Effect of Forage Allowance on Native Pasture Traits, Stocking Rate and Beef Cow Body Condition

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Introduction

Stocking rate is a poor indicator of grazing intensity because, in contrast to forage allowance, it gives no information of feed availability. Forage allowance (FA), measured as kg of forage dry matter (DM) per kg of live weight (LW), is the ratio between forage mass and stocking rate (Sollenberger *et al.* 2005). Crossbred cows demonstrated higher production efficiency than purebreds in poor and rich quality pastures (Barlow *et al.* 1994) but few experiments have been conducted under different FA in Campos grasslands with growing beef steers (Maraschin *et al.* 1997, Soares *et al.* 2005), and no work has been conducted with beef cows during various gestation-lactation cycles. Also, there have been no studies on FA to test for interations between cow genotype and environment. The objective of this work was to test the effect of two FA and two cow genotypes on pasture traits, stocking rate and body condition score (BCS) of cows.

Methods

This study was conducted in Uruguay (32º 20` S, 54º 26` W) to determine the effect of two forage allowances (FA) on pasture mass, height and accumulation, stocking rate and body condition score (BCS) using pure (Hereford and Angus) and crossbred (F1 reciprocal crosses) beef cows. In eight plots, four per block, the effects of two FA per two cow genotype were tested from August 2007 to March 2010. Forage allowance varied seasonally, in HIGH (5, 3, 4 and 4 kg DM/kg LW) and LOW (3, 3, 2 and 2 kg DM/kg LW) during autumn, winter, spring and summer; respectively. Continuous stocking method was applied throughout the year, with FA adjusted monthly, using the "put and take method".

Forage mass at ground level (kg DM/ha) and height (cm) were estimated by the comparative yield method (Haydock and Shaw, 1975). Forage accumulation (kg DM/ha/d) was estimated by mobile cages, according to `t Mannetje (1978). Thirty PURE (Hereford and Aberdeen Angus) and thirty CROSS (F1 reciprocal Hereford and Angus crosses) multiparous cows aged four to eight years with normal calving and pregnant were randomly assigned to the plots. Cow BCS was visually assigned monthly, on a scale ranking from 1 = very thin to 8 = very fat (Vizcarra *et al.* 1986). Data of forage mass, height and accumulation, cow BCS and stocking rate were analysed by repeated measures using the MIXED procedure (SAS Institute, Cary, NC, USA, 2002). The model included FA, cow genotype, season and their interactions as fixed effects and block as random effect. Tukey–Kramer tests were conducted for mean separation ($\alpha = 0.05$). Relationship between rainfall and forage accumulation was analysed by PROC REG of SAS, excluding winters from the database because pasture species were mainly C_4.

Results

Forage mass and height were higher ($P<0.01$) in HIGH than in LOW during summer 2008, autumn 2008 and summer 2010. Average stocking rate was similar ($P>0.2$) between HIGH and LOW (382 vs 398 ± 28 kg LW/ha), but the interaction of FA x season was significant (Fig 1B). Average forage accumulation differed ($P=0.0536$) between HIGH and LOW, 14.7 vs 12.1 ± 1.7 kg DM/ha/d respectively. Rainfall (x) affected ($P<0.01$, r2 = 0.59) forage accumulation (y) and the relationship was $y = -6.09 + 0.12 x - 0.00011 x^2$.

Higher forage accumulation in HIGH leaded to higher forage mass than in LOW and allowed to sustain a similar stocking rate between treatments. Control of FA allowed variations of stocking rate according to forage accumulation and rainfall (Fig. 1). In spite of the variations in forage mass and accumulation, cow BCS in HIGH was similar between autumn and spring in years of contrast rainfall, and higher ($P<0.05$) than in LOW from summer 2009 to summer 2010. Average cow BCS was higher in CROSS (4.2 ± 0.04) than in PURE (4 ± 0.04) adding an advantage to FA.

Conclusion

Our works highlights the opportunity to increase forage productivity and improve forage structure to increase intake and cow BCS through the management of HIGH and variable forage allowance during the pregnancy-lactation cycle of the beef cow. This results were not associated with different stocking rate but with different FA.

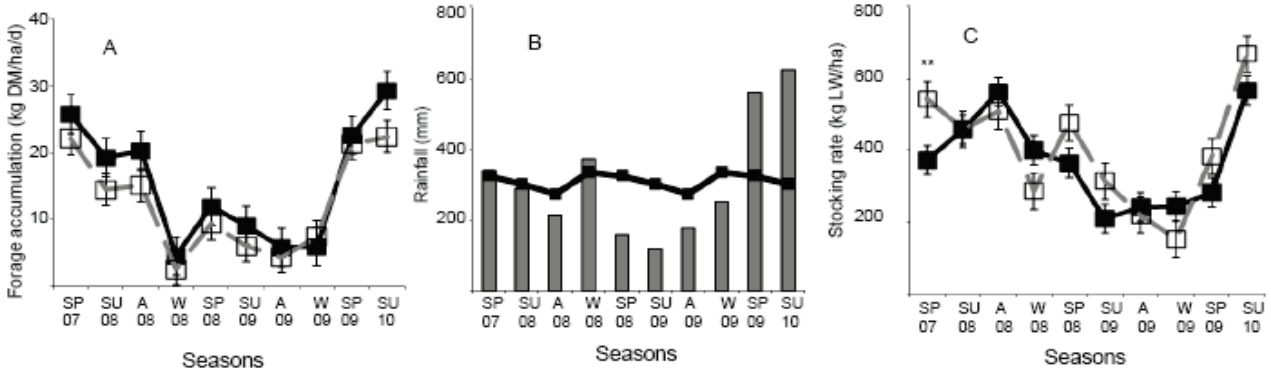

Figure 1. Effect of forage allowance and season on forage accumulation (A) and stocking rate (C) in HIGH (■) and LOW (□) and rainfall (mm; grey bars) compared to a long-term seasonal average (solid line) (B). Values are mean ± standard error. Differences between HIGH and LOW are indicated with **. Seasons were defined as summer (SU) from December to February, autumn (A) from March to May, winter (W) from June to August and spring (SP) from September to November. Seasons are from spring 2007 to summer 2010.

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