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Performance of Nelore steers in *Panicum maximum* pastures

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Resumo: O objetivo do trabalho foi avaliar o ganho de peso médio diário (GMD) de novilhos Nelore, a taxa de lotação (TL) e o ganho de peso por área (GA) em pastagens de três cultivares de *Panicum maximum*. O experimento foi conduzido em Planaltina, Distrito Federal, Brasil, durante 248 dias, divididos em período chuvoso (140 dias) e período seco (108 dias). Os tratamentos experimentais foram as cultivares Zuri, Tamani e Massai manejadas em lotação rotacionada em ciclos de pastejo de 28 dias (21 dias de descanso e 7 dias de pastejo) na estação chuvosa e 56 dias (42 dias de descanso e 14 dias de pastejo) na estação seca. Os ajustes na taxa de lotação foram conduzidos considerando a mesma oferta de forragem entre tratamentos. O GMD (novilhos desmamados de 216 kg de peso vivo) foi de 0,352, 0,391 e 0,254 kg/cabeça para as cultivares Zuri, Tamani e Massai, respectivamente. O GMD diminuiu no período seco, mas permaneceu maior para Zuri e Tamani. O maior desempenho individual foi associado a valores mais elevados de proteína bruta e digestibilidade da forragem, especialmente para a cultivar Tamani. A TL foi mais elevada para Massai e Zuri em ambas as estações do ano, enquanto o GA foi semelhante entre os tratamentos. Embora a cultivar Tamani tenha proporcionado lotação mais baixa, o GA foi parcialmente compensado por valores elevados de GMD. A cultivar Zuri conseguiu aliar maior desempenho individual com alta lotação.

Palavras-chave: digestibilidade da matéria seca, massai, proteína bruta, tamani, zuri

Abstract: The objective of this work was to compare the average daily live weight gain (ADG) of Nelore steers, stocking rate (SR) and gain per area (GA) in pastures of three *Panicum maximum* cultivars. The experiment was conducted in Planaltina, Federal District, Brazil, during 248 days, divided into rainy (140 days) and dry (108 days) season. Treatments were cultivar Zuri, cultivar Tamani and cultivar Massai managed in rotationally stocked pastures under a 28-day grazing cycle (21-d of rest and 7-d of grazing) during the rainy season and a 56-day grazing cycle (42-d of rest and 14-d of grazing) during the dry season. Adjustments in stocking rate were performed considering the same herbage allowance between treatments. ADG (216 kg weaning steers) was 0.352, 0.391 and 0.254 kg/head for Zuri, Tamani and Massai pastures, respectively. ADG decreased in dry season but kept showing higher values for Zuri and Tamani. Differences in individual performance were associated with higher crude protein and digestibility of forage, especially for Tamani. SR values were higher for Massai and Zuri pastures for both seasons of the year, but the GA was similar between all treatments. Although Tamani provided low stocking rates, GA was partially compensated by high ADG values. Cultivar Zuri succeeded to combine high stocking rates with high individual animal performance.

Keywords: crude protein, dry matter digestibility, massai, tamani, zuri

Introduction

In Brazil *Panicum maximum* cultivars are usually recommended to high-input cattle production systems, since, they present high forage production (Fernandes et al., 2014). On the other hand, they require medium-high soil fertility and rotational stocking management, especially Mombaça and Tanzânia-1 cultivars. Even though Tanzânia-1 is considered one of the most productive and adapted *P. maximum* cultivar, it is susceptible to leaf spots caused by *Bypolaris maydis* fungus (Euclides et al., 2010). Thus, Embrapa released a resistant cultivar named BRS Zuri in 2014 in order to guarantee the important role of this species for beef and dairy cattle systems.

Another important cultivar of *P. maximum* is Massai, a small-sized grass that requires less soil fertility than Mombaça and Tanzânia-1 (Volpe et al., 2008). Despite its leafy sward with low proportion of stems, in general Massai presents lower nutritive value (Brâncio et al, 2002). Released in March-2015 a new small-sized cultivar named BRS Tamani has thin leaves and presents high tillering, soil cover and nutritive value. Compared to *P. maximum* cultivars like Mombaça, Tanzânia-1 and Zuri, it has the advantage of an easier and flexible grazing management. In addition to diseases and pests resistance, forage yield and nutritional characteristics it is necessary to test the potential of these new cultivars for animal production. The objective of this work was to evaluate live weight gain of Nelore steers in pastures of three *P. maximum* cultivars, Zuri, Tamani and Massai.



Material e Methods

The trial was conducted at Embrapa Cerrados in Planaltina, Federal District, Brazil (15°35'S; 47°42'W, 993 m altitude), in an Oxysol. Evaluations were performed from December 2013 to August 2014 (248 days). The experimental design was completely randomized with two repetitions. Treatments consisted of three genotypes of *Panicum maximum* (BRS Zuri, BRS Tamani and Massai). In each experimental unit (2.6 ha) were kept at least five Nellore steers with initial weight of 216 kg. The grazing method used was rotational stocking with adjustable stocking rate based on an herbage allowance of approximately 10% (10 kg of dry matter per 100 kg of live weight per day). The experimental unit was divided into four paddocks - the rest and grazing periods in the rainy season were 21 and 7 days (140 days), respectively. In dry season (108 days), rest and grazing periods were 42 and 14 days, respectively. Nitrogen fertilization applied in the first two rainy grazing cycles, after steers left the paddock was 100 kg/ha. In addition to the average daily gain (ADG - kg/head) were also estimated the stocking rate (SR – Animal Units of 450 kg/ha) and the gain per area (GA - kg/ha/day) for both seasons. Animals were weighed (i.e. after 16 h without feed or water) once per 28-day (rainy season) or 56-day (dry season) grazing cycle. Herbage mass estimates were done in one 'control paddock' at pre-grazing by destructive samplings (twelve quadrats of 2 × 0.5 m cut at soil level). Subsamplings were performed to separate green leaf blades and green stems from dead material. All samples were dried in the air oven-forced at 55° C by 72 h. Crude protein, neutral detergent fiber (NDF), acid detergent fiber (ADF) and *in vitro* dry matter digestibility were evaluated from forage samples collected at 3rd or 4th grazing day in the control paddock by hand-plucking method. Data were analyzed using analysis of variance (Proc Mixed) with SAS (1999).

Results and Discussion

The adjustments in stocking rate were pre-established at 10% herbage allowance. Even with the use of put-and-take steers, average herbage allowance increased to 14%. Average daily gain (ADG), gain per area (GA) and stocking rate (SR) were affected by the season of the year ($P < 0.0001$), regardless of cultivar (Table 1). Due to declining rainfall from April to October, forage yield and nutritive value decrease severely in the Brazilian savannahs, affecting grazing animal performance as a whole. ADG was 0.352, 0.391 and 0.254 kg/head for Zuri, Tamani and Massai cultivars ($P < 0.01$), respectively. Pastures of Tamani provided the lowest SR ($P < 0.10$). At the same time, there was no effect of cultivar on GA ($P > 0.10$). The significant inferiority of SR for Tamani pastures was partially compensated by its high ADG value. Steers maintained throughout the year in Massai pastures in Campo Grande, MS gained 0.300 kg/head compared to 0.437 kg/head for steers in Mombaça pastures. The same trial showed SR for Massai pastures was 14% superior than Mombaça pastures (Euclides et al., 2008). Cultivar Zuri was the only one that succeed to combine high values of SR and GMD.

Table 1. Average daily gain (ADG), gain per area (GA), stocking rate (SR), herbage mass (HM), leaf blade mass, stem mass, acid detergent fiber (ADF), neutral detergent fiber (NDF) and *in vitro* dry matter digestibility evaluated in pastures of *Panicum maximum* at 248 days including rainy (140 days) and dry season (108 days).

	Cultivar ^a				Season			P values		
	Zuri	Tamani	Massai	MSE ^b	Rainy	Dry	MSE	Season	Cultivar	Season × Cultivar
ADG (kg/head)	0.352a	0.391a	0.254b	0.020	0.519	0.148	0.016	<.0001	0.0066	0.7856
GA (kg/ha/day)	0.852	0.709	0.766	0.089	2.494	0.329	0.166	<.0001	0.5515	0.4055
SR (AU/ha) ^c	2.33a	1.75b	2.36a	0.166	2.74	1.55	0.135	0.0008	0.0689	0.4694
HM (kg/ha) ^d	5008b	3962c	6261a	290.2	4843	5310	236.9	0.2124	0.0041	0.8065
Leaf blade (kg/ha)	2569a	1811b	2686a	128.1	2768	1942	104.6	0.0014	0.0057	0.2593
Stem (kg/ha)	1411a	626b	1357a	111.9	887	1376	91.4	0.0091	0.0044	0.2135
ADF (%)	40.3b	39.4b	41.7a	0.46	38.9	42.0	0.37	0.0010	0.0312	0.1871
NDF (%)	69.5b	69.0b	71.7a	0.72	69.4	70.8	0.59	0.1417	0.0823	0.1825
Digestibility (%)	58.4b	61.1a	55.1c	0.90	61.7	54.6	0.74	0.0005	0.0096	0.1505

^a Cultivar means in rows followed by the same letter are not different at $P < 0.10$ (t test); ^b MSE = mean standard error; ^c AU = animal unit equivalent to 450 kg of live weight; ^d Herbage mass, leaf blade mass and stem mass were evaluated at pre-grazing.



Zuri and Massai pastures presented higher values of herbage mass (HM), leaf blade and stem mass ($P < 0.01$), regardless of the season of year (Table 1). The lowest herbage mass explains low stocking rates for Tamani pastures. On the other hand, the proportion of leaf blades relative to stems was favorable to Tamani (2.9) when compared to Zuri (1.8) and Massai (2.0) swards. About the nutritive value of forage, both ADF and NDF were higher for Massai ($P < 0.10$), while digestibility was higher for Tamani, followed by Zuri and Massai ($P < 0.01$). Brâncio et al. (2002) verified that Massai leaves presented ADF (44%) slightly higher than Mombaça and Tanzânia-1 (43%), due to its higher lignin content (6.4 vs. 8.0%). There was effect of interaction between cultivar and season for crude protein (Figure 1; $P < 0.10$). In the rainy season, Zuri and Tamani presented 9% of crude protein while Massai had only 7%. In dry season, there was no difference between cultivars for crude protein, which was on average 5%. Low nutritive value appears to be associated with reduced animal performance in Massai pastures. As a result of a particular sward structure with low growth of stems (Fernandes et al., 2014), cultivar Tamani enables a more flexible grazing management with no extreme deterioration of nutritive value. Cultivar Zuri, a high-tufted grass needs more attention with grazing management as well as Mombaça, in order to avoid an excessive growth of poorly consumed stems.

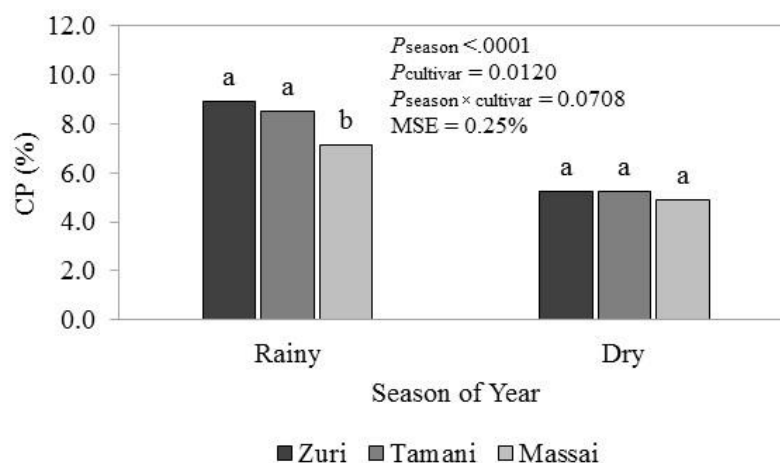


Figure 1. Crude protein of *Panicum maximum* cultivars sampled during the rainy and dry seasons. Cultivar bars followed by the same letter for each season are not different at $P < 0.10$ (t test). MSE = mean standard error.

Conclusions

Zuri and Tamani cultivars provided the highest individual performance of Nelore steers. In addition, a high stocking rate was obtained in Zuri pastures. Results confirmed cultivar Massai has nutritive value limitations that affect cattle performance, although it provides a high carrying capacity. Zuri and Tamani are good cultivar options to speed up growing and finishing cattle on pastures, especially in the rainy season.

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