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# 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, LAIZ P. OLIVEIRA AND SILA C. DA SILVA

*Universidade de São Paulo, Escola Superior de Agricultura "Luiz de Queiroz" (ESALQ), Piracicaba, SP, Brazil.*
www.esalq.usp.br

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## Introduction

Several research papers on tropical forage grasses have demonstrated that grazing management modifies sward structure that, in turn, alters patterns of ingestive and foraging behavior of the grazing animal. For that reason it has been used to explain adjustments in intake characteristics like bite mass, bite rate, intake rate and nutritive value of the consumed herbage (Fonseca et al. 2012). Tall tussock plants like elephant grass (*Pennisetum purpureum*) cv. Napier display stem elongation during the vegetative state (da Silva and Carvalho 2005), causing swards to become too tall and out of reach for grazing animals, making efficient grazing management difficult, particularly when long regrowth periods are used. In that context, an increase in defoliation frequency can improve herbage intake and nutritive value (Palhano et al. 2007), by favoring leaf elongation as opposed 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 short-term herbage intake (intake rate, bite mass and bite rate) and nutritive value of the consumed herbage from elephant grass cv. Napier subjected to 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; 554 m asl), from October 2011 to April 2012 (mid-spring and summer). Treatments corresponded with combinations of 2 post-grazing conditions (post-grazing heights of 35 and 45 cm) and 2 pre-grazing conditions (95% and maximum canopy light interception during regrowth – $LI_{95\%}$ and $LI_{Max}$), and were allocated to experimental units (850 $m^2$ paddocks) according to a 2 x 2 factorial arrangement and a randomized complete block design, with 4 replications. Canopy light interception was monitored using a canopy analyzer LAI 2000 (LI-COR, Lincoln, NE, USA).

An oeso-phageal-fistulated Nelore heifer was used to harvest extrusa samples and measure time spent to execute 20 bites during 8-minute sampling periods for each grazing at the pre-grazing condition. Extrusa samples were freeze dried (lyophilized), weighed and ground. Data were used to calculate bite rate (bites/min), bite mass (g DM) and intake rate (g DM/min). Ground samples were used to determine concentrations of neutral (NDF) and acid (ADF) detergent fiber (Van Soest et al. 1991) and crude protein (CP) (Leco Corporation, St. Joseph, MI, USA), 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® (Statistical Analysis System), version 8.2 for Windows®, 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 at 5% probability.

## Results

Resulting sward structures were different between LI pre-grazing treatments, with pre-grazing heights of 85 and 130 cm for the $LI_{95\%}$ and $LI_{Max}$ targets, respectively. While bite mass at $LI_{95\%}$ target was smaller (P=0.0009) than at $LI_{Max}$, a higher bite rate (P<0.0001) on this treatment meant that intake rate (g/min) was not influenced by LI pre-grazing (P>0.05) (Table 1). There were no

Correspondence: Sila C. da Silva, Universidade de São Paulo, Escola Superior de Agricultura "Luiz de Queiroz" (ESALQ), Av. Pádua Dias 11, Piracicaba CEP 13418-900, SP, Brazil.
Email: siladasilva@usp.br

treatment differences in NDF, ADF and IVDMD (P>0.05), but CP was higher on swards managed with the $LI_{95\%}$ target relative to those managed with the $LI_{Max}$ target (P=0.0025).

## Conclusion

Increasing grazing frequency on elephant grass pasture had no marked effects on forage intake as the grazing animal adjusted its grazing behavior, in terms of smaller bite mass and higher bite rate to maintain the same intake as with less frequent grazing. Higher CP with the more frequent grazing could impact on animal performance. Responses in DM production, utilization levels, liveweight gains or milk production would need to be studied to measure any benefits from altering the grazing frequency.

**Table 1**. Bite rate, bite mass, intake rate and chemical composition of extrusa samples of elephant grass cv. Napier subjected to rotational stocking management with 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. bites/min) | Bite mass (g DM/bite) | Intake rate (g/min) | NDF (%) | ADF (%) | IVDMD (%) | CP (%) |
| $LI_{95\%}$ | 25.4 a[1] | 1.20 b | 30.0 | 53.0 | 27.2 | 71.1 | 17.4 a |
| $LI_{Max}$ | 17.6 b | 1.53 a | 26.0 | 54.0 | 26.0 | 71.2 | 15.5 b |
| s.e.m. | 1.18 | 0.070 | 2.93 | 0.70 | 0.52 | 0.86 | 0.39 |

[1]Values in columns followed by different letters differ (P<0.05).

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## References

da Silva SC; Carvalho PCF. 2005. Foraging behavior and herbage intake in the favourable tropics/sub-tropics. In: McGilloway DA, ed. Grassland: A global resource. Wageningen Academic Publishers, Wageningen, The Netherlands. p. 81−95.

Fonseca L; Mezzalira 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; Dittrich 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 of Dairy Science 74:3583−3597.

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