Paper ID: 1103
Theme 2. Grassland production and utilization
Sub-theme 2.1. Quality, production, conservation and utilization

Effect of supplementation frequency on forage utilization by heifers grazing a tropical pasture during the dry season

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Keywords: Forage, Frequency, Supplementation, Utilization

Introduction

In tropical pasture, low quality and availability forage during the dry season can limit the cattle intake. Energetic and protein supplementation is a viable practice to improve feed intake and animal performance. Previous studies have shown that infrequent protein supplementation decreases feeding cost achieving similar performance compared with every day supplementation (Farmer *et al*., 2004). Even though infrequent protein supplementation has been widely studied, little research has been carried out on infrequent energetic supplementation, especially its effect on pasture utilization. Some evidence indicates that negative effects on forage use at low levels of infrequent supplementation (Beaty *et al*., 1994). However, high levels of energetic supplementation can result in a substitution effect of forage for concentrate, reducing pasture utilization, even more when forage quality decreases as dry season progresses. Thus, the aim of this study was to evaluate the effect of supplementation frequency (continuous or discontinuous, based on energetic concentrate) on forage utilization by heifers grazing a *Chloris gayana* pasture during the dry season in the Semiarid Chaco Region (Northwestern Argentine).

Materials and Methods

Twenty eight braford heifers were subjected to two frequencies of supplementation based on corn (70%) and soybean expeller (30%): a) Daily supply (continuous) at 1.10% liveweight -LW-, b) Discontinuous supply (four times per week) at 1.92% LW – in order to reach an equal supplementation level in week basis, for two grazing periods (GP) of 21 days during the winter 2013 (Period 1**[GP1]**: June; Period 2**[GP2]:** August). Each treatment had two replicates with 7 animals, and the initial weight was 206.3 ± 10.4 for P1 and 233.3 ± 12.3 kg for P2. Fecal collection was made for 7 days of each period on selected animals grazing individual subplots. Diet digestibility (DMD) was estimated using the acid detergent insoluble ash (ADIA) as internal marker. Simultaneously, initial and final forage availability and plant fractions (leaf, stem, sheaths and dead material) were measured above and below the grazing layers. Pasture grazing layers were divided or classified in: upper (> 21 cm above the ground) and lower strata (< 21 cm). Plant utilization was measured before and after each grazing period. Twenty plants per paddock (0.5 ha) were randomly identified close to the site where forage was measured. Extended tiller length, which gives an estimation of the swart height, was measured with sliding ruler form ground level to the top of the tiller. Forage digestibility and crude protein concentration (CP) was determined at each grazing stratum. Data were analyzed using Beta regression model in GP1 and Dirichlet regression was implemented in order to evaluate significance (0.05) of the factors in GP2. Model formulation is as follows: 3 – part compositional vector for forage biomass ~ Stage of forage (S: after or before grazing) + Plant layer (L: upper or lower) + Supplementation frequency (SF: continuous or discontinuous). Fractions of green (leaf and non-leaf) and dry/dead forage components were projected in a ternary plot, discriminating data points by plant layer and stage of forage. Characteristic profiles of each stratum, before and after grazing, were deduced from the statistical model. At GP1, compositional vectors consist of the following material fractions: [Green leaf; green Non-leaf; dry/dead]. At GP2, since forage was completely dry, compositional vectors consisted of two parts, namely leaf and non-leaf fractions. In order to support this study, data from animal performance [Dry matter intake (DMI), DMD and average daily gain (ADG)] were evaluated by two-way ANOVA. When significant interactions were detected, a subsequent Tukey test was applied to determine the effect of the treatments.

Results and Discussion

Pasture utilization did not differ between supplementation treatments in both grazing periods ($p>0.05$). Deferred forage quality was different ($p<0.01$) between grazing periods due to the pasture growth cessation and winter frost occurrences, especially at the end of the dry season (GP2). Chemical composition of forage had the following values: 74 – 64 g Kg^{-1} CP, 330 – 347 g Kg^{-1} NDF and 701 - 677 g Kg^{-1} ADF for June (GP1) and August (GP2), respectively. As a result, a difference on forage fraction utilization was found between both grazing periods ($p<0.05$). In GP1, total pasture utilization reached 35% mainly composed by 70% of green leaf and 30% of green non-leaf (stem and sheath) selected from both grazing stratum (Figure 1). Starting and ending biomass values were 2090 and 1300 Kg DM ha^{-1}, respectively. In GP2, when forage was completely dry, pasture utilization decreased to 20% mainly composed by leaf fraction from upper stratum (Figure 2). Starting and ending biomass values were 2645 and 1290 Kg DM ha^{-1}respectively. Leaf utilization from lower plant stratum was very low, probably due to the increase of tensile resistance of stems, creating a barrier that avoids the leaf selection by animals (Benvenutti *et al*., 2006). The upper leaf fraction showed higher correlation with the forage quality. Regarding, quality of stems (48.5 g Kg^{-1} CP; 450 g Kg^{-1} ADF and 800 g Kg^{-1} NDF) showed lower values than leaf fraction (73 g Kg^{-1} CP; 350 g Kg^{-1} ADF and 690 g Kg^{-1} NDF). Supported these results significance differences between treatments ($p<0.05$) for DMI, DMD and ADG in both grazing periods were not found. Moreover, GP1 showed higher values for these parameters than those observes in GP2.

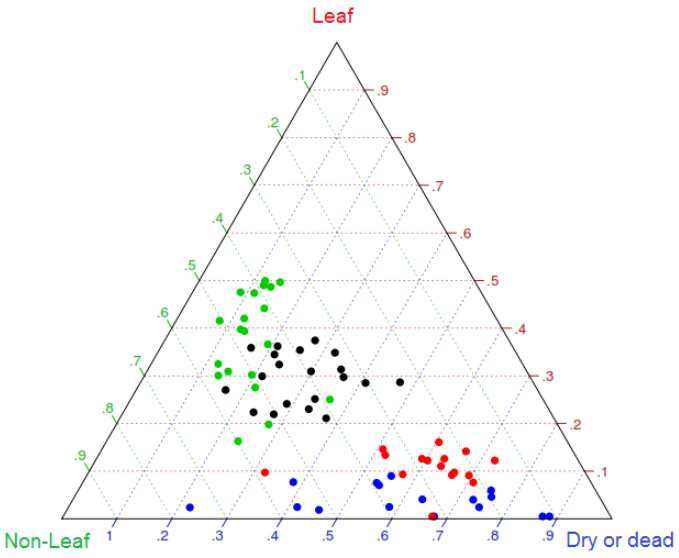

Fig 1: Forage biomass of each sample represented in a ternary plot before (green point: upper layer; black_point: lower layer) and after (blue point: upper layer; red point: lower layer) grazing period 1 (GP1).

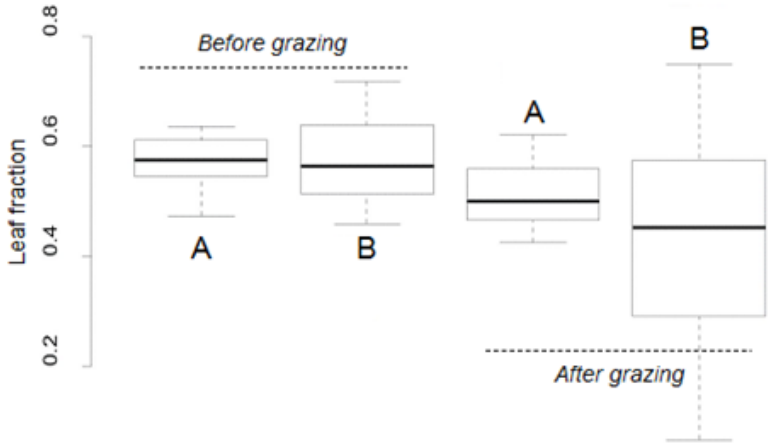

Fig 2: Forage leaf fraction before and after the second grazing period (GP2). A= lower layer; B=upper layer.

Conclusion

The energetic supplementation frequency did not affect the pasture utilization by heifers grazing this tropical pasture during middle and late dry season. The pasture utilization reached from 35% to 20%, respectively. Under this conditions pasture leaf availability might be used as a good forage intake estimator.

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