Management targets to maximize short-term herbage intake rate

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Introduction

Besides grazing, the animals carry a host of other essential activities to their survival, such as rumination, vigilance and idling, and these activities compete with each other in the animal's daily time (Fonseca *et al.* 2012). Therefore, any management action that provides an increase in forage intake rate, with a consequent reduction in the time necessary to achieve the daily nutrient requirements, is essential for an animal production success. In this study, four experiments were performed based upon the hypothesis that different sward structures, formed by distinct sward surface heights (SSH) and levels of grazing down influence the short-term herbage intake rate (STIR).

Methods

Two contrasting species were used (*Cynodon dactylon* and *Avena strigosa*). Two experiments were conducted for each species and they were: (1) Cynodon under six different SSH (10; 15; 20; 25; 30; 35 cm), (2) Cynodon under four levels of herbage depletion (20; 40; 60; 80 % of initial sward height), (3) Avena under eight different SSH (15; 20; 25; 30; 35; 40; 45 & 50 cm) and (4) Avena under four levels of herbage depletion (20; 40; 60 & 80 % of initial SSH). All experiments used a completely randomized block design, with four replicates. The STIR was measured by double-weighing technique and corrected for insensible weight loss. All experiments were measured pre- and post SSH. Data were analyzed using segmented equation (broken line).

Results and Discussion

The results showed that the better SSH to maximize the STIR was 19 and 29 cm for Cynodon and Avena respectively. This model suggests that maximum STIR for a medium SSH. The maximum STIR in median SSH (Fig. 1a,b) is due to a combination of structural factors, such as: SSH, forage bulk density and the proportion of leaf in relation to stems (Laca *et al.* 1992).

The STIR was constrained both in lower and higher SSH, because of the low bite mass (BM) harvested in either case. In the case of lower sward the low BM is due to lower potential bite depth (Gonçalves *et al.* 2009). However, in higher swards this constraint in BM is due to difficulty in harvesting and manipulation the sward (*e.g.* Fonseca *et al*. 2012; Gordon and Benvenutti 2006). In both species studied, the increase in STIR (from a low SSH to maximum STIR) is twice the decrease rate from the peak (see models coefficients in Fig. 1 legend). This characteristic shows that the capacity of the animal adjusted the ingestive behaviour components are most affected by sward structures in lower SSH. The STIR was reduced below 31 and 18% graze down level from the initial SSH (Fig. 2). Therefore, it can be inferred that, sward structure imposed constraints on bite formation.

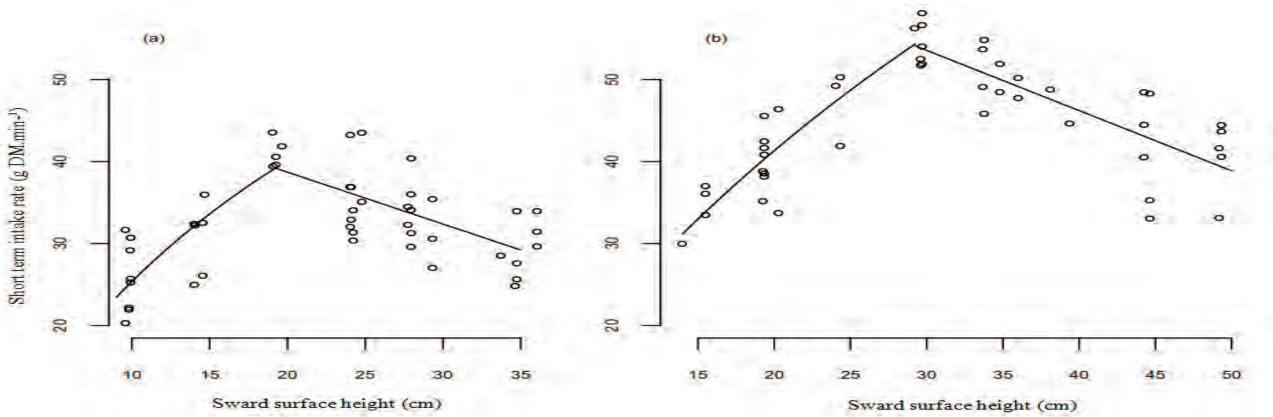

Figure 1. Short term intake rate of beef heifers in (a) *Cynodon dactylon*. and (b) *Avena. strigosa* swards under different sward surface height – Michaelis Menten-broken line [*C. dactylon.*: y_1= (95.83 x) / (27.77 + x); y_2= 39.20 – 0.63 * (x – 19.2); R^2= 0.55; *P*<0,0001; *A. strigosa*: y_1= (166.9 x) / (60.81 + x); y_2= 54,.6 – 0.736 * (x – 29.2); R^2= 0.73; *P*<0,0001].

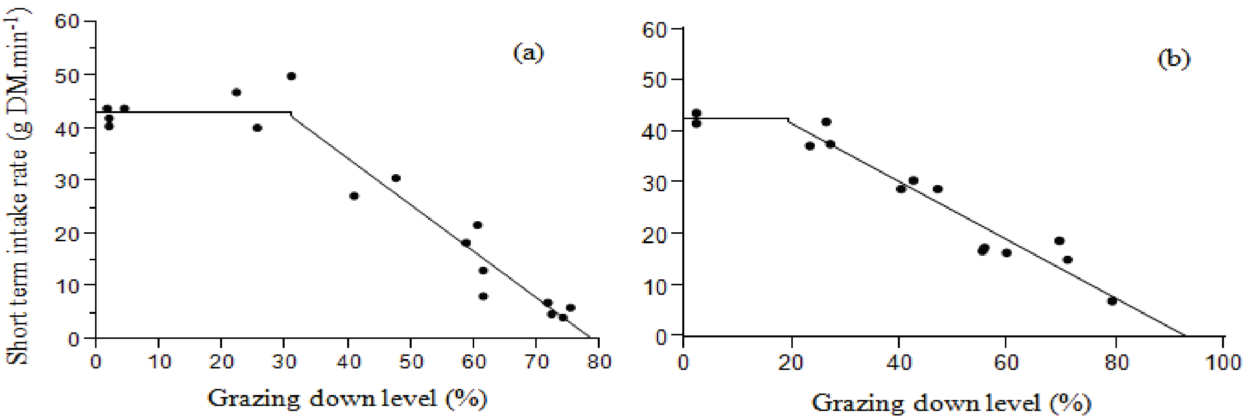

Figure 2. Short term intake rate of beef heifers in (a) *Cynodon dactylon* and (b) *Avena strigosa* swards under under distinct grazing down levels. *Cynodon* - (y=42.08+(0.881(31-x)), if x>31, and y=42.08 if x<31; R2=0.87; *P*<0,0001); *Avena* - (y=41.92+0.566(19-x), if x>19 and y=41.92 if x<19; R2=0.93; *P*<0.0001).

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