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ANIMAL PRODUCTION IN PIATÃ GRASS PASTURE IN AN INTEGRATED SYSTEM

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ABSTRACT
This work aimed to evaluate the average daily weight gain, area gain and stocking rate of beef cattle in Piatã grass pasture in an integrated crop-livestock-forest system. The experiment was carried out at Embrapa Beef Cattle, crop 2018/2019. The experimental design was in randomized blocks with the treatments arranged in subdivided plots, with 3 treatments (ICLF28, ICLF22 and ICL) and 4 repetitions. The evaluation months were from January to May 2019. The paddocks were managed under continuous stocking and variable stocking rate, with the average initial animal load of the paddocks being 1.3 animal unit ha^{-1}. The average daily weight gain, kg day^{-1} was estimated by the difference in weight of the evaluator animals, divided by the number of days between weighings. The stocking rate, animal unit ha^{-1} monthly was estimated as the product of the average weight of the evaluating and regulating animals, by the number of days they remained in the paddocks. The weight gain per area, kg ha^{-1} was obtained by multiplying the average daily gain of the evaluator animals by the animals' number per hectare per month. The stocking rate and daily weight gain was higher in the months of January and February, regardless of the systems.
Key words: Stocking rate; Average daily weight gain; weight gain per area

INTRODUCTION

According to Simeão et al. (2016), in Brazil, there are more than 100 million hectares with cultivated pastures, mainly with *Urochloa* spp. It is estimated that 80% of pastures in Central Brazil are and/or are in some degradation degree (CORDEIRO et al., 2015), which compromises the sustainability of animal production.

The integrated crop-livestock-forest (ICLF) system is a sustainable production strategy, which integrates crop, livestock and forestry activities, carried out in the same area, in intercropped crop, in succession or rotation and seeks synergistic effects between the components of the agro-ecosystem, contemplating environmental adequacy, valuing man and economic viability (BALBINO et al., 2011).

In shaded systems the forage nutritive value can be affected and it becomes a basic factor to be considered, as animal production is influenced by this factor, reflecting in improvements in weight gain. Improvements in the forage composition under intense shading have been observed by several authors (PACIULLO et al., 2007; SOARES et al., 2009).

Gamarra (2015), in the 5th year of evaluation when comparing the ICL system with the ICLF, observed improvements in the forage composition of the forage in the ICLF system in relation to the

ICL, with crude protein (CP) contents of 10% in the ICLF and 7.3% in the ICL; 70.3% NDF in the ICLF versus 72.5% in the ICL in the summer. There were no differences in the average daily gain with an average of 0.403 kg day^{-1}. The stocking rate in the summer was 3.35 and 2.96 animal unit (AU) ha^{-1}, and in the winter, 1.37 and 1.17 AU ha^{-1} for the ICL and ICLF systems, respectively.

Animal production on pastures varies according to the seasonality of forage production. Oliveira et al. (2014) obtained similar weight gains ha^{-1} between the different productive systems, even with shading promoted by the forest component in winter. In the water seasons, spring and summer, and in the fall, however, the weight gain ha^{-1} was reduced as the shade percentage in the system increased. These results show that the differences in animal performance are due to the higher forage masses, and generally due to the greater radiation availability for photosynthesis.

Thus, the aim was to evaluate the weight gain and stocking rate of beef cattle in Piatã grass pasture in an integrated crop-livestock-forest system.

MATERIAL AND METHODS

The experiment was carried out at the Technological Reference Unit (TRU) in Agrosilvipastoral systems, from Embrapa Beef Cattle, in Campo Grande-MS, Brazil. The region is located in the Cerrado biome, with an average annual rainfall of 1,560 mm, with defined seasons of rain from September to April and drought from May to August.

The experimental area used was composed of three systems: Integrated Crop-Livestock-Forest systemwith 28 m of eucalyptus rows (ICLF28); Integrated Crop-Livestock-Forest system with 22 m of eucalyptus rows (ICLF22); Integrated Crop-Livestock system (ICL).

The experimental design was a randomized block with the treatments arranged in subdivided plots, with 3 treatments in the plots (ICLF28; ICLF22; ICL) and 4 repetitions. The harvest months were January, February, March, April and May 2019 and the sample points A, B, C, D and E composed the subplots.

The paddocks were implanted in Piatã grass pasture and managed under continuous stocking and variable stocking rate, with the average initial animal load of the paddocks being 1.3 AU ha^{-1}. The stocking rate adjustment was carried out on the days of the animals' weighing. A variable number of regulating animals was used when necessary, according to the forage mass, following the recommendations of Machado and Kichel (2004). All animals received water at will and mineral supplement.

The animals were weighed individually and monthly, the average daily weight gain (ADWG, kg day^{-1}) was estimated by the difference in weight of the evaluator animals, divided by the number of days between weighings. The monthly stocking rate (SR, AU ha^{-1}) was estimated as the product of the average weight of the evaluating and regulating animals, by the number of days they remained in the paddocks. The animal weight gain per hectare (WGA, kg ha^{-1}) was obtained by multiplying the average daily gain of the evaluator animals by the number of animals per hectare per month.

The data were subjected to analysis of variance and the means were compared using the Tukey test at 5% probability. The analyzes were performed using the SISVAR statistical package (Ferreira, 2008).

RESULTS AND DISCUSSIONS

For the stocking rate, average daily gain and weight gain by area (Table 1) there was no difference among the systems, however there was a significant difference among the sampling months.

Table 1. Stocking rate (SR), Average daily weight gain (ADWG) and weight gain per area (WGA) in the sampling months.

Variable	January	February	March	April	May	CV	P value
SR (AU ha^{-1})	2.3 a	2.1 a	1.62 b	1.58 b	1.47 b	8.80	<0.01
ADWG (kg day^{-1})	0.630 a	0.624 a	0.529 b	0.517 b	0.498 b	15.35	<0.01
WGA (kg ha^{-1})	73 a	74 a	74 a	65 b	63 b	22.10	<0.01

Means followed by the same lowercase letter on the row, do not differ by the Tukey test (P> 0.05).

The highest stocking rates and average daily weight gain were found in the months of January and February. The months of January, February and March resulted in the highest values for weight gain per area.

The best results found in the initial months of the experiment, January, February and March, can be related to the environmental conditions in which the Piatã grass was, vigorous and in full development, with regular rains and the beginning of grazing after sealing the pasture.

The lowest values were obtained in the final months of the experiment, April and May, months when the rains were irregular and showing scarcity, typical of the region, causing the Piatã grass development to be limited.

These results demonstrate that the tree component used together with the characteristics that they presented during the experiment did not harm animal production in the different systems (ICL and ICLF), the determining factor occurred in the months of sampling.

Coelho (2011) and Santos (2011), evaluating average daily weight gain in the initial phase of three integrated systems with eucalyptus and Piatã grass, also did not observe any difference. The authors relate to the fact that the trees are in an early development stage, and the shading was not enough to decrease the pasture production and consequently the animals weight gain.

The similar average daily weight gain in the systems can be attributed in part to the Piatã grass quality, since it is the first grazing cycle after the eucalyptus thinning, which provided greater solar radiation and also the year season when the experiment was carried out, as the rains were very well distributed throughout the period.

The lower ADWG and WGA values, observed in the final months, reflect the lower leaf blade percentages and the higher dead material percentages, reducing the Piatã grass nutritional quality.

CONCLUSIONS

The stocking rate and daily weight gain were higher in the months of January and February, regardless of the integration system used.

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