Impact of nitrogen fertilization on animals grazing ryegrass pastures

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In Brazil, approximately 95% of beef production occurs in pastoral systems, highlighting its significant agricultural importance. Fertilizers, especially nitrogen (N), play a crucial role in improving forage performance, thereby increasing forage availability and subsequently improving animal performance. This study aimed to evaluate animal performance in response to different sources of nitrogen fertilizer applied to annual ryegrass (*Lolium multiflorum Lam*). The experiment was conducted at the Experimental Station of the Federal University of Rio Grande do Sul, in Eldorado do Sul, during the years 2021 and 2022. 12 paddocks were used, each with approximately 1.5 hectares (ha), arranged in a grid. Complete randomized blocks with four treatments and three replications. Treatments included control (no N), urea (46% N), ammonium nitrate (NH_4NO_3, 32% N), and a mixture of ammonium nitrate with calcium and sulfur (NH_4NO_3+, 27% N + 5% Ca + 3, 7% S). The fertilized paddocks received 60 kg N ha^{-1} in each stocking season. Pasture management was carried out under continuous stocking with put-and-take animals to maintain the pasture at 20 cm, following the concept of "Rotatinous" grazing (i.e., target pasture that reduces grazing time per unit of matter dry ingested). In 2021, 48 Brangus steers were used, aged 18 months and weighing an average of 175 kg, while in 2022, 24 Brangus heifers were used, aged 24 months and weighing 361 kg. All animals tested and placed and removed were weighed at the beginning and end of each stocking station. The data were submitted to ANOVA with a significance level of 5% ($P<0.05$). Means were compared using the Tukey test with a significance level of 5% ($P < 0.05$). The study revealed that nitrogen fertilization significantly increased stocking rate and live weight gain per area in Italian ryegrass pastures compared to unfertilized areas. In this case, the unfertilized areas showed a stocking rate of 668 kg LW day^{-1} compared to the N treatments; urea, NH_4NO_3 and NH_4NO_3 + Ca + S which presented, respectively, 1064, 1066, 1123 kg LW day^{-1}. Regarding live weight gain per area, the following values were observed; in the control 197 kg LW ha^{-1}, urea with 296 kg LW ha^{-1}, NH_4NO_3 with 289 kg LW ha^{-1} and NH_4NO_3 + Ca + S with 316 kg LW ha^{-1}. Specifically, the absence of nitrogen fertilization led to an average reduction of 52% in the animals' live weight gain per area. No significant differences were observed between the different nitrogen sources tested. This highlights the critical importance of nitrogen fertilization in improving animal performance on pastures.

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