Behaviour of grazing goats on Tanzania grassland under different residue leaf area index in southeastern Brazil

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Introduction

Defoliation intensity is important for grassland management. While the residue is the result of defoliation, maintaining a remaining leaf area is essential, as leaf area index (LAI) determines forage yield, by increasing percentage of light interception and incident light capture. The understanding of animal behavior is also essential for adopting strategic measures to manage grasslands since the behavioral factor is the link between plant and animal performance. The objective of this study was to evaluate changes of the behavioral characteristics of goats grazing on Tanzania grassland (*Panicum maximum* cv. Tanzania) under rotational stocking with different residue leaf area index (RLAI).

Methods

The experimental area was divided into 9 paddocks of 243 m^2 each, planted with *Panicum maximum* Jacq. cv. Tanzania grass in the College of Agriculture and Veterinary Sciences (FCAV), São Paulo State University (UNESP), Jaboticabal, Sao Paulo, Brazil. The treatments consisted of three RLAI targets, 0.8, 1.6 and 2.4 m^2/m^2, arranged in randomized block design with three replicates. The RLAI was the criterion for period of animal occupation and 95% light interception (LI) the criterion to determine grazing frequency according to intermittent stocking management. These variables were measured using a canopy analyser AccuPAR LP-80 da Decagon (USA). For the pre and post-Grazing, 20 random leaves per paddock were harvested to measure the leaf length using a portable leaf area meter LI-3000C. Nine Anglo Nubian goats per treatment, weighing average 25 kg, were observed to determine grazing behavior. The goats were properly identified with numbers on the animal's body and colored collars. The observations were recorded every 10 minutes during 11 hours, totaling 594 daily observations/treatment. Each paddock was divided into 27 imaginary quadrants and, the position and activity of the animals were recorded with respect to these quadrants for each paddock. These data were used to estimate the time spent on grazing, rumination and other activities, as well as animal displacement. Displacement animal was considered as the distance in metres that the animal walked to commence the grazing activities, rumination and other activities. The statistical analysis was realized using SAS (Statistical Analysis System) mixed models. The polynomial orthogonal contrasts (1st and 2nd order) were used to compare animal occupation period and residue leaf area index (RLAI) at 5% probability (Littell *et al*. 2006).

Results and Discussion

Leaf length, in the pre-grazing, varied little for the different RLAI studied while average value was 55.0 cm. In the post grazing, the values increased as residue also increased denoting the effect on photosynthetic apparatus with the imposition the treatments (Fig. 1).

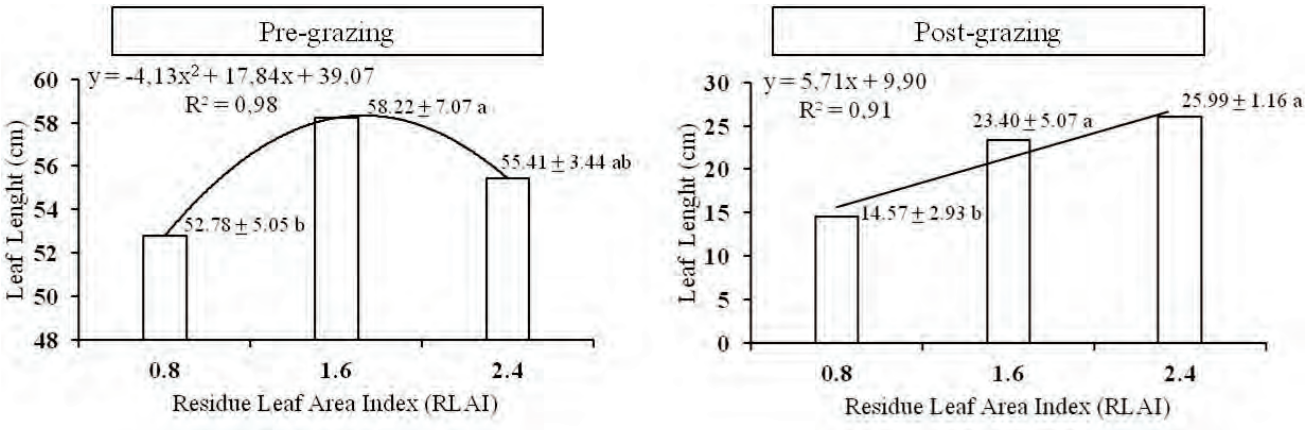

Figure 1. Leaf length (cm) of Tanzânia grassland under different RLAI.

Table 1. Average percent grazing time (%G), rumination time (%R) and other activity (%O); displacement during grazing (Displac.P), rumination (Displac.R) and other activity (Displac.O), expressed as meter/animal/day, for different RLAI and animal occupation period (Day). ns – not significant.

Treatment	%G	%R	%O	Displac.P	Displac.R	Displac.O
0.8 RLAI	72.09	10.55	17.36	281.13	17.56	37.28
1.6 RLAI	68.15	12.49	18.05	222.35	19.41	45.99
2.4 RLAI	69.11	13.22	17.66	228.42	16.61	36.48
Contrast						
linear	ns	ns	ns	ns	ns	ns
quadratic	ns	ns	ns	ns	ns	ns
Day						
1	74.96	12.94	12.10	222.63	18.35	31.23
2	66.12	12.17	20.39	241.72	16.22	45.67
3	68.27	11.15	20.57	267.55	18.99	42.86
Contrast						
linear	*	ns	*	*	ns	*
quadratic	*	ns	*	ns	ns	ns

Table 1 shows that RLAI did not affect any of the studied variables. However, this fact demonstrates the peculiar behavior of grazing goats which are able to maintain uniformity during the activity, even when subjected to different management strategies. The different treatments affected the length of the remaining leaves, which became longer as RLAI increased (Fig. 1). Thus, the animals reduced %G and increased %O as the studied RLAI were reached as the days of occupation increased and, consequently, the animals had to move around more during grazing (Displacement G) in order to fill the rumen and begin rumination (Table 1). Carvalho *et al*. (2001) demonstrated the importance of the intake rate concept and showed that the grazing process is time-dependent, where different activities such as grazing, ruminating and others, compete among themselves. So, the efficient use of time is critical for domestic herbivores that are often searching for grass one-third of their time. It is noteworthy that, during grazing, each animal moved about 244 m/day inside the 9 m (width) x 27 m (length) paddock.

The goats paced about nine times the paddock length to graze independently of RLAI. As the forage mass availability reduced over time, animal displacement increased while %G decreased. This activity was expected to increase as according to Hodgson (1990), the first change in grazing behavior when forage availability decreases is to increase grazing time to try to maintain the level of intake. Nevertheless, it was observed that the rotational stocking system allowed the goats to condition themselves to the changing paddock routine, thus reducing %G on the last day of occupation while waiting for the transfer to the new paddock which had high forage availability.

Conclusion

The use of residual leaf area index as a tool to aid grassland management is effective. Leaf length is an essential variable for understanding animal grazing behavior because it can compromise the process of seizing the food, and should be used as a parameter to define strategies in pasture management.

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