Diet Selection and Nutritive Value of Coastal Bermudagrass as Influenced by Grazing Pressure

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Summary

Coastal Bermudagrass *(Cynodon dactylon)* was continuously grazed by cattle at one of four grazing pressure levels. Forage and esophageal samples were collected in early-, mid- and late-summer. Average daily gain (ADG [pound/day]) of stocker calves was measured over a 114-day period. The forage availability (lb dry matter/A) varied inversely with grazing pressure. Differences existed among grazing pressure levels in leaf proportion in the available forage (P=0.02), but there were no differences in leaf proportion of the diet (P=0.53). The neutral detergent fiber (NDF) content of leaf in the available forage decreased (P=0.01) as grazing pressure was increased, as did NDF content of the leaf in the diet (P=0.0001). No significant differences existed among grazing pressure levels for NDF content of stem in the available forage (P=0.23) or in the diet (P=0.33).

Introduction

The performance of individual grazing animals generally decreases as grazing pressure increases. This depressed performance may be due to effects of grazing pressure on the morphology, physiology, and growth of the forage plant. These interactions at the plant-animal interface remain largely conceptual and unquantified. This study was conducted to examine the influence of grazing pressure on these plant-animal interactions. Leaf and stem proportions and fiber content of the available forage and the diet were used as indicators of selectively grazed components of the forage, its nutritive potential, and responses by the plant to grazing pressure.

Procedure

A 4-month study was conducted during the summer months at the Texas A&M University Agricultural Research and Extension Center at Overton. Four pastures of Coastal bermudagrass *(Cynodon dactylon)* were continuously grazed, with a put-and-take variable stocking rate to maintain four levels of grazing pressure (pound of forage per dry matter/100 lb animal liveweight). The pasture sizes were 5.3 A (low, L), 5.3 A (medium low, ML), 3.2 A (medium high, MH), 2.3 A (high, H) with corresponding grazing pressure levels listed in Table 1. Each pasture was stocked with two yearling Brahman steers that were esophageally and ruminally fistulated, four F-1 Brahman x Hereford cows and their calves, five stocker calves, and a variable number of put-and-take animals as required to regulate grazing pressure to

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KEYWORDS: Neutral detergent fiber/Coastal Bermudagrass/leaf/stem.

TABLE 1. PASTURE SIZE, STOCKING RATE, AND GRAZING PRESSURE OF COASTAL BERMUDAGRASS

	Grazing pressure level			
	High (H)	Medium high (MH)	Medium low (ML)	Low (L)
Pasture size, A	2.3	3.2	5.3	5.3
Stocking weight, 100 lb animal wt/A	82.5	49.0	33.8	26.2
Actual grazing pressure lb forage DM/100 lb animal wt	7.4	27.5	75.5	155.6

maintain targeted levels of forage availability. All animals were weighed at 28-day intervals, with gains of the stocker calves reported over a 114-day period.

Samples of available forage and esophageal extrusa were collected in early- (June 28, date 1) mid- (August 20, date 2), and late-summer (September 17, date 3). Forage availability was measured by clipping four areas of 1 ft^2 each to ground level. The clipped forage was hand-separated into leaf and stem portions. Neutral detergent fiber content was determined on the leaf and stem components after grinding to pass a 2 mm screen.

Esophageal extrusa (diet) samples were collected daily from the two esophageal fistulated steers at each grazing pressure level during three 3 consecutive days for date 1, and 2 days for dates 2 and 3. The extrusa samples were freeze-dried and separated into leaf and stem components by a vertical-draft air column. The separated components were used to determine proportions of leaf, stem, and fiber content of the diet.

Results and Discussion

The mean forage availability and average daily gain (ADG) of stocker calves is displayed in Figure 1. Forage availability ranged from 4,497 lb/A from L grazing pressure to 721 lb/A from a high (H) grazing pressure. The ADG of the stocker calves differed (P=0.0001) due to grazing pressure levels and ranged from 1.39 lb/day for L to 0.29 lb/day for H.

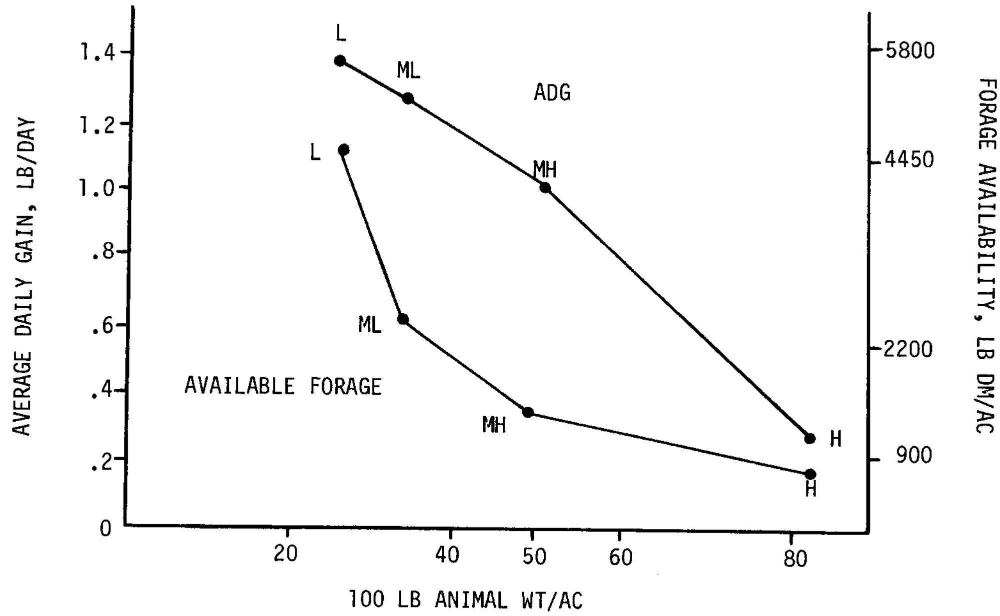
The mean leaf proportions of available forage and diet are shown in Figure 2. The mean leaf proportion of available forage differed (P=0.02) due to grazing pressure levels and ranged from 39.7 percent for L to 51.6 percent for H. A numerical trend was present for the leaf proportion of available forage to increase with increasing grazing pressure. No differences (P=0.53) existed among grazing pressure levels for mean leaf proportion in the diet which ranged from 82.7 percent for L to 78.5 percent for H. The differences in leaf proportions of available forage and the diet within grazing pressure levels indicated an apparent selectivity by the grazing animal for the leaf component of the available forage.

The mean NDF content of leaf in the available forage is shown in Figure 3. The NDF content of leaf in the available forage differed (P=0.01) due to grazing pressure levels. Differences (P=0.0001) in NDF content of leaf in the diet existed among grazing pressure levels. Mean leaf NDF content of the diet was highest in L at 72.1 percent and decreased to 59.6 percent for H. The fiber content of the selectively grazed leaf tended to be lower than the fiber content of the leaf present in the available forage at the same grazing pressure level. This suggests the ability to selectively graze the less mature leaves present in the available leaf population.

No differences in NDF content of stem existed in the available forage (P=0.23) or in the diet (P=0.33) (Fig. 4). The NDF content of stem from the diet was generally less than the NDF content of stem in the available forage at the same grazing pressure level. The lack of a difference among grazing pressure levels in fiber content of stem in the diet suggested that animals on different grazing pressure levels were consuming stem of similar maturity.

In the study, as grazing pressure increased, the leaf proportion in the diet did not change but fiber content of

Fig. 1. Average daily gain of stockers at four levels of forage availability.



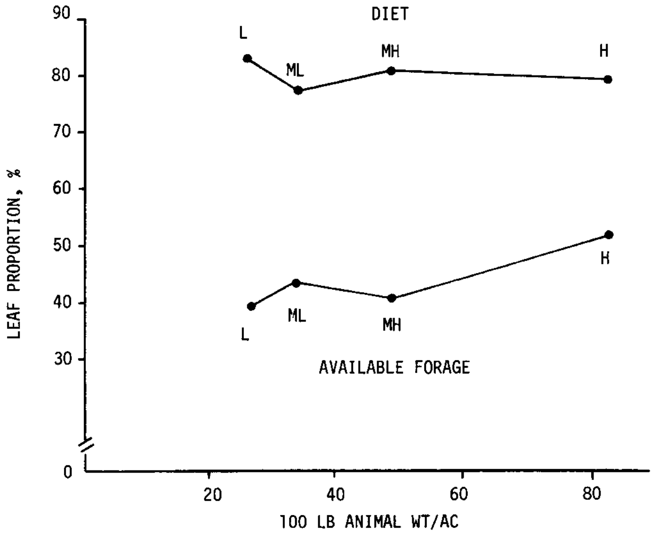


Fig. 2. Percent leaf in diet of stockers and available forage of Coastal bermudagrass at four grazing pressures.

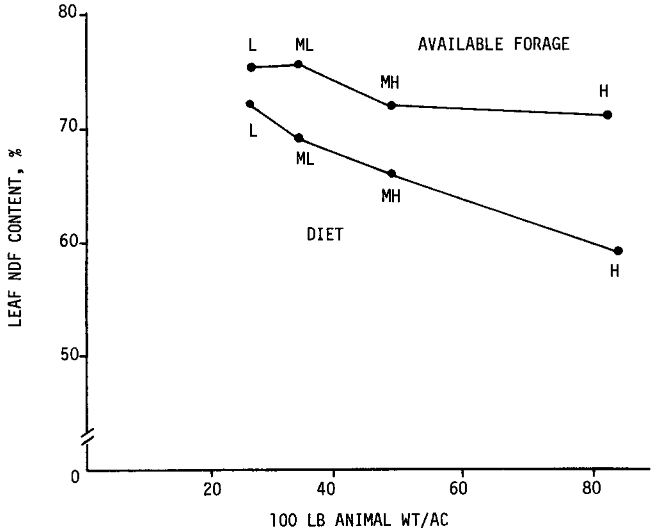


Fig. 3. Neutral detergent fiber (NDF) content of diet and available forage of Coastal bermudagrass at four grazing pressures.

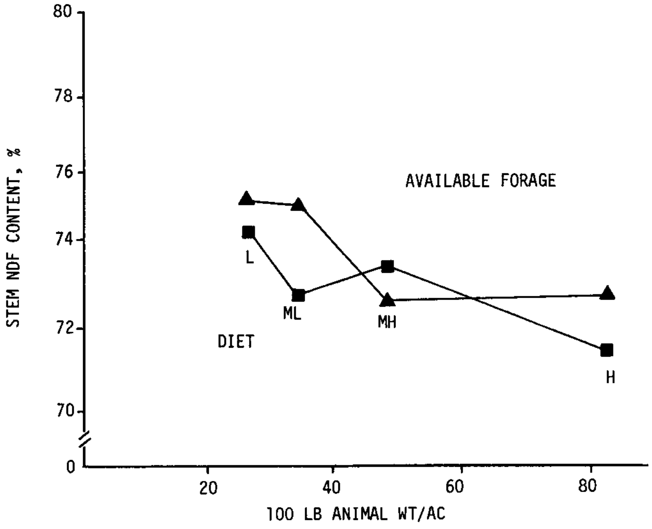


Fig. 4. Neutral detergent fiber (NDF) of diet and available forage of Coastal bermudagrass at four grazing pressures.

the leaf declined which could result in a higher quality diet. However, as grazing pressure was increased, animal performance declined as a result of restricted DM intake. These results demonstrate the complexity and interactive nature of factors at the plant-animal interface. Further research is needed to understand the preferences the animal has in selecting its diet, and how these preferences and forage growth interact with grazing pressure. Knowledge of these variables at the plant-animal interface is necessary to project the most economical systems of animal production from forages.