

# Intake rate and nutritive value of elephant grass cv. Napier subjected to strategies of rotational stocking management

Eliana V Geremia, Lilian E T Pereira, Adenilson J Paiva, Thiago M Santos, Laiz P Oliveira and Sila C Da Silva

Animal Science Department, ESALQ/USP, Piracicaba, SP, Brazil

Contact email: [siladasilva@usp.br](mailto:siladasilva@usp.br)

**Keywords:** *Pennisetum purpureum*, herbage intake, sward structure, grazing management.

## Introduction

Several research papers on forage tropical grass species have demonstrated that grazing management interferes with sward structure that, in turn, alters patterns of ingestive and foraging behaviour of the grazing animals. For that reason it has been used as explicative variable for adjustments in intake characteristics like bite mass, bite rate, intake rate and nutritive value of the consumed herbage (Fonseca *et al.* 2012). Tall tufted growing plants like elephant grass (*Pennisetum purpureum* Schum.) cv. Napier show a continuous pattern of growth characterised by stem elongation during their vegetative state (Da Silva and Carvalho 2005), causing swards to become too tall and out of reach for grazing animals, generating serious difficulties in executing efficient grazing management, particularly when long regrowth periods are used. In that context, the increase in defoliation frequency has positive effects on herbage intake and nutritive value (Palhano *et al.* 2007), since it favours leaf elongation relative to stem elongation and senescent material accumulation throughout successive grazing cycles. Against that background, the objective of this experiment was to evaluate the components of the short term herbage intake (intake rate, bite mass and bite rate) and the nutritive value of the consumed herbage from elephant grass cv. Napier subjected to strategies of rotational stocking management defined in terms of pre- and post-grazing management targets.

## Methods

The experiment was carried out at E.S.A. "Luiz de Queiroz" (ESALQ), University of São Paulo, Piracicaba, SP, Brazil (22°43' S, 47°25' W and 554 m a.s.l.), from October 2011 to April 2012 (mid spring and summer). Treatments corresponded to combinations between two post- (post-grazing heights of 35 and 45 cm) and two pre-grazing conditions (95% and maximum canopy light interception during regrowth – LI<sub>95%</sub> and LI<sub>Max</sub>), and were allocated to experimental units (850 m<sup>2</sup> paddocks) according to a 2x2 factorial arrangement and a randomised complete block design, with four replications. Monitoring of canopy light interception was carried out using a canopy analyser LAI 2000 (LI-COR,

Lincoln, Nebraska, USA). An oesophageal fistulated Nelore (*Bostaurus indicus* L.) heifer was used to harvest extrusa samples and measure time spent for executing 20 bites during 8-minute sampling procedures performed every grazing at the pre-grazing condition. Extrusa samples were freeze dried (lyophilised), weighed and ground. Data were used to calculate bite rate (bites/min), bite mass (g of DM) and intake rate (g DM/min). Ground samples were used to determine concentrations of neutral (NDF) and acid (ADF) detergent fibre (Van Soest *et al.* 1991) and crude protein (CP) (Leco Corporation, St. Joseph, MI, EUA) as well as *in vitro* dry matter digestibility (IVDMD) (Tilley and Terry 1963; adapted by Van Soest *et al.* 1991). Analysis of variance was carried out using SAS<sup>®</sup> (*Statistical Analysis System*), version 8.2 for Windows<sup>®</sup>, on average data for the entire experimental period. When appropriate, treatment means were calculated using the "LSMEANS" statement and comparisons made with the Student test and a 5% significance level.

## Results

Resulting sward structures were different between LI pre-grazing treatments, with a pre-grazing height of 85 and 130 cm for the LI<sub>95%</sub> and LI<sub>Max</sub> targets, respectively. Intake rate (g/min) was not influenced by LI pre-grazing, post-grazing height or their interaction ( $P>0.05$ ). Bite mass ( $P=0.0009$ ) and bite rate ( $P<0.0001$ ) varied with LI pre-grazing only. In general, larger bite mass was recorded on swards managed with the LI<sub>Max</sub> target and higher bite rate recorded on swards managed with the LI<sub>95%</sub> target (Table 1). There were no treatment differences in NDF, ADF and IVDMD ( $P>0.05$ ), but CP was higher on swards managed with the LI<sub>95%</sub> target relative to those managed with the LI<sub>Max</sub> target ( $P=0.0025$ ).

## Conclusion

Adjustments in bite mass and bite rate between LI pre-grazing targets result in relatively stable rate of intake on elephant grass. Although higher CP content was detected on swards managed with the LI<sub>95%</sub> target, NDF, ADF and IVDMD did not vary with grazing management

**Table 1. Bite rate, bite mass, intake rate and chemical composition of extrusa samples of elephant grass cv. Napier subjected to strategies of rotational stocking management characterised by the pre-grazing targets of 95% and maximum canopy light interception from October 2011 to April 2012.**

Light interception	Intake components			Chemical composition			
	Bite rate (no. bite/min)	Bite mass (g MS/bite)	Intake rate (bite/min)	NDF (%)	NDA (%)	IVDMD (%)	CP (%)
LI <sub>95%</sub>	25.4 A	1.20 B	30.0	53.0	27.2	71.1	17.4 A
LI <sub>Max</sub>	17.6 B	1.53 A	26.0	54.0	26.0	71.2	15.5 B
SEM	1.18	0.070	2.93	0.70	0.52	0.86	0.39
LI pre-grazing	***	**	NS	NS	NS	NS	**
Post-grazing height	NS	NS	NS	NS	NS	NS	NS
Interaction	NS	NS	NS	NS	NS	NS	NS

NS – Non significant; \* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.0001$

strategies used, indicating that definition of management targets depends on other responses like herbage accumulation, grazing efficiency and animal performance.

### Acknowledgements

To FAPESP and CNPq for the sponsorship provided to students involved in this project.

### References

- Da Silva SC, Carvalho PCF (2005) Foraging behavior and herbage intake in the favorable tropics/sub-tropics. In 'Grassland: a global resource Wageningen'. (Eds DA Mc Gilloway) pp.81-95. (Wageningen Academic Publ)
- Fonseca L, Mezzalana JC, Bremm C, Filho RSA, Gonda HL, Carvalho PCF (2012) Management targets for maximizing the short-term herbage intake rate of cattle grazing in *Sorghum bicolor*. *Livestock Science* **145**, 205-211
- Palhano AL, Carvalho PCF, Ditttrich JR, Moraes A, Silva SC, Monteiro AL (2007) Características do processo de ingestão de forragem por novilhas holandesas em pastagem de capim mombaça. *Revista da Sociedade Brasileira de Zootecnia* **36**, 1014-1021
- Tilley JMA, Terry RA (1963) A two stage technique for the in vitro digestion of forage crops. *Journal of the British Grassland Society* **18**, 104-111
- Van Soest PJ, Robertson JB, Lewis BA (1991) Symposium: carbohydrate methodology, metabolism, and nutritional implications in dairy cattle. *Journal Dairy Science* **74**, 3583-3597