Herbage intake, methane emissions and animal performance of steers grazing dwarf elephant grass with or without access to *Arachis pintoi* pastures

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Keywords: Average daily gain, greenhouse gases, ingestive behavior, *Pennisetum purpureum.*

Introduction

The inclusion of legumes in diets based on grass has nutritional benefits due to ingestive and digestive interactions (Niderkorn and Baumont 2009). Moreover, it is speculated that tropical legumes can contribute to reducing the emission of greenhouse gases (GHG) compared to diets exclusively composed of grasses (Archimède *et al.* 2011). However, under grazing conditions, these advantages are not always possible to obtain. This occurs when the spatial distribution of sward grasses impose limitations on access to legumes by grazing animals (Solomon *et al.* 2011). This can be the case, for example, when legumes are overlapped by the leaves of a tufted tall grass, as dwarf elephant grass (Crestani *et al.* 2013).

Considering that management strategies for increasing legumes in the diet of grazing animals should be better studied and data on enteric methane emitted by ruminants eating tropical forages are scarce, the aim of this work was to evaluate the effect of access to an exclusive area of peanuts (*Arachis pintoi* cv. Amarillo) for cattle grazing dwarf elephant grass (*Pennisetum purpureum* cv. BRS Kurumi) on herbage intake, animal performance and enteric methane emission.

Methods

The experiment was conducted at Ituporanga, State of Santa Catarina, Brazil (approximate geographic coordinates 27°38' S, 49°60' W and 475 metres altitude). The assessments were conducted during three grazing cycles, from January to April 2012. The experimental treatments were dwarf elephant grass heavily fertilized (150 kg N/ha as ammonium nitrate) and dwarf elephant grass intercropped with peanuts plus an adjacent area of legume which was allowed to be accessed by animals for 5 h/day, from 7 to 12 pm). Each area was subdivided into 16 paddocks of approximately 400 m^2. Twelve Charolais steers, aged between 10 and 12 months and average weight of 213 kg ± 8.9, were distributed in four groups, two per treatment. The animals were managed in a rotational grazing method with a herbage allowance of 6.0 kg of leaf dry matter/100 kg BW, with a fixed stocking rate, but a variable period of occupation.

Table 1. Herbage intake measured during 3 grazing cycles, methane enteric production measured during 2 grazing cycles, and animal performance in steers grazing dwarf elephant grass (DEG, *Pennisetum purpureum* cv. BRS Kurumi) with or without access to peanut (*Arachis pintoi* cv. Amarillo) pastures. RSD is residual standard deviation.

Parameter	DEG	DEG + peanut	*RSD*	*P-value*
Average daily gain (kg)	0.70	0.97	0.174	<0.001
Dry matter intake				
kg/day	6.7	7.8	1.43	0.048
% of body weight	2.7	3.1	0.73	0.086
Methane production				
g/day	146	180	23.5	0.009
g/kg of DM intake	22.9	25.3	5.40	0.387
Grazing time (min/day)				
Total	594	535	44.6	<0.001
Morning (6:00 - 12:00 h)	191	136	25.8	<0.001
Afternoon (12:00 - 18:00 h)	184	187	29.3	0.756
Evening (18:00 - 24:00 h)	151	155	13.4	0.372
Night (24:00 - 6:00 h)	68	57	12.3	0.025

Herbage intake was measured by the technique of n-alkanes (Mayes *et al.* 1986). To measure the average daily gain, the animals were weighed before and after each grazing cycle, with a previous fasting of solids and liquids for 12 hours. Grazing time was quantified by visual observations every five minutes from 7 am to 7 pm and every 10 minutes from 7 pm to 7 am. The enteric methane production was estimated by the technique of sulfur hexafluoride (SF6) (Johnson *et al.* 1994) in two grazing cycles (February and March-April/2012).

Data was submitted to variance analysis using PROC MIXED (Statistical Analysis Systems 1996) considering repeated measures and using a model that included random effects of animals and the fixed effects of legume access, grazing cycle and the interaction between legume access and grazing cycles.

Results

There was not interaction between legume access and grazing cycle for any variable. Both, average daily gain and herbage dry matter intake were higher (P<0.05), while time spent grazing in the morning and total grazing time were lower (P<0.001) for animals grazing legume pastures (Table 1). The daily methane emission was higher (P<0.05) in animals grazing legume pastures, whereas methane emission by kg of dry matter intake was not affected by treatments.

Conclusion

Steers grazing dwarf elephant grass with access to peanut pastures can improve their performance with a higher grazing efficiency without increasing methane production by kg of dry matter intake.

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