FORAGE AND LIVESTOCK RESEARCH - 1988

RESEARCH CENTER TECHNICAL REPORT 88-1

Texas A&M University Agricultural Research & Extension Center
at Overton

Texas Agricultural Experiment Station
Texas Agricultural Extension Service

Overton, Texas

April 21, 1988

All programs and information of the Texas Agricultural Experiment Station and Texas Agricultural Extension Service are available to everyone without regard to race, color, religion, sex, age, or national origin.

Mention of trademark or a proprietary product does not constitute a guarantee or a warranty of the product by the Texas Agricultural Experiment Station or Texas Agricultural Extension Service and does not imply its approval to the exclusion of other products that also may be suitable.

SELF-LIMITING SUPPLEMENTAL PROTEIN FOR CALVES GRAZING BERMUDAGRASS PASTURES

K. N. Grigsby, F. M. Rouquette, Jr., M. J. Florence
W. C. Ellis, and D. P. Hutcheson

SUMMARY

A two-year study was conducted to determine the influence of supplemental protein on performance of beef calves grazing bermudagrass pastures, and to evaluate the condensed molasses block as a method of limiting daily supplement intake. Results indicated that calves responded in live weight gain to low levels of supplemental protein, and converted the supplement to extra gain very efficiently (<3:1). These efficient feed:extra gain ratios suggested an increased forage utilization, i.e., intake, digestibility, or both. The condensed molasses block was an effective method of limiting daily supplement consumption by beef calves grazing bermudagrass pastures.

INTRODUCTION

Bermudagrass is the primary perennial forage in the humid south and is characterized by moderate quality in early summer with decreasing crude protein (CP) content and digestibility in mid- to late-summer. Beef calves grazing bermudagrass pastures consistently gain live weight at a rate less than their maximum genetic potential. Since supplemental protein has been reported to increase dry matter intake and digestibility of low quality forages, low levels of protein supplement may enhance performance of beef calves grazing bermudagrass pastures. The objective of this two-year study was to determine the influence of source and level of supplemental protein on performance of beef calves grazing bermudagrass pastures and to evaluate the condensed molasses block as a method of limiting daily supplement intake.

PRODEDURES

Trial 1

Seventy-two weaned, fall-born 1/2 Simmental x 1/4 Hereford x 1/4 Brahman steers (n=36) and heifers (n=36) were blocked by sex and allotted by weight (650 lb) and visual condition score (VCS) to two replicate groups of the following six treatments: (1) 'Coastal' bermudagrass (Cynodon dactylon (L.) Pers.) pasture with free-choice mineral (PAS); (2) PAS plus a 31.6% CP, commercially available condensed molasses block (PDQ); (3) PAS plus a 32.5% CP condensed molasses block containing a specially selected low-solubility Menhaden fishmeal (FMB); (4) PAS plus a 34.2% CP dry supplement (DRY); (5) PAS plus a 30.7% CP supplement composed of DRY containing 1.3% rumen-stable methionine (RSmet) and 1.7 % rumen-stable lysine (RSlys) (DAA); and (6) PAS plus a 37.2% CP dry supplement containing 48.5% specially selected low-solubility Menhaden fishmeal and monensin at 90 mg/lb (FMR). Supplement formulations are presented in Table 1.

Calves in individual pastures were fed supplement ad libitum. Average daily supplement consumption (ADC) of each replicate group was estimated weekly by weighing supplement offered and supplement orts. Orts collected from FMR, DRY, and DAA were discarded and fresh supplement was replaced; whereas, the PDQ and FMB molasses block supplements were weighed weekly and replaced in respective pastures. The condensed molasses blocks were weighed to the nearest pound using a load cell weighing device.

All groups were placed on respective pastures with supplement for a 7-day adjustment period. The 7-day adjustment period allowed calves to adjust to the pasture and supplements, and allowed accumulation of rumen-fill equivalent to that in subsequent live weight measurements. Weights were taken at approximately 28-day intervals during the 110-day trial (June-October). Calves were assigned a VCS and were measured for rumpfat thickness (RFT) at the initiation and the termination of the grazing period. The VCS ranged from 1 to 10 with 1 denoting an animal which was extremely thin and 10 being an animal that was very fat. Rumpfat thickness was measured via ultrasound (210 DX Technicare) approximately 2 inches lateral to the tailhead.

Pastures were fertilized with 50 lb/ac of nitrogen (N) at 4 to 6 week intervals. Forage-on-offer was monitored closely by visual observation and hand-clipped areas. Monthly pasture samples to estimate dry matter available for consumption were taken by hand-clipping four, 1-foot-square areas to ground level. Each sample was intended to represent 1/4 of the pasture. To equalize forage-on-offer across treatments at initiation of the trial, all pastures were shredded to an average sward height of 8 to 10 inches. Forage-on-offer was maintained at a sufficient level to prevent excessive maturation of the bermudagrass, but was kept in adequate quantity to allow for selective, ad libitum intake of forage. Calves were rotated among pastures at each weighing. Forage samples for chemical analysis were taken on 14-day intervals by hand-picking portions of the sward which visually represented those selected by the calves. Pasture samples for chemical analysis were analyzed for neutral detergent fiber (NDF) (Goering and Van Soest, 1970) and CP (AOAC).

Trial 2

Seventy weaned, fall-born 1/2 Simmental x 1/4 Hereford x 1/4 Brahman steers (n=30) and heifers (n=40) were allotted by weight (620 lb) and VCS to the following five treatments: (1) bermudagrass (Cynodon dactylon (L.) Pers.) pasture (PAS); (2) PDQ; (3) PAS plus a 44.4% CP dry supplement containing heat-treated soybean meal specially selected low solubility fishmeal, and monensin (90 mg/lb; SOY); (4) PAS plus a 35.8% CP dry supplement containing specially selected low solubility fishmeal (FIS); and (5) FMR. All calves had access to a salt/mineral mix containing a coccidiostat. Each treatment was replicated twice with 3 steers and 4 heifers per replicate. As in Trial 1, calves were allowed a 7-day period to adjust to the forage and supplements before initiation of the grazing study. Calves in the individual replicates of each supplemented treatment were group fed and ADC was estimated for animals in each replicate group as in Trial 1. All supplemented treatments were fed ad libitum except calves receiving FIS which failed to limit daily intake to the targeted maximum of 2.0 lb/day. Animal performance was determined as in Trial 1 with the exception that RFT was not measured. Forage quality and forage-on-offer were also measured as described in Trial 1.

RESULTS

Trial 1

The ADG (lb/day) for calves receiving FMR (1.92) was higher (P<.01) than those receiving PAS (1.04), PDQ (1.28), FMB (1.21), DRY (1.52), or DAA (1.41) (Table 2). The ADG for calves on DAA and DRY was similar (P>.05) but both were higher (P<.01) than calves on PAS. The ADG of calves on DRY was higher (P<.05) than for calves on PDQ or FMB molasses block supplements. There was no response (P>.05) from RSlys or RSmet (DAA) on live weight gain. Supplemental PDQ tended to increase (P<.08) daily live weight gains over calves receiving pasture only (PAS). At the level of supplement consumption in Trial 1, calves on FMB did not have a higher ADG than calves on PAS (P>.10). Ad libitum ADC by calves on PDQ, FMB, DRY, DAA, and FMR was .44, .46, 1.92, 2.20, and 1.12 lb/day, respectively (Table 2). The incremental gain (IG), which refers to the level of extra gain by calves in a supplemented treatment over PAS, for calves receiving PDQ, FMB, DRY, DAA, and FMR was .24, .17, .48, .37, and .88 lb/day, respectively. The ADC and ADG of calves on all treatments within Trial 1 had a correlation coefficient of r=.54. When the FMR supplemented calves were removed from the analysis, there was a highly positive correlation (r>.92) between ADC and ADG for the 110-day grazing period. Since PDQ, FMB, DRY, and DAA were basically isocaloric and isonitrogenous, ADG was positively related to daily intake of NEg (r>.94) and CP (r>.96). Calves on all treatments had less finish upon termination of the grazing period, as compared to initial condition (Table 2). The RFT of DRY supplemented calves was higher (P<.05) than that of calves on PAS or FMB treatments at the termination of this study. The VCS of calves on DRY also tended to be higher (P<.06) than calves on PAS (Table 2).

The average level of forage allowance across all treatments at initiation and termination of the grazing study was 205 and 170 lb dry matter (DM)/100 lb body weight (BW), respectively (Table 3). The level of forage allowance for calves receiving PAS, PDQ, FMB, DRY, DAA, and FMR was 180, 221, 167, 155, 185, and 298 lb DM/100 lb BW, respectively (Table 3). The average CP content of bermudagrass pastures was 17.1, 16.7, 17.4, 17.7, 16.4, and 17.2% for pastures grazed by calves on PAS, PDQ, FMB, DRY, DAA, and FMR; while the respective NDF of bermudagrass pastures was 70.3, 70.5, 70.1, 70.7, 70.3, and 68.4% (Table 4).

Trial 2

The ADG (lb/day) of calves receiving SOY (1.54), FIS (1.37), and FMR (1.49) was higher (P<.03) than the ADG of calves assigned to PAS (.84) or PDQ (1.10) (Table 5). Calves receiving PDQ gained faster (P<.03) than calves on PAS. The ADC of the PDQ, SOY, FIS, and FMR supplements was .50, 1.05, 1.60, and .84 lb/day, respectively, which was converted to extra gain (ADC:IG) at a ratio of 1.92, 1.50, 3.02, and 1.29:1, respectively. Calves receiving FMR did not have a higher (P>.10) ADG than calves receiving FIS; however, it must be noted that the ADC of calves on FIS was approximately twice the ADC of calves receiving FMR. There was a positive relationship between ADC of supplement and ADG for all treatments in Trial 2 (r>.83). When calves assigned to FIS were removed from the analysis, the correlation coefficient improved to r>.95.

As in Trial 1, calves in all treatment groups had less finish upon termination of the grazing period, as compared to their initial VCS. At the initiation of the grazing period, calves in all treatments had similar VCS (P>.05); however, calves on SOY, FIS, and FMR had a higher (P<.001) VCS than calves on PAS at the termination of the study. Calves on SOY and FMR had a higher (P<.05) VCS than calves on PDQ; whereas, calves on FIS also tended (P<.06) to have a higher VCS than calves receiving PDQ.

The average level of forage allowance at the initiation and the termination of Trial 2 was 199 and 252 lb DM/100 lb BW (Table 6). Forage allowance in pastures grazed by calves assigned to PAS, PDQ, SOY, FIS, and FMR was 293, 297, 301, 289, and 323 lb DM/10 lb BW, respectively. The average CP content of bermudagrass pastures from pastures grazed by calves assigned to PAS, PDQ, SOY, FIS, and FMR was 12.3, 11.7, 11.5, 12.3, and 11.9%, respectively; while the respective NDF of bermudagrass pastures was 64.7, 67.2, 67.6, 64.7, and 66.3% (Table 7).

DISCUSSION

Forage quantity and quality varied between years and between treatments within year. The tendency was for forage allowance to be lower and CP and NDF to be higher in pastures of Trial 1 as compared to Trial 2. According to Rouquette et al. (1984), the minimum level of forage allowance which will support maximum daily live weight gain is probably below 100 lb DM/100 lb BW. Although the level of forage allowance varied between treatments within year, the level of CP and NDF was consistent across treatments. Since calves in Trial 1 and Trial 2 had sufficient quantity of available forage to graze selectively and the forage from which they selected was similar, differences in live weight gain within year were attributed to supplement rather than differences in the quality or quantity of forage allowance.

The ADG of calves assigned to PAS in Trial 1 (1.04) and Trial 2 (.84 lb/day) were similar to live weight gains reported by other researchers. Rouquette et al. (1984) and Oliver (1975) reported daily gains of .93 and 1.01 lb/day, respectively, for beef calves grazing bermudagrass pasture. In Trial 1 and Trial 2, daily live weight gains were increased by protein supplementation. Since all supplements were basically isocaloric and isonitrogenous and ADG tended to be positively related to ADG, it cannot be determined if the live weight gain response was due to supplemental protein, supplemental energy, or a combination thereof. Rouquette et al. (1980) reported no increase in live weight gain by calves grazing bermudagrass pastures when supplied daily with 2 lb of high energy (14% CP) creep pellets. Oliver (1975) reported a .23 lb/day increase in ADG due to 2 lb/day of supplemental corn by calves grazing 'Coastal' bermudagrass pasture. Calves in the Oliver (1975) study converted the supplemental corn to extra gain at 8.7:1, which is similar to the 8.8:1 feed efficiency reported by Lusby et al. (1981) for calves grazing Oklahoma native range and supplemented daily with corn. Lusby et al. (1981) and Lusby and Horn (1983) reported conversion of supplemental protein to extra live weight gain at a ratio of less than 3:1. Therefore, the relatively efficient ADC:IG ratios in Trial 1 and Trial 2 suggested that the live weight responses reported in these trials were primarily due to supplemental protein rather than supplemental energy.

Since calf ADG tended to be positively related to ADC of supplement, an increased intake of the PDQ and FMB supplements may have increased daily live weight gains considerably over those reported in these trials. Alternatively, formulating a condensed molasses block with a higher CP content and an ionophore may enhance daily gain at similar daily intakes as in Trial 1 and Trial 2. The condensed molasses block was an effective and labor conserving method of limiting daily intake of supplements. The consistency of the blocks was not adversely affected by the high temperatures both years or the unseasonably high rainfall encountered during Trial 1.

In conclusion, the live weight gain response to low levels of supplemental protein (<1 lb/day) by beef calves grazing bermudagrass pasture was probably due to stimulation of dry matter intake which resulted in more total nutrients available to the animal. Formulations of these or similar protein supplements are expected to be cost effective for stocker cattle grazing perennial summer grass pastures which have moderate nutritive value. Table 8 presents a preliminary, non-inclusive economic assessment of the protein supplements used in this trial. Approximate costs of the supplements ranged from $22.50/cwt to $13.30/cwt. Although this is a wide range, it closely approximates the variability that exists in prices among protein supplements. The cost per pound of gain using only pasture and supplement costs ranged from $.2618 for pasture only to $.4981 for the fishmeal supplement that did not contain an ionophore. By using the protein supplement consumption and extra animal gain attributable to the supplements, the calculated supplement cost per pound of extra gain was $.4563, $.4775, $.5101, and $.9155, respectively, for SOY, PDQ, FMR, and FIS. It may be concluded, therefore, that in most grazing seasons, the use of protein supplements such as SOY, PDQ, or FMR would be cost effective in a bermudagrass-stocker operation. Some of the more critical factors of the economic feasibility of these types of programs are related to total consumption of the supplement, supplement:extra gain, and pricing structure of the cattle market.

REFERENCES

AOAC. 1975. Official Methods of Analysis (12th Ed.). Association of Official Analystical Chemists, Washington, D. C.

Goering, G. H., and P. J. Van Soest. 1970. Forage fiber apparatus, reagents, procedures and some applications. ARS, USDA Agr. Handbook No. 379.

Lusby, K. S., and G. W. Horn. 1983. Energy vs protein supplementation of steers grazing native range in late summer. Oklahoma Agric. Exp. Stn. OSU MP-114:209.

Lusby, K. S., G. W. Horn, and M. J. Dvorak. 1981. Energy vs protein supplementation of steers grazing native range in late summer and early fall. Oklahoma Agric. Exp. Stn. OSU MP-112:36.

Oliver, W. M. 1975. Effect of monensin on gains of steers grazed on Coastal bermudagrass. J. Anim. Sci. 41:999.

Rouquette, F. M., Jr., J. L. Griffin, R. D. Randel, and L. H. Carroll. 1980. Effect of monensin on gain and forage utilization by calves grazing bermudagrass. J. Anim. Sci. 51:521.

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 Agr. Exp. Sta., College Station.

TABLE 1. FORMULATION OF PROTEIN SUPPLEMENTS USED WITH CALVES GRAZING BERMUDAGRASS PASTURES

	SUPPLEMENT FORMULATIONS†							
INGREDIENT	PDQ	FMB	DRY	DAA	FMR-1	FIS	FMR-2	SOY
	% of Ration							
Cane molasses	66.98	67.05	4.26	4.26	-	5	5	5
Soy oil	.71	.71	-	-	-	-	-	-
Lecithin	1.36	1.36	-	-	-	-	-	-
Urea	6.49	6.50	2.13	2.13	-	-	-	-
Hydrated lime	.97	.97	-	-	-	-	-	-
Trace minerals	.97	.97	.21	.21	.25	.50	.50	.50
Fish solubles	1.95	1.95	1.70	1.70	-	-	-	-
Vitamin A, D, & E	.28	.20	-	-	-	-	-	-
Dical phosphate	4.37	4.37	2.13	2.13	-	-	-	-
Cottonseed meal	11.92	-	34.04	34.04	-	-	-	-
Meat scraps	3.18	-	8.51	8.51	-	-	-	-
Blood meal	.80	-	-	-	-	-	-	-
Fishmeal (Menhaden)	-	15.90	-	-	48.50	50.0	50.0	18.0
Wheat midds	-	-	21.28	21.28	-	44.5	44.3	-
Milo meal	-	-	7.45	4.47	-	-	-	-
Calcium carbonate	-	-	2.13	2.13	-	-	-	-
Ammonium sulfate	-	-	.21	.21	.25	-	-	-
Vegetable fat	-	-	1.06	1.06	-	-	-	-
Salt	-	-	14.89	14.89	2.94	-	-	-
Rumen-stable methionine	-	-	-	1.28	-	-	-	-
Rumen-stable lysine	-	-	-	1.70	-	-	-	-
Rumensin 60	-	-	-	-	.15	-	.20	.20
Magnesium oxide	-	-	-	-	.74	-	-	-
Cottonseed hulls	-	-	-	-	27.00	-	-	-
Wheat mill run	-	-	-	-	11.34	-	-	-
SoyPlus	-	-	-	-	-	-	-	76.3
Crude protein (%)	31.6	32.5	34.2	30.7	37.2	35.8	35.8	44.4

† PDQ - Commercially available condensed molasses block.
FMB - Specially formulated condensed molasses block containing Menhaden fishmeal.
DRY - Dry protein supplement.
DAA - DRY plus rumen-stable methionine and lysine.
FMR-1 - Dry fishmeal supplement containing monensin (90 mg/lb), used in Trial 1.
FIS - Fishmeal used in Trial 2
FMR-2 - Fishmeal plus monensin (90 mg/lb) used in Trial 2.
SOY - Heat-treated soybean meal, fishmeal, and monensin used in Trial 2.

TABLE 2. PERFORMANCE OF CALVES GRAZING BERMUDAGRASS PASTURES AND RECEIVING SUPPLEMENTAL PROTEIN

	TREATMENTS[†]					
Measurement	PAS	PDQ	FMB	DRY	DAA	FMR
Avg. Daily Gain, lb/d	1.04[d]	1.29[cd]	1.21[cd]	1.52[b]	1.41[bc]	1.92[a*]
Avg. Daily Consumption (ADC), lb/d	0	.44	.46	1.92	2.20	1.12
Incremental Gain (IG), lb/d	0	.24	.17	.48	.37	.88
ADC:IG (lb:lb)	0	1.83	2.70	4.00	5.95	1.27
Initial Rump Fat Thickness (inches)	.26[a]	.31[a]	.33[a]	.31[a]	.31[a]	.20[b]
Final Rump Fat Thickness (inches)	.12	.13	.12	.15	.18	.14
Final Visual Condition Score	5.5	5.6	5.6	5.9	6.0	5.8

*Means in same row and followed by a different letter differ at $P<.05$ (Student-Newman-Keuls' Test).

†PAS - Bermudagrass pastures with free-choice minerals.
PDQ - Commercially available condensed molasses block.
FMB - Specailly formulated condensed molasses block containing Menhaden fishmeal.
DRY - Dry protein supplement.
DAA - DRY plus rumen-stable methionine and lysine.
FMR - Dry fishmeal supplement containing monensin (90 mg/lb).

TABLE 3. THE FORAGE ALLOWANCE OF BERMUDAGRASS PASTURES GRAZED BY SIMMENTAL CROSSBRED CALVES IN TRIAL 1 [LB DRY MATTER (DM) AVAILABLE/100 LB BODY WEIGHT (BW)]

	DATE					
TREATMENT[†]	6/27	7/25	8/25	9/19	10/11	AVG
	lb DM/100 lb BW					
PAS	194	176	197	162	138	180[b*]
PDQ	191	218	189	252	197	221[b]
FMB	188	220	152	194	125	167[b]
DRY	130	139	220	170	139	155[b]
DAA	242	185	197	192	136	185[b]
FMR	280	333	263	309	287	298[a]
AVG	205	212	204	213	170	201

*Means in the same column and followed by a different letter differ at P<.05 (Student-Newman-Keuls' Test).

†PAS - Bermudagrass pastures with free-choice minerals.
PDQ - Commercially available condensed molasses block.
FMB - Specially formulated condensed molasses block containing Menhaden fishmeal.
DRY - Dry protein supplement.
DAA - DRY plus rumen-stable methionine and lysine.
FMR - Dry fishmeal supplement containing monensin (90 mg/lb).

TABLE 4. PERCENT CRUDE PROTEIN (CP) AND NEUTRAL DETERGENT FIBER (NDF) OF BERMUDAGRASS PASTURES GRAZED BY CALVES IN TRIAL 1

	PASTURE-SUPPLEMENTS[†]											
DATE	PAS		PDQ		FMB		DRY		DAA		FMR	
1987	CP	NDF	CP	NDF	CP	NDF	CP	NDF	CP	NDF	CP	NDF
	% of Dry Matter											
6-27	15.4	70.5	14.8	69.7	16.0	69.4	15.4	70.3	15.5	69.5	15.2	66.5
7-11	16.0	72.1	16.3	70.8	16.8	73.2	18.5	71.8	14.6	71.7	17.1	68.9
7-25	12.4	72.8	12.8	68.3	12.8	69.2	13.5	72.2	11.3	70.6	14.4	66.8
8-12	20.9	-	19.6	-	19.3	-	20.6	-	19.3	-	20.0	-
8-25	18.0	68.5	18.6	71.6	20.4	68.1	17.9	66.2	17.6	69.1	16.7	67.9
9-19	18.7	66.2	17.1	69.6	16.7	70.9	18.9	69.7	17.7	68.4	18.0	71.3
10-11	18.1	71.8	17.7	72.8	20.1	70.0	19.3	74.6	18.9	72.6	18.1	69.0
AVG	17.1	70.3	16.7	70.5	17.4	70.1	17.7	70.7	16.4	70.3	17.2	68.4

[†] PAS - Bermudagrass pastures with free-choice minerals.
PDQ - Commercially available condensed molasses block.
FMB - Specially formulated condensed molasses block containing Menhaden fishmeal.
DRY - Dry protein supplement.
DAA - DRY plus rumen-stable methionine and lysine.
FMR - Dry fishmeal supplement containing monensin (90 mg/lb).

TABLE 5. PERFORMANCE OF SIMMENTAL CROSSBRED CALVES RECEIVING SUPPLEMENTAL PROTEIN IN TRIAL 2

MEASUREMENT	TREATMENT† PAS	PDQ	SOY	FIS	FMR
Avg. Daily Gain, lb/d	.84[c]	1.10[b]	1.54[a]	1.37[a]	1.49[a]*
Avg. Daily Consumption (ADC), lb/d	0	.50	1.05	1.60	.84
Incremental Gain (IG), lb/d	0	.26	.70	.53	.65
ADC:IG (lb:lb)	0	1.92	1.50	3.02	1.29
Initial Visual Condition Score	6.35	6.38	6.29	6.67	6.48
Final Visual Condition Score	4.56[c]	4.94[b]	5.50[a]	5.46[a]	5.52[a]

TABLE 6. THE FORAGE ALLOWANCE OF BERMUDAGRASS PASTURES GRAZED BY SIMMENTAL CROSSBRED CALVES IN TRIAL 2 [LB DRY MATTER (DM)/100 LB BODY WEIGHT (BW)]

TREATMENT†	DATE 7/2	8/3	8/27	9/16	10/12	AVG
	---lbs DM/100 lbs BW---					
PAS	241	352	393	254	227	293
PDQ	204	243	571	256	209	297
SOY	190	287	383	360	283	301
FIS	205	389	399	224	230	289
FMR	154	227	546	376	312	323
AVG	199	300	458	294	252	301

*Means in same row and followed by a different letter differ at $P<.05$ (Student-Newman-Keuls' Test).

†PAS - Bermudagrass pasture with free-choice minerals.
PDQ - Commercially available condensed molasses block.
SOY - Heat-treated soybean meal, fishmeal, and monensin.
FIS - Fishmeal.
FMR - Fishmeal plus monensin.

TABLE 7. PERCENT CRUDE PROTEIN (CP) AND NEUTRAL DETERGENT FIBER (NDF) OF BERMUDAGRASS PASTURES GRAZED BY CALVES IN TRIAL 2

	PASTURE-SUPPLEMENT TREATMENTS†									
DATE	PAS		PDQ		SOY		FIS		FMR	
1987	CP	NDF	CP	NDF	CP	NDF	CP	NDF	CP	NDF
	% of Dry Matter									
7-2	16.5	59.9	13.8	68.9	12.6	67.1	15.9	57.4	13.6	68.0
7-17	17.2	59.1	14.8	70.3	14.8	70.5	17.2	61.2	15.0	70.3
8-3	10.7	64.9	10.8	65.2	11.3	66.0	11.4	63.3	11.0	67.5
8-18	8.4	69.1	10.6	64.7	9.1	67.5	9.2	67.3	9.1	66.3
9-3	10.4	68.8	10.6	65.1	9.8	69.3	9.2	69.0	10.8	62.8
10-12	10.5	66.4	9.5	68.8	11.2	65.4	10.8	69.9	11.7	62.9
AVG	12.3	64.7	11.7	67.2	11.5	67.6	12.3	64.7	11.9	66.3

†PAS - Bermudagrass pasture with free-choice minerals.
PDQ - Commercially available condensed molasses block.
SOY - Heat-treated soybean meal, fishmeal, and monensin.
FIS - Fishmeal.
FMR - Fishmeal plus monensin.

TABLE 8. ESTIMATED PASTURE AND PROTEIN SUPPLEMENT COSTS FOR CALVES GRAZING BERMUDAGRASS PASTURES

ITEM	ESTIMATED COSTS
Pasture lease	\$20/ac
Fertilizer	\$60-80/ac
PASTURE COSTS/AC	\$80-100/ac
Stocking Rate	4 an/ac
PASTURE COSTS/AN	\$20-25/animal
Labor for Feeding[1]	\$1/an/week
Self-Feeder[2]	\$5/an/yr
Bulk Supplement	
Fishmeal Ration	\$15.06/cwt
Fishmeal + Rumensin	\$15.82/cwt
SoyPlus + Fishmeal + Rumensin	\$13.30/cwt
PDQ Block	\$22.50/cwt

ITEM	SUPPLEMENTS				
	PAS	PDQ	FIS	FMR	SOY
Average Daily Consumption	0	.49	1.65	.85	1.00
Avg. Daily Gain	.85	1.10	1.32	1.47	1.54
Extra Gain	0	.25	.47	.62	.69
Suppl:Extra Gain	0	1.96	3.51	1.37	1.45
Pasture Costs/An.	25.00	25.00	25.00	25.00	25.00
Suppl. Costs/An.[3]					
1. Feeder	0	0	5.00	5.00	5.00
2. Labor/An	0	1.00	15.00	15.00	15.00
3. Suppl./An	0	12.13	27.33	14.79	14.63
Pasture + Suppl. Costs/An	25.00	38.13	72.33	59.79	59.63
TOTAL GAIN[3]	93.5	121	145.2	161.7	169.4
COST/LB GAIN	\$.2618	\$.3151	\$.4981	\$.3698	\$.3520
TOTAL SUPPL. GAIN (LBS)	0	27.5	51.7	68.2	75.9
TOTAL SUPPL. COST (\$/AN)	0	13.13	47.33	34.79	34.63
SUPPL. COST/LB EXTRA GAIN (\$)	0	.4775	.9155	.5101	.4563

[1]Labor based on 10 hrs/week/100 calves or 1 hr/10 calves per week at \$10.00/hr or \$1.00/calf/week.

[2]Cost of self-feeder or feed bunk based on \$500/feeder/20 calves. Feeders estimated to have a 5-year life, therefore, costs of \$100/year/20 calves or \$5/calf/year.

[3]110-day period.