Animal Performance in Pastures of *Panicum maximum* cv. IPR 86 Fertilized with Nitrogen

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ANIMAL PERFORMANCE IN PASTURES OF *Panicum maximum* cv. IPR 86 FERTILIZED WITH NITROGEN

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Abstract

The experiment was carried out at the Experimental Station of the IAPAR in Paranavaí–PR, Brazil, from October 1998 to May 1999 to evaluate the response of crossbred steers grazing pastures of *Panicum maximum* cv. IPR 86 fertilized with four doses of N (0; 150; 300 and 450 kg.ha^{-1}.year). The grass was grazed according to a rotational grazing system with grazing cycles (GCs) of 40 days (grazing period of 5 days and rest period of 35 days). It was used a randomized complete block design, with split-plots, and two replications per treatment, being the N-doses studied in the main plots and the GCs in the sub-plots. The availability of green leaf-blades increased with the increase of N-doses, resulting in 4.09; 8.18; 11.18; and 13.92 steers.ha^{-1}.day^{-1}and daily LWG of 2.73; 5.25; 7.40; and 9.24 kg.ha^{-1} when the pastures were fertilized with 0; 150; 300 and 450 kg N.ha^{-1}, respectively. The efficiency of N-utilization was 3.35; 3.11; and 2.89 kg LWG kg.N^{-1} when the pastures were fertilized with 150; 300; and 450 kg N.ha^{-1}, respectively.

Keywords: carrying capacity, liveweight gain, nitrogen, *Panicum maximum*, stocking rate

Introduction

Several cultivars of *Panicum maximum* Jacq. recently released in Brazil were well accepted by the farmers due to their adaptation to different edaphic and climatic conditions as well as their high potential for forage production. Other accesses, such as BRA-006998, registered as cv. IPR 86, are still being studied by the research Institutions and may be released in a near future. This species has a high requirement of N, especially in soils with low levels of organic matter. There are many papers reporting the responses of tropical grasses to the application of a wide range of N-doses. Unfortunately there are not too many papers reporting animal production under these conditions. The objective of this work was to determine the effects of four N-doses on forage production and animal performance in pastures established with the new cultivar IPR 86 in the northwest region of the State of Paraná, Brazil.

Material e Methods

The experiment is being conducted at the Experimental Station of the IAPAR in Paranavaí-PR, Brazil, ($23^0$00'05'' S, $42^0$02'06'' W, and 480m above sea level). It was initiated in 11/1997 and will be concluded in 11/2001. The data presented in this paper were obtained from October 15, 1998 to May 03,1999 (200 days).

The region has a subtropical climate (Cfa – humid and mesothermic) with an annual average temperature of 22^0 C and 1500 mm of rainfall (Muzilli et al., 1990). The soil of the experimental area was classified as red-yellow Podzolic, sand-texture, flat and well drained.

The treatments consisted of four N-doses (0; 150; 300; and 450 kg.ha^{-1}) applied as calcium nitrate and distributed throughout the growing season (Nov., Jan., and Mar.) according to a randomized complete block design, with split-plots, and two replications per treatment, being the N-doses studied in the main plots and the grazing cycles (GCs) in the sub-plots. The area was divided in 8 paddocks to allow a rotational grazing system (variable stocking) with a grazing period of 5 days and a rest period of 35 days. Treatments 0 and 150 kg N.ha^{-1} were allocated to paddocks with 1.35 ha, and treatments 300 and 450 kg N.ha^{-1} to paddocks with 0.68 ha. Crossbred steers (Nelore x Red Angus, Nelore x Marchigiana, and Nelore x Simental) with 12 months of age and an average LW of 248 kg were equally distributed by the treatments. Three animal-testers were maintained in each treatment throughout the experimental period. The stocking rate (SR) adjustment was done considering that 70 % of green leaf-blades (GLB) DM produced would be consumed by the animals, allowing an intake of 11 kg of GLB-DM.AU^{-1}. The SR was adjusted every 10 days, after sampling to determine forage availability. The animals received water and mineral mixture “ad-libitum” and preventive applications of vermifuge against endo and ectoparasites.

The effects of N-doses were evaluated by regression analysis using the procedures GLM and REG (SAS, 1990).

Results and Discussion

The DM availability of GLB before grazing increased with the increase in the N-doses presenting the following overall means for GC: 1136; 2857; 3663; and 4384 kg.ha^{-1}, respectively for the treatments 0; 150; 300; and 450 kg N.ha^{-1}. Increases in DM availability with the increase in N-doses up to 500 kg N.ha^{-1} were also observed in a rotational grazing system using *P. maximum* (Crespo, 1986).

The average daily gain (ADG) was not affected (P>0,01) by N-doses with values of 0.668; 0.641; 0.644; and 0.664 kg.animal^{-1}.day^{-1}, when the pastures were fertilized with 0; 150; 300; and 450 kg N.ha^{-1}, respectively. It has been shown that increases in beef cattle production can be obtained due to the increase in the SR associated with the N-fertilization (Setelich et al., 1998). The ADGs obtained in this work are similar to those reported by Euclides (1995) for several cultivars of *P. maximum* but lower than that registered by Tosi (1999) working with crossbred steers in pastures of Tanzania-grass (*P. maximum* cv. Tanzania).

The SR was affected (P<0.01) by N-doses (N), by GC and by the interaction NxGC. The effects of the N-doses in each GC is shown in Figure 1. In all GCs the N-fertilization increased the number of steers.ha^{-1}.day^{-1}. Stocking rates responses to N-fertilization were better in GCs 2 and 1 (Figure 1) with the maximum doses of N resulting in an increase of 4.43 to 3.69 times in the SR when compared to the control. The LWG.ha^{-1}.day^{-1} was affected (P<0.01) by N-fertilization (N), by GC and by the interaction N x GC. The effects of N-doses on the LWG were linear (Figure 2). In all GCs occurred an increase in the gain.ha^{-1}.day^{-1} due to the N-fertilization. The maximum N-doses allowed an increase of 4.32; 3.66; 3.32; 3.19; and 2.77 times in the LWG.ha^{-1} in the GCs 2; 1; 4; 3; and 5, respectively. The LWGs of 2.73; 5.25; 7.40; and 9.24 kg.ha^{-1}.day^{-1} in the treatments 0; 150; 300; and 450 kg.ha^{-1}, respectively, indicate the high potential of IPR 86 for DM production of a good quality forage as well as the good performance of the crossbred steers used in the experiment.

The efficiency of N-utilization was 3.35; 3.11; and 2.89 kg LWG.kg N^{-1} when the pastures were fertilized with 150; 300; and 450 kg N.ha^{-1} respectively. These values are in agreement with those reported for tropical pastures by Gomide (1989).

It is concluded nitrogen fertilization estimulated forage growth resulting in higher pasture carrying capacity and weight gain per hectare.

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GC1 Y = - 0.140 + 2.4870 N P<0.01 R^2 = 0.98
GC2 Y = - 0.415 + 3.5700 N P<0.01 R^2 = 0.99
GC3 Y = 1.585 + 3.8020 N P<0.01 R^2 = 0.99
GC4 Y = 2.145 + 3.9560 N P<0.01 R^2 = 0.93
GC5 Y = 5.496 + 0.0172 N P<0.01 R^2 = 0.91

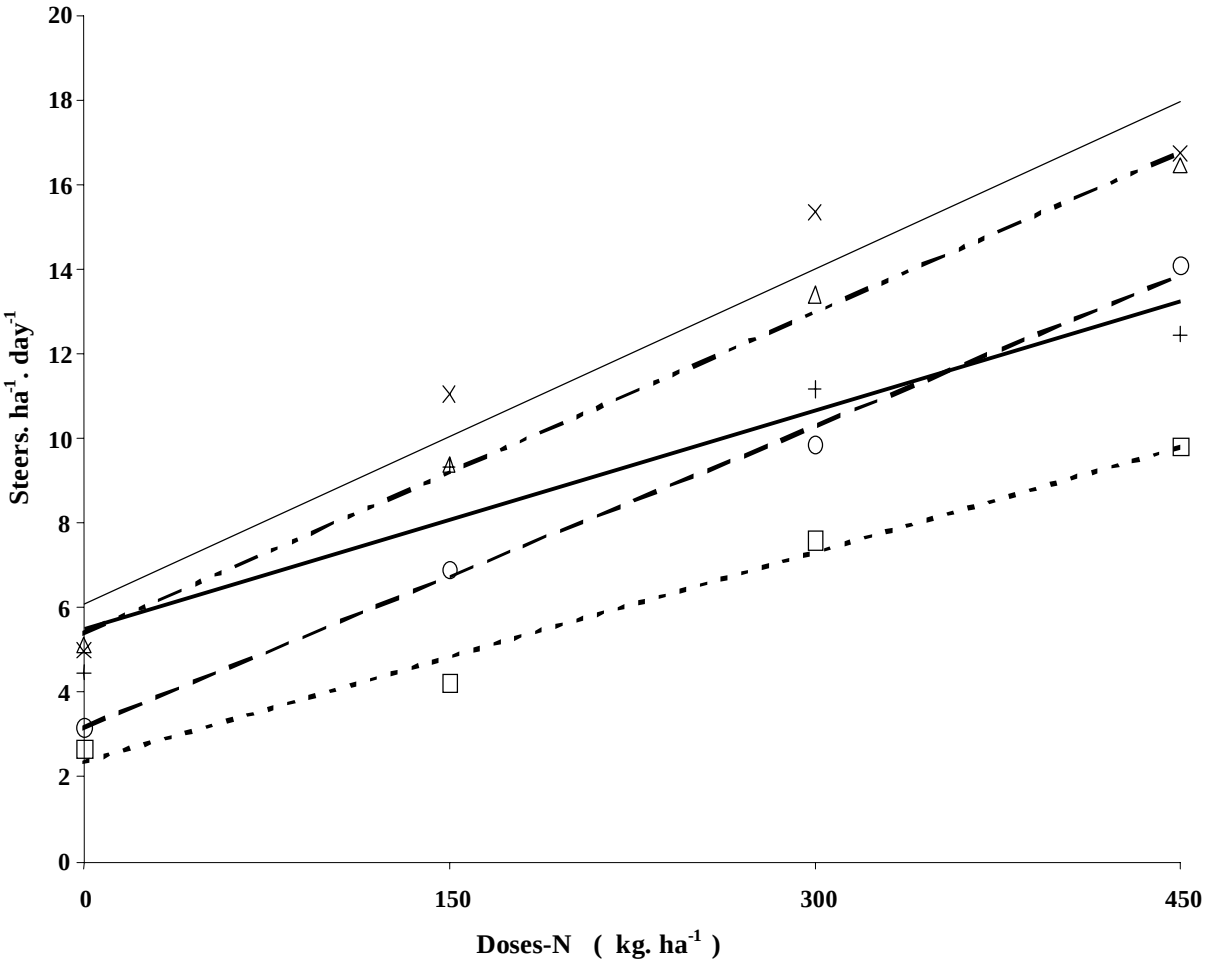

Figure 1 - Effects of four nitrogen doses on the number of steers.ha^{-1}.day^{-1} in five grazing cycles (GC1: □ ----- ; GC2: ○ – – – ; GC3: Δ –··–··– ; GC4: × —— ; GC5: + ——) in *Panicum maximum* Jacq. cv. IPR 86 pastures from 10/15/1998 to 05/03/1999 (200 days).

GC1 Y = 1.521 + 0.0109 N P<0.01 R^2 = 0.98
GC2 Y = 2.029 + 0.0157 N P<0.01 R^2 = 0.99
GC3 Y = 3.486 + 0.0167 N P<0.01 R^2 = 0.99
GC4 Y = 3.945 + 0.0174 N P<0.01 R^2 = 0.96
GC5 Y = 3.549 + 0.0114 N P<0.01 R^2 = 0.93

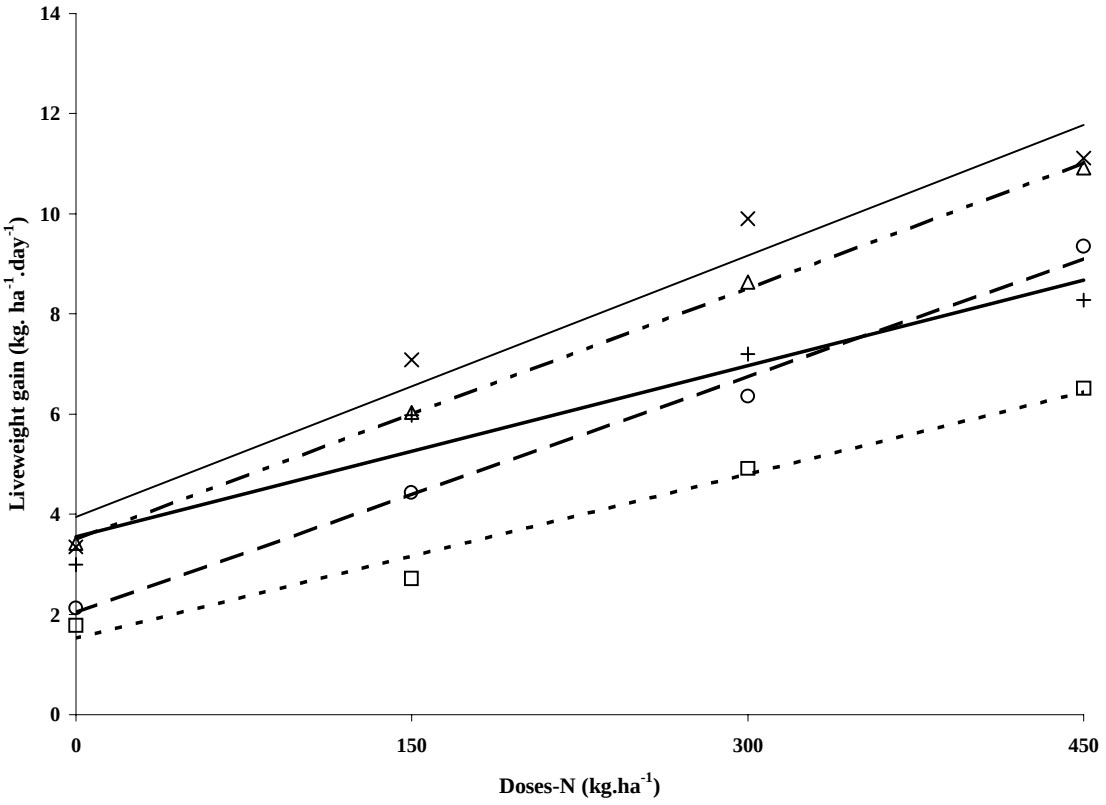

Figure 2- Effects of four nitrogen doses on the liveweight gain of steers in five grazing cycles (GC1: □ ----- ; GC2: ○ −−−; GC3: Δ −··−·· ; GC4: × ——; GC5: +——) in *Panicum maximum* Jacq. cv. IPR 86 pastures from 10/15/1998 to 05/03/1999 (200 days).