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Dry matter intake by beef steers on Piatã palisadegrass (*Brachiaria brizantha* cv. BRS Piatã) pasture

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Introduction

Beef production in Brazil is primarily based on tropical pastures and 85% of these pastures are *Brachiaria brizantha* cv. Marandu. Such a monoculture could prove disastrous, if some pest or disease emerged. With the goal of further diversifying pastures and contributing to the sustainability of the pasture production system, *B. brizantha* cv. BRS Piatã was released by the Brazilian Agricultural Research Corporation (Embrapa). Little is known about the characteristics of this cultivar in relation to grazing management and plant-animal interactions. Dry matter (DM) intake by grazing animals is influenced by the structural characteristics of tropical grasses (Stobbs 1973; 1975), and the presence of stem and dead material at the grazing horizon limits bite depth (Carvalho et al. 2008). Under such conditions, it is common to observe a reduction in bite rate and increases in time per bite and daily grazing time (Difante et al. 2009), resulting in inefficient harvesting and lower herbage intake. The aim of this work was to estimate the DM intake by beef steers grazing Piatã palisadegrass managed at 3 grazing intensities.

Methods

Place and time

The experiment was conducted at Embrapa Beef Cattle, Campo Grande, MS, Brazil, during the summer and autumn of 2010.

Treatments and experimental design

The Piatã palisadegrass pasture was grazed at 3 intensities of continuous stocking, represented by 15, 30 and 45 cm sward height. The experimental design was a randomized block design with 3 treatments and 2 replicates. Six paddocks measuring 0.7 ha were used and received 80, 40 and 40 kg/ha of N, P_20_5 and K_20, respectively. Three steers (testers) were kept in each paddock, and additional steers (grazers) were added to or removed from all paddocks as necessary to maintain the sward height imposed in each treatment.

Experimental evaluations

Sward height was measured weekly at 60 random points per paddock. For determination of herbage mass and morphological components of the pasture (leaf blade, stem and dead material), 15 samples per paddock were cut at ground level using a 1 m x 1 m frame. All samples were divided, with 1 subsample weighed fresh and oven-dried at 65ºC to determine dry herbage mass, and the other separated into leaf (leaf blades), stem (stems and leaf sheaths) and dead material before drying to determine percentages of the components. Two hand-plucked samples were taken from each paddock. They were oven-dried, ground to pass through a 1-mm screen, and analyzed to obtain estimations of crude protein (CP), neutral detergent fiber (NDF) and acid detergent lignin (ADL) concentrations and in vitro organic matter digestibility (IVOMD) via near-infrared reflectance spectroscopy (NIRS) (Marten et al. 1985). Dry matter intake (DMI) was estimated using the n-alkanes as external markers (Dove and Mayes 2006). The test animals (3 per paddock) were dosed twice-a-day for 12 days (Penning 2004) using 200 g of dotriacontane (C_{32}) in each application. The determination of n-alkanes of the forage and faeces samples, within the range of C-chains between 27 and 35, followed the methodology proposed by Dove and Mayes (2006) and DMI was estimated according to the equation proposed by Dove and Mayes (1991).

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Statistical analyses

The data were analyzed using the Mixed Procedure in SAS (1996). The model included the random effect of blocks, the fixed effects of sward height, season and interactions between them. If appropriate, the means were compared with a Tukey test at a 5% significance level.

Results and Discussion

Average sward heights were maintained relatively stable and within pre-determined limits of variation during the entire experimental period, and averaged 14.2 ± 1.1, 30.0 ±1.3 and 42.6 ± 1.3 cm, respectively, for 15, 30 and 45 cm treatments. To maintain these target sward conditions, an increase in the stocking rate (SR) was needed as the grazing height declined. During summer the means were 7.3, 6.9 and 5.9 steers/ha; and in autumn 3.6, 3.4 and 3.4 steers/ha for swards managed at 15, 30 and 45 cm, respectively. The higher (P=0.0007) SR in summer was a consequence of the greater herbage accumulation rate (P=0.0161) at that time of year (83.4 and 49.3 kg/ha/d for summer and autumn, respectively), which would have resulted from more favorable climatic conditions and the application of N fertilizer during summer.

No sward height by season (P>0.05) interaction was detected for any of the variables studied. Herbage mass (HM) increased as sward height increased, but there was no effect of season on HM (P=0.1203) (Table 1). Swards grazed at 15 cm presented higher leaf percentage and leaf:stem ratio than those grazed at 30 and 45 cm, so steers on the shorter pastures would have been able to more readily select a diet high in leaf. No sward height effect was found for CP (P=0.4757), IVOMD (P=0.8790) or NDF (P=0.8973) concentrations in plucked samples, and the averages were, respectively, 12.8%, 63.8% and 73.7%. Apparent dry matter intake for steers grazing swards at 15 cm was higher than for those grazing pastures at either 30 or 45 cm (Table 1). As there were no quality differences in plucked samples, it seems probable that steers grazing swards at 30 or 45 cm with lower leaf percentage and consequently lower leaf:stem ratio had difficulty selecting high levels of leaf (Table 1). These findings were in agreement with several other studies (Carvalho et al. 2008; Difante et al. 2009), in which sward structure was found to be more important than nutritive value of leaf in determining herbage intake.

Table 1. Means, standard errors of the difference (s.e.) and probability levels (P) for herbage mass, leaf percentage, leaf:stem ratio and apparent dry matter intake (DMI) by steers in Piatã palisadegrass pastures subjected to 3 grazing intensities. Means followed by the same letter in the same row do not differ (P>0.05).

	Sward height (cm)				
	15	30	45	s.e.	P
Forage mass (kg DM/ha)	1.757 c	2.999 b	4.411 a	249	0.0003
Leaf %	23.1 a	16.6 b	16.8.b	1.2	0.0181
Leaf:stem ratio	1.24 a	0.83 b	0.65 b	0.1	0.0083
DMI (% live weight)	2.94 a	1.80 b	1.70 b	0.2	0.0003

Conclusion

Sward height seems to be critical in management of Piatã palisadegrass pastures. It is important to keep pastures at a height where dry matter availability is adequate and sufficient leafy material is accessible for grazing animals to satisfy appetite. A grazing height of 15 cm appears adequate to satisfy these requirements.

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