Canopy changes of brachiaria managed under continuous stocking in the dry-water transition

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Key words: herbage allowance; protein supplementation; trough.

Abstract: Pasture supplementation is an alternative to take advantage of the forage mass deferred in the rainy season and maintain or provide weight gain in periods of rain absence. The objective was to compare the structural characteristics, mass production, density and population dynamics of tillers of *Urochloa brizantha* cv. 'Paiaguas' and *U. spp*. cv. 'Convert' under fixed and continuous stocking with steers supplemented in the trough or on the ground in the water/dry transition period. The experiment was carried out at Jatai Federal University, from March to June, in a completely randomized design and a 2x2 factorial scheme, using six paddocks/treatment. The completely randomized design was adopted and variance analysis was performed with software SAS following the GLM procedure, were compared using repeated-measures. There was a significant interaction between Brachiaria and the method of supplementation for basal, aerial, and total tiller density. Convert had an average of 551 basal and 577 total tiller/m^2. Paiaguas grass presented higher tiller density (1,03 vs. 582 tiller/m^2) and higher tiller birth rate (12.92 vs. 9.14%) than Convert. No significant difference was observed between brachiarias. The average height of Paiaguas was 62.34 and 50.70 cm for Convert. The average height was 57.83 and on the ground it was 54.90 cm. Supplementation offer method changed Paiaguas canopy. The Convert showed higher leaf and dead mass production but lower weeds despite its smaller tillering.

Introduction

Pasture supplementation is an alternative to take advantage of the forage mass deferred in the rainy season and maintain or provide weight gain in the dry season. Pasture characteristics that allow the description of its structure are relevant in the evaluation of pastures because they influence grazing behavior, forage digestibility, and the animals performance and allow the evaluation of forage nutritive value. Thus, determination of the mass of morphological components in the pasture is essential (Santos et al. 2010).

Understanding forage productive potential and its morpho-structural characteristics is important for the selection of correct management practices that will promote pasture perennity while granting an adequate supply of good quality mass for grazing. Thus, knowledge of how the tillering forage occurs is one way to reach high productivity in the pastures throughout the year and at same time looking for its perennity. The objective was to compare the mass production, tiller density, and population dynamics of *Urochloa brizantha* cv. Paiaguas and *Urochloa spp*. cv. Convert under continuous stocking of steers supplemented with pelleted concentrate supplied in the trough or on the ground in the water/dry transition period.

Materials and Study Site

The experiment was carried out in the Beef Cattle Sector at Jatai Federal University, in the southwestern region of Goias State, from March to June of 2020. The total monthly rainfall measured at the experiment locally decreased from 103.0 mm (March) to 6.6 mm (June) and average temperatures fell from 24.3 to 19.0ºC. It evaluated *Urochloa brizantha* cv. Paiaguas and *Urochloa spp*. cv. Convert with two different supplementation methods (in-trough and on-ground) in three cycles, using 36 Nellore steers, averaging 24 months of age. There were used continuous and fixed stocking rate with 2 animal unit/paddock which means that the same five steers stayed in the paddock from the beginning to the end of the assay. The steers were distributed in 12 paddocks, being six with in-trough supplementation and six with on-ground supplementation. Pelletized protein supplement (7% P, 1-1.7% Ca, 20% CP, 64% TDN, 15.000 IU vitamin A, 0.02% selenium, other microminerals and monensin) was provided once a day, at 10:00 am.

To determine total dry mass (DM), three areas/paddock of 0.25 m^2 were collected to the ground with scissors. Samples were separated in botanic fraction (brachiaria and weeds) and morphologic fraction, leaf, stem, dead mass and inflorescence. Then, these fractions were weighed, dried, milled, homogenized and quartered to obtain a representative sample to dry on an oven-dried at 105°C and calculate dry matter (Silva & Queiroz 2002).
In each paddock, three points were chosen in which the sward was representative of the average grass height and at each of these places a PVC ring measuring 350 mm in diameter was installed. Evaluations of tiller dynamics and population dynamics were performed by counting basal and aerial tillers and conducting vessels of aerial and basal tillers.
The completely randomized design was adopted and variance analysis was performed with software SAS following the GLM procedure, were compared using repeated-measures GLM, cultivars and supplementation methods (in-trough and on-ground), and the interaction term as fixed factors, and cycles as repeated measure to analyze mass production, density, and population dynamics of tillers.

Results and Discussion

There was a significant interaction between forage and supplementation method for the basal, aerial, and total tillers density and for supplementation method for Paiaguas.
Convert had an average of 551 basal and aerial tillers and 582 and 572 total tiller/m^2, on-ground and in-though supplementation, respectively, which indicates that there was no representative presence of sap conducting vessels which represented 5.3 and 5.4% of the total tillers. The presence of high percentage of sap conducting vessels can indicates that the canopy management was inadequate or higher than it must be done.
Paiaguas presented higher tiller density (1,03 vs. 582 tiller/m^2) and higher tiller birth rate (12.92 vs. 9.14%) than Convert, which can demonstrate higher resilience and a greater likelihood of persistence. No significant difference was observed between the brachiarias, regardless of supplementation method, for sap conducting vessel density and tiller mortality rate (Table 1).

Table 1. Basal and aerial tillers density (DBA), conducting vessels of basal and aerial tillers (VBA), total tillers density (TD), birth (TB) and mortality tillers rate (TM) and conducting vessels of tillers basal and aerial density (VBA) in Paiaguas and Convert grazed by Nellore animals being supplemented on the ground and in the trough

Variables	Paiaguas		Convert		Pr> F
	on-ground	in-trough	on-ground	in-trough	
DBA (tiller/m^2)	946	624	551	551	0.05
DT (tiller/m^2)	1,03	675	582	572	0.01
VBA	53		31		ns
TN (%)	12.92		9.14		0.01
TM (%)	55		58		ns

The average height of Paiaguas was 62.34 cm and 50.70 cm for Convert. In the paddocks where the supplementation was offered in the trough, the average height was 57.83 cm and on the ground it was 54.90 cm. The highest tillering was observed in Paiaguas when the supplementation was fed on the ground, and this could be explained by higher forage defoliation stimulated by the supplementation method. Stocking rate of just 2 ua/ha resulted in a high forage allowance, which permitted an excessive forage growth and leaving the apical meristem exposed. When tillers were defoliated by ruminant livestock, they removed the meristem, which caused great tiller mortality.

On the other hand, lower rates of tiller development indicates that lower light quantity and, more importantly, lower light quality is penetrating lower in the canopy strata (Rosa 2015).

The higher tiller birth rate in Paiaguas occured at the end of data collection period, probably, due to apical meristem decapitation and tiller mortality which permitted that more light penetrating lower in the canopy and stimulating new tillers.

According to Fiori et al. (2016) the regenerative capacity of foliar tissue is one of the most important reasons why tropical grasses persist after defoliation, since the apical meristem remains preserved below the defoliation level. When the apical meristem is eliminated, tillering through the basal bud becomes a most important process. In these cases, there will be an increase in both basal and aerial tillers, changing the canopy and increasing perennity and functionality.

The herbage mass of Convert was higher than for Paiaguas (7,62 and 6,14 kg/ha, respectively). Normally, higher DM values are related to plant age, but in this experiment it was observed that senescent biomass was significantly larger in Convert (3,53 vs. 2,65 kg/ha), which may explain its higher total herbage production. Paiaguas samples had less leaf production (1,29 vs. 1,99 kg/ha) and larger weeds production (1,01 vs. 105 kg/ha), which could explain the higher amount of senescent biomass from Convert (Fig. 1).

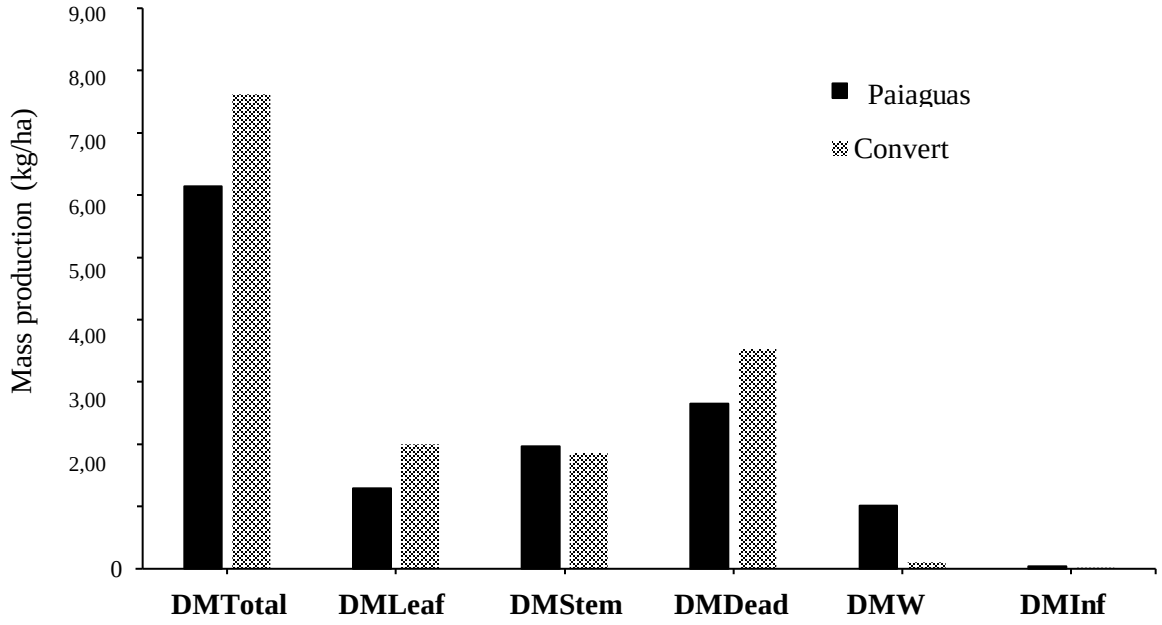

Figure 1. Total dry matter production (DMTotal), leaf mass (DMLeaf), stem mass (DMStem), dead mass (DMDead), weeds mass (DMW) and inflorescence mass (DMInf), in kg/ha, in four collects of Paiaguas and Convert, in experimental period during dry-water transition (May to June)

Conclusion

Supplementation feeding method changed Paiaguas canopy. Convert showed higher leaf and senescent biomass but lower weeds despite its lower amounts of tillering. This could mean that this cultivar has a greater ability to dominate and persist, despite the Paiaguas tillering more, indicating greater resilience when the supplement was provided on the ground, probably, as a result of the substitutive effect observed by the great quantity senescent mass.

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