dry Matter
Menhaden fishmeal	50.0
Wheat midds	44.3
Cane molasses	5.0
Rumensin 60	0.2
Trace minerals	0.5
Formulated crude protein (%)	35.8
Formulated net energy for maintenance (mcal/lb)	.59
Formulated net energy for gain (mcal/lb)	.39

TABLE 2. FORAGE ALLOWANCE [LB DRY MATTER (DM) AVAILABLE/100 LB BODY WEIGHT (BW)], AND % CRUDE PROTEIN (CP) AND % NEUTRAL DETERGENT FIBER (NDF) OF SELECTED FORAGE SAMPLES FROM BERMUDAGRASS PASTURES GRAZED BY PUREBRED BRAHMAN CALVES

	Forage Allowance		CP		NDF	
DATE[c]	PAS[a]	FMR[b]	PAS	FMR	PAS	FMR
	-lb DM/100 lb BW-		------%------		------%------	
July 7	206.4	104.2	18.7	12.3	64.8	69.4
July 21	-	0	15.4	15.1	69.2	68.6
August 3	183.2	107.4	11.6	10.0	68.7	69.4
August 18	-	-	9.9	9.3	68.6	69.4
Sept. 3	-	-	9.1	10.3	72.2	72.0
Sept. 29	162.6	83.8	18.3	17.1	62.3	67.4
Average	184.1	98.5	13.8	12.4	67.6	69.4

TABLE 3. FORAGE ALLOWANCE [LB DRY MATTER (DM) AVAILABLE/100 LB BODY WEIGHT (BW)], AND % CRUDE PROTEIN (CP) AND % NEUTRAL DETERGENT FIBER (NDF) OF SELECTED FORAGE SAMPLES FROM BERMUDAGRASS PASTURES GRAZED BY SIMMENTAL CROSSBRED CALVES

	Forage Allowance		CP		NDF	
DATE[c]	PAS[a]	FMR[b]	PAS	FMR	PAS	FMR
	-lb DM/100 lb BW-		-----%------		------%------	
July 2	241	154	16.5	13.6	59.9	68.0
July 17	-	-	17.2	15.0	59.1	70.3
August 3	352	227	10.7	11.0	64.9	67.5
August 18	-	-	8.4	9.1	69.1	66.3
August 27	393	546	-	-	-	-
Sept. 3	-	-	10.4	10.8	68.8	62.8
Sept. 16	254	376	-	-	-	-
October 12	272	312	10.5	11.7	66.4	62.9
Average	293	323	12.3	11.9	64.7	66.3

[a]Bermudagrass pasture with free-choice minerals.

[b]Bermudagrass pasture plus a 35.8% CP supplement containing Menhaden fishmeal and monensin.

[c]1987.

TABLE 4. PERFORMANCE OF BRAHMAN AND SIMMENTAL CROSSBRED CALVES GRAZING BERMUDAGRASS PASTURES

	Brahman		Simmental Crossbred			
	Steers		Steers		Heifers	
ITEM	PAS[1]	FMR[2]	PAS	FMR	PAS	FMR
Average Daily Gain (lbs/day)	.63[b]	1.32[a]	.80[b]	1.66[c]	.88[b]	1.33[a]
Average Daily Consumption (ADC) (lbs/day)	-	1.15	-	1.35	-	1.35
Crude Protein Suppl. Intake (lbs/day)	-	.35	-	.49	-	.49
Incremental Gain (IG) (lbs/day)	-	.69	-	.86	-	.45
ADC:IG (Suppl.) (lb:lb)	-	1.88	-	1.74	-	3.0
ADC:IG (CP) (lb:lb)	-	.59	-	.63	-	1.08

[1]PAS - Bermudagrass pasture plus free-choice minerals.

[2]FMR - PAS plus 35.8% crude protein supplement containing fishmeal and monensin.

[a,b,c]Means in the same row with different superscripts are different, $P<.01$.