system (particularly quantity and quality of forage available) and the genetic potential for growth of the calves produced. If forage is abundant and the cows are being crossed to bulls from larger, growthier breeds, increased milk production may be desired. However, if forage is somewhat limited, increased milk production may result in cows with an inadequate nutritional level to reproduce normally. Whether or not it would be economically feasible to supplement the range nutrition of the cows to permit normal reproduction in this circumstance depends upon the prevailing feed costs and the selling price of additional weaning weight of calves. The producer should strive for a level of milk production in the cow herd that will provide adequate nutrition for the calves produced to maximize profit in most years.

Summer Performance and Forage Intake of Stockers Grazed on Bermudagrass

B.R. Wilson, G.W. Horn and W.E. McMurphy

Story in Brief

Forage intakes of eight steers grazing a 5.4-acre Midland bermudagrass pasture were measured at approximately 28-day intervals from May 24 to September 15, 1976. Digestible dry matter intakes (lb./100 lb. steer body wt.) were not significantly correlated with average daily gains, and accounted for only two percent of the variation of stocker gains. Digestible protein intakes (lb. DP/head/day) were significantly ($P<.01$) correlated with average daily gains and accounted for 38 percent of the variation of gains. The results indicate (1) that protein supplementation for 30 to 45 days during the later part of the bermudagrass growing season, or (2) that pasture management practices that would maintain a high-quality bermudagrass forage throughout the summer may hold stocker weight gains to acceptable levels.

Introduction

A major criticism of bermudagrass is that it will not support acceptable stocker weight gains after the first 60 to 75 days of the growing season. The

---

In cooperation with U.S.D.A., Agricultural Research Service, Southern Region.

decreased weight gains during the latter part of the bermudagrass growing season are usually attributed to decreased forage intake due to decreased forage quality, or to the concept that bulk-fill limits the intake of this low-quality forage.

The objective of this study was to measure, at monthly intervals, (1) forage intakes and forage protein digestibility, and (2) weight gains of stockers grazed on bermudagrass during the summer.

Materials and Methods

Forage intakes and weight gains of eight steers (626 ± 18.1 pounds average initial weight) grazing a 5.4 acre Midland bermudagrass pasture[1] were measured monthly from May 24 to September 15, 1976, using chromic oxide and *in vitro* dry matter digestibilities of hand-clipped forage samples to calculate fecal output and forage intake, respectively. The eight steers consisted of four Herefords, two Angus, and two Hereford x Angus steers that had been on bermudagrass pastures for about 19 days prior to the first intake trial.

The bermudagrass pasture on which the steers grazed during the intake trials was sprayed with 0.5 pounds of 2,4-D per acre, and fertilized with 60 pounds of nitrogen per acre as ammonium nitrate on May 21 and May 24, respectively. The pasture was mowed twice to a forage height of about three inches on June 6 and July 29. In general, the summer in which these trials were conducted was characterized by an abnormally cold spring that delayed the onset of bermudagrass growth and a dry summer — approximately 50 percent below the average rainfall for May through September. Shade was available to the steers throughout the summer.

The five forage intake trials were begun on May 24, June 21, July 19, August 16, and September 13. During each forage intake trial, the steers were bolused with four grams of chromic oxide in gelatin capsules twice daily (8:00 am and 4:00 pm) during a five-day preliminary period and a three-day fecal collection period, in which fecal samples were taken each time the chromic oxide boluses were given. The steers were weighed on two consecutive days during each intake trial, and six hand-clipped forage samples were taken from the pasture. Protein digestibility of the bermudagrass during each intake trial was determined by the lignin ratio method.

Results and Discussion

Table 1 shows the bermudagrass dry matter digestibility, crude protein content, protein digestibility, and digestible protein content during each of the five intake trials; and the intakes of forage dry matter, digestible dry matter, and digestible protein. Dry matter digestibility of the available forage was significantly greater ($P<.01$) in May; decreased slightly in June; and declined

[1]Southwestern Livestock and Forage Research Station, El Reno, Oklahoma.

Table 1. Bermudagrass quality, forage and digestible protein intakes during intake trials[1]

Item	May	June	July	August	Sept
Dry matter digestibility, %	55.9[a]	53.8[a]	43.5[b]	40.1[b]	43.0[b]
Crude protein, %	20.4[a]	17.2[b]	12.8[c]	9.3[d]	9.0[d]
Protein digestibility, %	63.7[a]	39.2[b]	41.3[bc]	24.4[d]	48.0[c]
Digestible protein, %	13.0	6.7	5.3	2.3	4.3
Forage, intake					
Dry matter, lb./steer/day	12.9[a]	14.5[ab]	13.3[a]	14.8[ab]	15.1[b]
Digestible dry matter, lb./100 lb. steer body wt.	1.16[a]	1.16[a]	.80[b]	.80[b]	.90[b]
Digestible protein, lb./steer/day	1.7[a]	1.0[b]	.7[c]	.3[d]	.7[c]

[1]Means in the same row with different lettered superscripts are significantly different (P<.01).

further to values of 43.5, 40.1 and 43.0 percent during the July, August, and September intake trials, respectively. Crude protein content of the forage decreased throughout the summer to a low of 9.0 percent during the September trial. Forage protein digestibility decreased markedly from May to June, and was lowest during the August trial. The digestible protein content of the forage decreased from May to August, and increased slightly in September.

Intake of digestible dry matter (lb./100 lb. steer body weight) was the same during the May and June intake trials, but was significantly decreased (P<.01) during July, August, and September. Digestible protein intake (lb./steer/day) decreased from May to August, then increased in September.

Average stocker weight gains, digestible dry matter, and digestible protein intakes between intake trials are shown in Table 2. Average daily gains of the stockers increased slightly from May-June to June-July, then decreased significantly (P<.01) to a low of 0.35 pounds in the July-August period, and increased in the August-September period. Average daily gain for the 112-day trial was 1.3 lb./steer/day. The decrease in digestible dry matter intake (lb./100 lb. steer body weight) in the July-August period was not large enough

Table 2. Average daily gains, digestible dry matter and digestible protein intakes of stockers grazed on bermudagrass[1]

	May-June	June-July	July-August	August-September
Average daily gain, lb.	1.63[a]	2.09[a]	0.35[c]	1.09[b]
% of May-June	---	128	21	67
Digestible dry matter intake[2], lb/100 lb. steer body weight	1.16	0.98	0.80	0.85
% of May-June value	---	84	69	73
Digestible protein intake[2], lb/steer/day	1.34	0.85	0.53	0.53
% of May-June value	---	63	40	40

[1]Mean in the same row with different lettered superscripts are significantly different (P<.01).
[2]Values are averages of May and June, June and July, July and August, August and September intakes.

to account for the decreased gains. Regression of average daily gain on digestible dry matter intake (lb./100 lb. steer body weight) resulted in a non-significant correlation coefficient of 0.15, and accounted for only about two percent of the variability in observed gains. This suggests that factor(s) other than forage quality, as usually evaluated, attribute to the variability of stocker gains on bermudagrass.

The decrease in digestible protein intake (lb./steer/day) for the July-August period more closely reflects the depressed gain for that period. Regression of average daily gain on digestible protein intake results in a low but highly significant correlation coefficient ($P<.01$) of 0.61 and can account for 38 percent of the variation in observed gains. This data suggests that supplementation with protein for 30 to 45 days during the latter part of the bermudagrass growing season may hold stocker weight gains on bermudagrass to acceptable levels by (1) supplying needed digestible protein, and (2) increasing ruminal dry matter digestibility and hence forage intake.

The challenge, however, in utilizing bermudagrass pastures in summer stocker programs is to supply an adequate amount of immature, high-quality forage on a continuous basis. Based on the results of stocker grazing trials on Coastal bermudagrass at the North Louisiana Hill Farm Experiment Station (Homer, Louisiana) that have produced over 750 and 625 lb of stocker gain per acre with yearling steers and spring-weaned calves, respectively, (Table 3) the following recommendations are made:

1. Begin grazing early in the bermudagrass growing season when forage growth is no more than 2 to 3 inches tall.
2. Use a heavy stocking rate — 3 to 5 head per acre. Bermudagrass forage growth must be removed as fast as it grows if young, high-quality forage is to be kept available. The average age of accumulated bermudagrass forage growth should not exceed 3 weeks for stockers.

Table 3. Production data for stocker cattle grazed on Coastal bermudagrass at the North Louisiana Hill Farm Experiment Station (Homer, Louisiana)

Year	No. days grazed	No. cattle	Stocking rate/acre Head	Stocking rate/acre lbs	Gain, lbs per Day	Gain, lbs per Head	Gain, lbs per Acre	Nitrogen applied per acre	Lb gain per pound N
Yearling steers wintered on hay									
1975	120	32	3.2	1671	1.89	227	726	258	2.81
1975	119	48	3.0	1326	1.94	231	692	225	3.08
1976	154	39	3.9	1679	1.47	226	884	400	2.21
1976	147	96	3.0	1510	1.76	259	777	350	2.22
Spring weaned calves									
1975	156	108	3.0	1036	1.37	214	642	267	2.40
1976	141	40	5.0	1636	1.06	148	744	350	2.12
1976	141	32	4.0	1272	0.93	132	525	350	1.54