Short-Term Herbage Intake Rate in Temperate Pastures Grasses Grown in Pure or in Intercropping Stands

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Introduction

Oat and ryegrass pastures grown in intercropping systems are the most common forages used during the fall and winter in subtropical and in some temperate climate regions. Nevertheless, it must be taken into account that the way in which the different species of plants are presented to the animals may lead to consequences for the efficiency of the grazing process (Prache and Damasceno 2006). Moreover, in heterogeneous environments, animals may reduce intake rate due to a partial preference for a specific species (Gonçalves *et al.* 2009).

Regarding the pasture development stage, it is known that the decrease of the leaf/stem ratio causes the animal to reduce the instantaneous herbage intake rate due to the reduction of the bite depth because of the physical barrier imposed by the stem (Benvenutti *et al.* 2006; Drescher *et al.* 2006) and/or the search for a higher food quality, in this case, leaf lamina (Soder *et al.* 2009). However, the dynamics of changes in temperate sward structures grown in pure stands compared to intercropping systems and its consequence in heifers' short-term herbage intake rate (STHIR) are scarce.

The objective of this work was to assess the changes in the STHIR in pastures of oat, ryegrass and their intercrop during the growing season. The hypothesis tested was that cattle reduce the STHIR in intercropping pastures compared to pure stands, and as the grazing season progress.

Methods

The experiment was conducted in the Municipality of Lages, State of Santa Catarina, Brazil (27º47' S; 50º18' W, 900 m altitude). The period of data collection was from June 26 to November 1 2011. The treatments were pastures of black oat (*Avena strigosa* cv. IAPAR-61) and annual ryegrass (*Lolium multiflorum* L. cv. Common) in monoculture and intercropping pastures of both species distributed in a randomized block design with four replicates. The pre-grazing pasture heights were 23, 17 and 20 cm for the oat, ryegrass and intercropping, respectively, and was reduced by 40% of initial height. The pre-grazing pasture height were defined according to studies that considered 17 cm as an ideal value to maintain high intake rates and appropriate plant structures to annual ryegrass (Amaral *et al.* 2012). Since the oat is taller than annual ryegrass, for this treatment a pre-grazing height of 23 cm was defined and the intercrop at an intermediary height (20 cm). Three Holstein heifers (300 ± 20 kg initial live weight (LW)) were used to measure the STHIR, according to a double weighing technique (Penning and Hooper 1985). In each grazing cycle, two grazing tests were carried out in the mornings and two in the afternoons for each treatment, without submitting the animals to previous fasting. During each grazing test, the biting rate (bites/minute) was determined through manual counting by observers previously trained. The morphological composition (leaf lamina, stem + pseudo-steam, dead material and inflorescence) of pastures was measured in 20 pasture samples with approximately 10-cm diameter, cut at ground level. The effect of the pasture's growing season progression on the behavioral variables of the animals was analyzed by a linear and segmented regression analysis (broken-line, yij = L+U *(R < x) (R-x)+€ij). The SAS statistical package (SAS Institute Inc., Cary, NC, USA) version 9.2 was used for all of the analyses described.

Results

The STHIR was similar (P>0.05) in the different types of pasture throughout the grazing season. Reductions in STHIR were observed after the third grazing cycle for oat pastures and after the fourth grazing cycle for ryegrass and intercropping pastures (Fig. 1). The bite mass did not change as the grazing season progress, but time needed to took a bite increased when the leaf lamina percentage was less than 37% of the total dry matter (DM), independently of pasture type (Fig. 2).

Conclusion

The STHIR of heifers grazing oat and ryegrass grown in pure or in intercropping stands is not affected by the pasture type, but it decreased when the proportion of leaf lamina in the pasture decreased below 37% of the total DM. This reduction is a consequence of the longer time required for the bite formation.

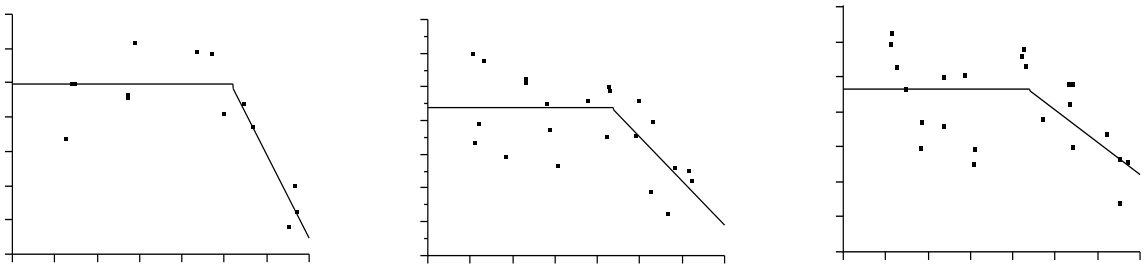

Figure 1. Short term herbage intake rate (STHIR) (g DM/min/kg body weight$^{0.75}$) during the pastures' growing season according to the days passed from sowing until grazing. (a) Oats as pure stands: y = 0.44 + 0.0053 (160-x) if x>160 and y = 0.44 if x<160; R^2 = 0.79; *P*<0.0001; (b) ryegrass as pure stands: y = 0.416 + 0.003 (148-x) if x>148 and y = 0.416 if x<148; R^2 = 0.44; *P* = 0.0008; (c) intercropping pastures: y = 0.43 + 0.0023 (148-x) if x>148 and y = 0.43 if x<148; R^2 = 0.75; *P*<0.0001.

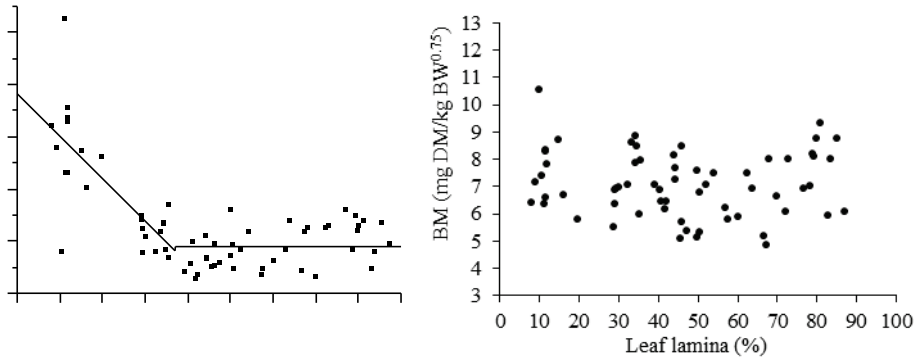

Figure 2. Relation between the percentage of leaf laminas in the pasture and the time required for a bite formation, and the bite mass. (a) time per bite (seconds): y = 0.96 + 0.016 (37-x) if x<37, and y = 0.96 if x> 37; R^2 = 0.55; *P*<0.0001; (b) bite mass (mg DM/kg body weight$^{0.75}$): linear effect *P*>0.05.

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