EVALUATION OF *Brachiaria brizantha* ECOTYPES UNDER GRAZING IN SMALL PLOTS

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Abstract

An intense search for new cultivars amongst recently collected and introduced ecotypes from Africa is in effect since 1988, at the National Beef Cattle Research Center, of the Brazilian Agricultural Research Corporation (Embrapa Beef Cattle). After agronomic evaluations of a large collection, 21 ecotypes were pre-selected for multilocational trials and from these, eight were elected for evaluation under grazing. The objective of this trial was thus to evaluate the persistence and carrying capacity of these eight new *Brachiaria brizantha* ecotypes after two years of grazing. The experimental design was a randomized complete block with nine treatments and two replicates. The experimental area was divided into 18 paddocks of 1000 m^2. They were grazed according to a deferred flexible system. After two years, it was possible to select four ecotypes, which were indicated for animal performance trials aiming at releasing at least one of them as a new cultivar in 2002.

Keywords: Carrying capacity, cultivar development, forage availability, persistence, stocking rates

Introduction

Brazil has the competitive advantage of a very dynamic and cost effective animal production system over others, especially in temperate regions, due to its high reliance on pastures. Its climate and adequate land area for pasture utilization justifies the pursuit for more productive forages that will result in higher quality beef at a lower cost. The narrowness of diversity in *Brachiaria*, the most important forage genus utilized in Brazil, prompted an intense search for new cultivars amongst recently collected and introduced ecotypes from Africa. Following the introduction of this material to the National Beef Cattle Research Center, of the Brazilian Agricultural Research Corporation (Embrapa Beef Cattle), agronomic evaluation and morphological characterization were performed (Valle et al, 1993a and b) which resulted in the selection of promising genotypes for multilocational trials. Results for a two-year plot evaluation of 21 pre-selected *Brachiaria* ecotypes from this collection, in two typical Cerrado (Savanna) ecosystems are presented in this Congress (Valle et al., 2001). Continuing on the process of cultivar development, eight out of the 21, selected for superior agronomic characteristics were subjected to grazing. The objective of this experiment was to evaluate plant accumulation rates, persistence and carrying capacity of these eight new *B. brizantha* ecotypes, after two years of grazing.

Material and Methods

The paddocks were planted in 1995 in a red dark Latossol (Oxisol) at Embrapa Beef Cattle, in Campo Grande, MS, Brazil. This soil type is characterized by a clay texture, with acid pH, low soil base saturation and high aluminum concentration. After conventional soil preparation, 2000 kg per hectare of dolomitic limestone (reactivity = 80%), 400 kg of the fertilizer formula 0-20-20 and 22 kg of FTE were applied.

The selected ecotypes were *B. brizantha* BRA 002844, 003395, 003450, 003719, 003891, 003948, 004308, 00439. The commercial cultivar, *B. brizantha* cv. Marandu was used as the control.

The experimental design was a randomized complete block with nine treatments and two replicates. The experimental area was divided into 18 paddocks of 1000 m^2. They were grazed according to a deferred flexible system. Grazing started, either in the rainy or the dry season, whenever the forage on offer reached around 2 t/ha of dry matter (DM) or animals were removed when forage declined to 1 t/ha of DM. Thus, the number of animals and grazing days were adjusted to the forage on offer for each individual ecotype.

Forage availability was estimated each time animals were added to or removed from the pastures, by sampling 25 quadrats (0.25 m^2) per paddock, cut at soil level. This samples were then separated into leaf, stem and dead material, dried and ground for future chemical analysis.

Data were analyzed according to GLM SAS and averages were compared by the Waller-Duncan test.

Results and Discussion

Values for total DM available forage were similar among ecotypes either before or after grazing ($P>0.71$). There were also no differences between the dry and the rainy season for forage availability, as expected, due to the grazing management imposed. There were no interactions ($P>0.09$) between ecotypes x seasons, or ecotypes x year for total DM, thus ranking of superior materials was independent of season of the year or year of evaluation.

A significant ($P<0.1$) decline in total DM availability sampled before grazing was observed from year one to year two: 2.7 to 1.6 t DM/ha, respectively. Since stocking rates ($P>0.10$) and grazing intervals ($P>0.80$) were similar for the two years, the decline in forage

production can be explained by the decrease in soil fertility, due to no nutrient replacement during these two years.

An attempt to group ecotypes using multivariate analysis (PRINCOMP and CLUSTER) was made. Results were not satisfactory, however, except for identifying those variables that influenced principal components the most. Those were leaf growth rate, leaf on offer before grazing and stocking rate. Thus, one-way-analysis of variance was performed on these variables and it will be presented thereon.

There was a significant ($P<0.01$) interaction between ecotypes and season of the year for stocking rate (Table 1). The resting periods were 35 and 48 days for the rainy and dry seasons in the two years, respectively.

Several publications refer to the overall preference for leaves over stems and dead matter by grazing animals. Consequently, leaf growth rate (LGR) becomes the key factor in selecting new cultivars for high animal production. There was a significant ($P<0.1$) interaction between ecotypes and seasons for LGR, that being in the dry season, half to one third that of the rainy season. During the rainy season, ecotypes BRA002844, 004308, and 003395 excelled. But during the dry season, BRA003891 surpassed 004308 and joined 002844 and 003395 in accumulating more leaf material (Table 1). There were significant interactions ($P<0.5$) between ecotypes and seasons for LGR. Ecotypes BRA002844, 003395 and 004308 displayed the highest leaf availability before grazing, during the rainy season. However, during the dry season the most productive ecotypes were BRA002844, 003395, and 003891 (Table 1). Throughout the rainy seasons, leaf forage on offer was enough to allow selective grazing except for ecotype BRA003719. The opposite was true for the dry season, when leaf forage on offer was probably limiting for a good quality diet for the grazing animals.

There were no significant differences (P>0.5) between fertilizer levels in all paddocks for P, K, base saturation and organic matter levels. This certifies that the differences detected among ecotypes, for the different variables studied are indeed genotype related.

Since many interactions were observed in the one-way analysis and the multivariate analysis did not provide satisfactory discrimination, a graphic scheme was used to identify those ecotypes that performed better than the averages for the most distinctive variables, using second-year data to portray persistence under grazing. This resulted in the selection of BRA003395, BRA004308, BRA003891 and BRA002844 (Figure 1). These ecotypes were indicated for animal performance trials aiming at releasing at least one of them as a new cultivar in 2002.

References

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Table 1 - Average stocking rate (number of steers/1000m^2/5 days of grazing), leaf growth rate (kg/ha/day) and leaf availability before grazing (kg/ha), for the different ecotypes during the rainy and the dry season.

Ecotypes	Stocking Rate		Leaf growth rates		Leaf availability	
	Rainy	Dry	Rainy	Dry	Rainy	Dry
BRA002844	6.17	3.97	30.9	13.5	1070	540
BRA003395	6.34	4.60	27.9	14.9	1060	630
BRA004308	5.95	3.48	28.2	9.80	1060	460
BRA003891	6.75	4.10	26.7	12.8	900	520
BRA003450	5.64	2.78	26.2	8.50	930	320
BRA004391	6.95	3.81	26.8	10.9	920	440
BRA003948	5.80	3.34	24.6	9.70	840	440
BRA003719	4.98	2.48	23.6	5.90	690	320
cv. Marandu	3.57	2.54	17.9	6.70	830	390
LSD*	0.78	0.72	4.2	2.0	218	144

*Least significance difference by Waller-Ducan test.

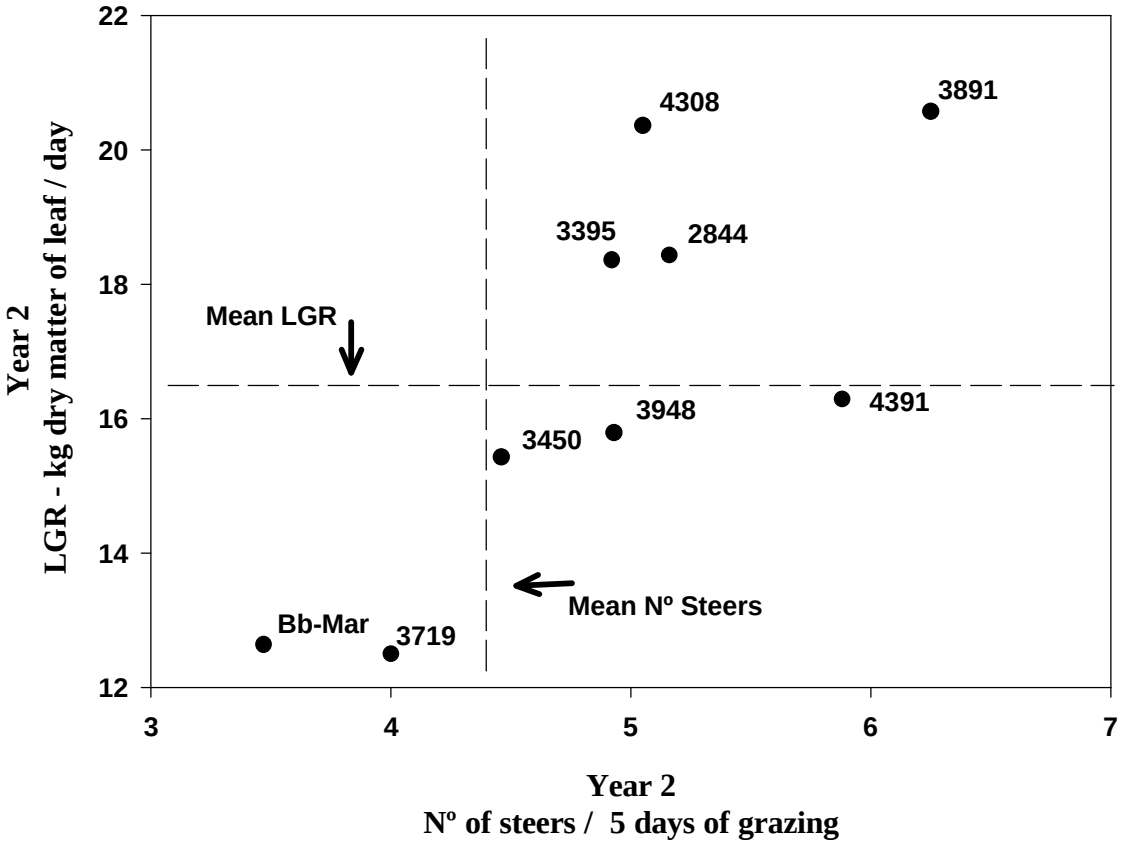

Figure 1 - Relationship between stocking rate (number of steers/1000 m^2) and leaf growth rate (LGR) among different ecotypes of *Brachiaria* in the second year of grazing.