Animal production from new *Panicum maximum* genotypes in the Amazon biome, Brazil

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Introduction

The *Panicum maximum* breeding program coordinated by the Brazilian Agricultural Research Corporation (Embrapa) has been evaluating and selecting genotypes under different soil and climatic conditions, with the objective to release new cultivars adapted to the diverse regions of Brazil. For the Amazon biome, small-plot experiments carried out in Acre between 2003 and 2005 allowed the selection of some promising genotypes (Valentim and Andrade 2005; Valentim et al. 2006; Andrade and Valentim 2009), with higher potential for forage growth than cultivars on the market. The objective of this work was to compare 2 new *P. maximum* genotypes with cv. Tanzânia in relation to carrying capacity and animal performance, when managed under rotational stocking in the Amazon biome.

Methods

This grazing experiment was carried out between October 2010 and September 2012 in Rio Branco, State of Acre, Brazil. The local climate is Am according to Köppen-Geiger classification and the soil is classified as Haplic Plinthosol. Three *Panicum maximum* genotypes (accession PM32, hybrid PM46 and cv. Tanzânia) were tested in a randomized block design with 2 replications. Each experimental unit was 1.0 ha divided into 3 paddocks of 0.33 ha, managed under a 42-day rotation with a rest period of 28 days. Three Aberdeen Angus x Nelore heifers were used as tester animals. Additional animals (regulators) were placed in or removed from each paddock according to pasture height targets (PM32 and Tanzânia, pre-grazing 70−75 cm and post-grazing 30−35 cm; PM46, pre-grazing 50−55 cm and post-grazing 25−30 cm). Pastures were fertilized with 240 kg/ha of reactive rock phosphate, 100 kg/ha of simple superphosphate and 50 kg/ha of potassium chloride at establishment, and 300 kg/ha of urea was applied annually.

Animals were weighed every 28 days after a fasting period of 16 h. Carrying capacity in AU (450 kg) per ha was calculated according to the mean weight and number of animals/days in each experimental unit. Animal production (kg/ha of live weight) was calculated based on animal daily gain and the number of animals/day in each experimental unit. Green forage allowance was calculated for each grazing cycle, dividing the green dry matter (kg/ha) by stocking rate (kg/ha of live weight), as proposed by Sollenberger et al. (2005). Data obtained for the various stocking cycles were grouped into rainy (October−April) or dry (May−September) season and were analyzed according to a randomized complete block design with repeated measures in time, using a mixed model with the fixed effects of genotype, season and their interactions, and the random effect of block. Significant interactions ($P<0.10$) were conveniently broken down. Least squares means were compared using Fisher's protected LSD ($P<0.10$).

Results

There was a significant ($P<0.10$) genotype x season interaction for carrying capacity, with hybrid PM46 showing consistently a lower carrying capacity than the other genotypes during the rainy seasons (Table 1). The Plinthosol of the experimental area became waterlogged during the February−March period in both years and this decreased growth of hybrid PM46, which is highly intolerant of soil waterlogging (Andrade and Valentim 2009). To avoid stand loss of hybrid PM46, animals were removed for about 60 days each year and this lowered its carrying capacity during the rainy seasons.

The grazing management adopted, with adjustment of stocking rate based on predetermined pasture height goals, ensured a similar green forage allowance ($P>0.10$)

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for the genotypes throughout the experimental period (Table 1). Despite this, hybrid PM46 supported greater (P<0.10) daily liveweight (LW) gains, demonstrating its superior forage quality to the other genotypes. This is related to the plant architecture of this grass, with smaller plant size than traditional *P. maximum* cultivars like Tanzânia, maintaining a pasture structure more favorable to high forage intake, with higher percentages of green leaves and lower percentages of dead material (Farinatti et al. 2012).

The highest animal production (P<0.10) was obtained during the second rainy season, but it did not vary among genotypes (P>0.10), with an annual average of 847 kg/ha/yr of LW gain (Table 1). This rather high production per unit area is a consequence of the level of nitrogen fertilizer used (135 kg/ha/yr of N) and the climatic conditions of the region. Thus, the higher daily gains of the heifers on hybrid PM46 compensated for the lower carrying capacity of this pasture during the rainy seasons.

Table 1. Carrying capacity, forage allowance, animal performance and production of heifers (Aberdeen Angus x Nelore) on *Panicum maximum* genotypes under grazing during 2 years.

Genotype	2010 − 2011		2011 − 2012		Annual mean
	Rainy	Dry	Rainy	Dry	
		Carrying capacity (AU/ha)[2]			
PM46	2.69 Ba[1]	2.23 Ab	2.79 Ba	2.28 Ab	2.51
PM32	3.42 Ab	2.50 Ac	3.83 Aa	2.63 Ac	3.14
Tanzânia	3.30 Aa	2.30 Ac	3.45 Aa	2.54 Ab	2.93
Mean	3.14	2.34	3.36	2.48	2.86
		Green forage allowance (kg DM/kg LW)			
PM46	1.75	1.53	1.52	1.83	1.66 A
PM32	1.50	1.37	1.33	1.59	1.49 A
Tanzânia	1.60	1.69	1.43	1.50	1.56 A
Mean	1.61 a	1.53 a	1.42 a	1.64 a	1.55
		Animal performance (g/hd/d)			
PM46	718	646	682	639	672 A
PM32	520	533	559	510	532 B
Tanzânia	470	488	568	499	509 B
Mean	569 a	556 a	603 a	550 a	571
		Area production (kg LW/ha)			
PM46	455	400	485	384	862 A
PM32	434	390	558	389	886 A
Tanzânia	360	334	523	371	794 A
Mean	416 b	375 b	522 a	381 b	847

[1]Means followed by different letters, upper-case in columns and lower-case in rows, differ at P<0.10.
[2]AU = 450 kg live weight.

Conclusion

The *Panicum maximum* hybrid PM46 has greater potential for beef cattle production under grazing in the Amazon biome than accession PM32 and cv. Tanzânia, but it should be released for areas with well-drained soils.

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