

## Grazing management strategies for Xaraés grass (*Brachiaria brizantha* cv. Xaraés)

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### INTRODUCTION

Forages is the main source of nutrients for growth, health and reproduction of cattle herds. Thus, the exploitation of these animals depends fundamentally upon forage production and the efficient management

### SUMMARY

The objective of this study was to evaluate the effects of two intermittent grazing strategies, with 24 fixed resting days and 95% light interception in Xaraés grass. For evaluation of productive, structural and nutritive characteristics, we used a completely randomized design with repeated measures in the time, with four grazing cycles and two grazing strategies. For consumption by the animals, we used a completely randomized design, in a 2 x 3 factorial, with two grazing strategies and three days of occupation. There was no effect for the variables: availability, structure and chemical composition of forage, except for light interception and crude protein, in which treatment with II showed the highest value of light interception and lower content of CP. There was effect for dry matter intake between the days of occupation, and the highest values found on the first day and the lowest on the third day of occupation. Thus, taking into account practicality of adoption, good soil and climatic conditions, grazing management with intensification of fixed days shows great potential for pasture use.

### Estratégias de manejo do pastejo para capim-xaraés (*Brachiaria brizantha* cv. Xaraés)

### RESUMO

Objetivou-se com este estudo, avaliar os efeitos de duas estratégias de pastejo intermitente, com 24 dias fixos de descanso e com 95% de interceptação luminosa em capim-xaraés. Para a avaliação das características produtivas, estruturais e bromatológicas foi utilizado o delineamento inteiramente casualizado com medidas repetidas no tempo, com quatro ciclos de pastejo e duas estratégias de pastejo. Para o consumo dos animais foi utilizado o delineamento inteiramente casualizado em arranjo fatorial 2 x 3, sendo duas estratégias de pastejo e três dias de ocupação, e para a taxa de lotação utilizou-se o arranjo 2 x 4 (duas estratégias e quatro ciclos de pastejo). Não houve efeito para as variáveis: disponibilidade, estrutura e composição bromatológica da forragem, com exceção para interceptação luminosa e proteína bruta, onde o tratamento com II obteve maior valor de interceptação luminosa (2,73% superior que o DF) e menor teor de PB (1,08% inferior ao tratamento DF). Para o consumo de matéria seca houve efeito ( $P < 0,05$ ) entre os dias de ocupação, sendo os maiores valores encontrados no primeiro dia (9,84 kg de MS) e os menores no terceiro dia de ocupação (6,21 kg de MS). A taxa de lotação foi 0,76 UA maior para a estratégia de manejo com II, quando comparada ao tratamento DF. Assim, tendo em vista a praticidade de adoção, boas condições edafoclimáticas, o manejo de pastejo com intensificação dos dias fixos apresenta grande potencialidade para uso de pasto.

of pastures, which, in turn, should advocate the pastures production, quality of the forage and sustainability of the system.

Management practices must be determined regarding the morphological and physiological character-

ristics of the forage plants, and how they relate to environmental conditions, this is done in order to ensure high yields and pasture persistence. Research has focused on strategies aimed at generating more strict control over the canopy structure, in an attempt to produce results both consistent and reproducible in the different edaphoclimatic conditions of the country.

At the present, the most utilized grazing strategies are the management on fixed days of rest and with 95% light interception (LI). In the grazing strategy on fixed days, forage harvesting is not always done at the ideal time (where quantity and quality should align), as it can be harvested too early or too late. In case of an early harvest plants have a lower amount of dry matter and forage mass, besides speeding up, in medium or long terms, the process of grazing degradation due to the use of plant reserves for regrowth. Regarding a late harvest, pastures presents higher amounts of dead matter, dry mass and stalk mass, which will negatively affect animal performance (Voltolini et al., 2010). However, the adoption of the grazing system on fixed days has the advantage of easy handling, since there is no need to measure LI and/or pasture height, which occurs in the strategy with LI.

Forages harvesting with 95% active photosynthetic interception of the forage canopy prioritizes the physiological development of the plant, when harvested at the appropriate time, which allows for a better balance between forage production and quality. However, the management strategy with 95% LI of the forage canopy has the disadvantage of the cost of the equipment required to measure the interception of the canopy and a lesser practicality when compared to the management on fixed days of rest. Pedreira et al. (2007) stated that there is a great association between LI and plant height. However, there is still the need to monitor the height of the grass on a regular basis.

In order to identify the condition of maximum productive and harvest efficiency, it is necessary to know the morphogenic characteristics that determine the structure of the pasture. This information, coupled with evidence of the effects of canopy structure over forage consumption and animal performance, leads to the development of management strategies focused on the pasture itself, with grazing goals defined by the height of the canopy or forage mass.

The objective of this study was to evaluate the effects of two strategies of intermittent grazing, with 24 fixed days of rest and 95% of light interception in xaraés grass. Generally, the pasture managed with long rest periods presents higher amount of dead material and stalk, which reduce bromatological and digestibility values, thus reflecting in lower gain per animal. Results from several studies show the importance of pasture management to regulate the level of animal performance, improve the efficiency of forage harvesting and generate management flexibility in the production system.

## MATERIAL AND METHODS

### Location and implementation of the experiment

The experiment was conducted at the Moura's Experimental Farm, belonging to the Federal University of Vales do Jequitinhonha e Mucuri (UFVJM), located in the municipality of Curvelo, state of Minas Gerais, Brazil (18 ° 44'52.03 "south latitude and 44 ° 26'53 , 56 "west longitude).

The pasture of *Uruchloa brizantha* cv. Xaraés (Xaraés grass) was implanted using the conventional method of tillage and seeding without incorporation. Light grazing was carried out in order to take advantage of the available forages and avoid forage bedding. The fertilizing process was carried out by covering the area through pitching, applying 100 kg N, 25 kg P<sub>2</sub>O<sub>5</sub> and 100 kg K<sub>2</sub>O/ha, fractionated in three applications.

The experimental period lasted six months. Meteorological data of the experimental period was collected at the meteorological station of the municipality of Curvelo and the results of the precipitation (mm) are 269, 240, 255, 173, 203 and 71, respectivamente.

### GRAZING MANAGEMENT

Two intermittent grazing strategies were evaluated, one with 24 fixed days of rest (FD) and another with 95% light interception (LI), in the last four pastured pickets (heifers and regulating animals) of each grazing cycle. The rest time of 24 fixed days was determined based on pre-experimental evaluations of the forage canopy, previously done *in loco*. Both grazing strategies (FD and LI) consisted of nine pickets of approximately 3000 m<sup>2</sup>, in which the animals were managed by means of the intermittent stocking grazing method. However, the LI strategy also had an escape area of approximately 4300m<sup>2</sup>, which was used when the subsequent picket still did not have 95% LI. This area was used in the first three cycles, as 24 days of rest were not enough for the pasture to reach 95% of LI. This was unnecessary in the last cycle, however, due to the favorable climatic conditions, but was taken into account for measuring the total LI for the treatment in all cycles.

Leaf area index (LAI) and LI evaluations were performed weekly, at ten random points of the picket, to measures close to 95% of LI, when the frequency of monitoring became daily. A canopy analyzer - AccuPAR Linear PAR/PAI captometer, Model - 80 (DECAGON Devices®) was used to evaluate LI and LAI in the pickets. These readings were performed between 10 and 14 o'clock, but avoiding the time between 12 and 13 o'clock, as the foliar laminae of the forage were curled during this period, impairing the light interception, increasing light incidence in the soil and, thus, underestimating the LI values of the leaves. The canopy height measurements were performed simultaneously with the LI and LAI evaluations, with the aid of an adapted ruler (approximately 150 cm), with ten measurements being taken at the same LI evaluation sites.

The forage dry matter (FDM) was evaluated with the aid of a square-shaped frame (1m<sup>2</sup>) at points that well represented the condition of the pickets, cutting the forage close to the soil, under pre and post grazing conditions and each sample was weighed to determine the amount of forage available. After that, tiller coun-

ting and separation of the leaf blade was performed, including stalk, leaf hem and senescent mass (dead material). For this variable, the senescent mass was separated from the green mass; both stalk and leaf were separated and then taken to a forced ventilation oven (55°C). Leaf blade, stalk plus hem and dead material were weighted individually. In addition, the "leaf blade/stalk plus hem" ratio was also determined.

For the bromatological analyzes, the upper part of the residue (20% of residual leaf area) from pickets evaluated in each grazing cycle was collected at their respective representative sites. These samples were weighed, pre-dried and taken to the Animal Nutrition Laboratory of UFVJM, where analyzes of dry matter (DM) and crude protein (CP) were made according to AOAC (1995); fiber in neutral detergent (FND) and fiber in acid detergent (FAD) by the method of Van Soest *et al.* (1991).

The criteria adopted for removing the animals (heifers and regulating animals) from the pickets was the same for both treatments. The animals were eventually relocated so that the post-grazing residue presented 20% residual leaf area, which was measured by continuous visual monitoring of two previously trained observers, who monitored the grazing during the entire period of occupation. The mean duration of intervals between cycles was 25 days for management with 95% LI and 27 days for management on fixed days.

#### FORAGE DRY MATTER INTAKE

A period of 18 days was adopted to adapt the animals to grazing management strategies, before the experiment itself. Measuring of forage dry matter intake was done in six days, using two pickets for each treatment, on each day of occupation based on the residue (3 days). This consumption was estimated only in the second evaluation cycle. The consumption of DM was estimated indirectly, utilizing the neutral detergent insoluble fiber (NDIF) as an internal indicator, according to the adapted equation (Cochran *et al.*, 1986):

$$FDMI = (FP \times FeIC) / FoIC$$

Where:

FDMI = forage dry matter intake (kg/day);

FP = fecal production (kg/day);

FeIC = fecal indicator concentration (kg/kg);

FoIC = forage indicator concentration (kg/kg).

Fecal production was estimated using the external indicator, chromic oxide, though the following formula (Kimura & Miller, 1957):

$$\text{Fecal Production (g/day)} = \frac{\text{Chromic Oxide Provided (g/day)}}{\text{Fecal Chromic Oxide Concentration (g/g of DM)}}$$

There was a seven-day adaptation period for use of the external indicator. Two daily doses of 5g of chromic oxide were given orally to each animal. This adaptation

period was immediately followed by the evaluation itself, with another six days providing the indicator. Stool collection was done directly in the rectum, twice a day (6 and 14 o'clock) just after providing the indicator, during all three days of picket occupation.

Stool samples were frozen, processed and analyzed for chrome concentrations. To estimate fecal production, feces samples from each animal were analyzed each day of occupation in the picket. Chrome analysis was performed at the Embrapa Food Analysis Laboratory of Dairy Cattle by the method of Cr - atomic emission spectroscopy (Willams *et al.*, 1962).

To obtain the FDNi of freshly ingested grass, samples were collected from two castrated male bovines, fistulated in the rumen, allowing sampling of the pasture consumed. As for the FDNi of feces, samples were collected from all four heifers of each treatment, per day of occupation in the picket. These fistulated cattle were kept under the same grazing conditions as the heifers evaluated. To collect the sample consumed, the animals had their ruminal contents emptied and remained in the picket for approximately 40 minutes, without access to water. Soon after the collection of extrusa samples, the previously withdrawn ruminal content was returned to the rumen.

After pre-drying in a ventilated oven at 55°C for 72 hours, the extrusa and feces samples were incubated in the rumen of the same animals used for ruminal extrusion collection, for 144 hours (Freitas *et al.*, 2002). For this, bags of TNT 100, with 16.67 mg/cm<sup>2</sup>, were used with approximately 0.5g of sample. After the incubation period, the TNT bags were removed, washed and pre-dried (oven at 55 ° C for 72 hours) for further calculation of FDNi, which were determined according to Van Soest *et al.*, (1991). The DM bromatological composition (in %) of the ruminal extrusion of the xaraés grass in two grazing strategies during the three days of occupation can be observed in **Table I**. **Table I** was also used to estimate DM intake by kg of forage per day, according to live weight (LW) of the studied heifers.

To estimate consumption, four H/Z crossbred heifers were used per treatment. In addition to these heifers, regulatory animals were used to adjust the stocking rate of the picket.

#### EXPERIMENTAL DESIGNS AND STATISTICAL ANALYSIS

To evaluate the productive, structural and bromatological characteristics of the pasture, a completely randomized experimental design was utilized, with repeated measurements in four grazing cycles and two grazing strategies. The results were submitted to analysis of variance (*mathematical model*:  $y_{ij} = m + b_j + t_i + e_{ij}$ ), using the F test at 5% probability.

To evaluate animal consumption, a completely randomized experimental design was used in a 2 x 3 factorial arrangement (two grazing strategies and three days of occupation), with four replications (animals). The results were submitted to analysis of variance (*mathematical model*:  $y_{klj} = m + b_j + Ak + Bl + (AB)kl + eklj$ ) and using the Tukey test at 5% probability for comparison of the mean values.

**Table I.** Bromatological composition (% DM) of ruminal extrusion of xaraés grass, in two grazing strategies and three days of occupation (Composição bromatológica (% DM) de extrusão ruminal da grama xaraés, em duas estratégias de pastagem e três dias de ocupação.)

Days	Grazing strategy					
	Light interception			Fixed days		
	CP	FND	FAD	CP	FND	FAD
1	9,84	61,57	30,62	10,70	66,19	33,28
2	8,36	62,17	33,33	8,07	69,39	36,44
3	8,11	67,16	32,01	9,84	74,33	37,74

\* CP= crude protein; FND= fiber in neutral detergent; FAD= fiber in acid detergent.

**RESULTS AND DISCUSSION**

No significant effect was observed on any treatment for forage dry mass availability, leaf (leaf blade), stalk (stalk + sheath) and dead (senescent) material, under both pre and post-grazing conditions of the Xaraés grass. The values observed for these variables in the two grazing strategies evaluated (95% of LI and 24 FD) are presented in **Table II**.

The absence of significant effect on treatments of pre-grazing dry matter availability is related to the proximity of resting days between adopted strategies, being observed 22.2 and 24.0 days for LI and FD, respectively. Thus, it is believed that the difference (1.8 days) between treatments was not enough to influence production of mass in this period. There was also no treatment effect (LI and FD) on residual dry matter (post-grazing), probably due to the similarity between pastures and the animal load adopted in both grazing strategies. Similar results were observed by Voltolini *et al.* (2010) when comparing two management strategies for elephant grass, 95% LI and 26 FD. It is worth noting that the difference between the rest periods for the two treatments (6.6 days) reported by these authors was higher than the difference presented in this study (1.8 days) and, even so, there was no evidence of effect among treatments.

Pedreira *et al.* (2009), working with xaraés grass under different management strategies (28 FD, 95 and 100% LI), also did not observe statistical difference between the forage mass for treatments 28 FD and 95% LI for pre and post-grazing. However, these authors observed a significant difference in treatments with 95 and 100% LI. In this case, since the difference between the grazing intervals of the two strategies was 9 days, it is possible that the longer time resulted in greater production of forage mass, which explains the statistical difference between the treatments evaluated by the authors mentioned above.

The absence of forage mass effect in the pre and post-grazing conditions, among evaluated treatments, resulted in a small difference between grazing cycles, with values of 25 and 27 days observed for the LI and FD strategies, respectively. Considering the experimental period of 108 days, the number of grazing cycles for the LI and FD strategies were 4.32 and 4.00; respectively, demonstrating proximity between treatments. Larger differences in the number of grazing cycles between treatments were reported by Voltolini *et al.* (2010), with values of 4.12 and 2.96 cycles reported for LI and FD treatments, respectively. Thus, it is speculated that, in the present study, the total forage yield values were very similar between strategies, since the difference between treatments was equal to 0.32 cycle, which is directly related to the proximity of days of rest for the two evaluated managements and for the control of the residual leaf area.

The lack of significant effects of the grazing strategies over leaf, stalk and dead masses, in pre and post-grazing, may also be related to the small difference (2 days) between the grazing intervals for the two grazing strategies, similar to the observed for the production of dry forage mass.

Regarding leaf disappearance (difference between pre and post-grazing leaf masses), values of 74.3 and 76.3% were observed for LI and FD treatments respectively, which emphasizes the similarity between the available leaf mass supplies for grazing in both treatments. The results showed similarity between leaf and stalk structural components and production of forage mass for the two management strategies, thus reinforcing the parity between the treatments studied.

**Table II.** Availability of DM of xaraés grass (kg/ha) submitted to intermittent grazing strategies (Disponibilidade de matéria seca de grama xaraés (kg/ha) submetida a estratégias de pastagem intermitente).

Component	Grazing strategy		VC <sup>1</sup> (%)	Average
	Light interception	Fixed days		
DM pre-grazing	4309,08	3865,11	18,39	4087,09
DM post-grazing	3071,29	2699,45	21,96	2885,37
DM leaf pre-grazing	1504,05	1431,53	25,71	1467,79
DM leaf post-grazing	386,54	338,89	46,01	362,72
DM stalk pre-grazing	1889,99	1695,14	31,71	1792,57
DM stalk post-grazing	1723,26	1416,78	31,79	1570,02
DM dead matter pre	751,79	581,68	38,69	666,74
DM dead matter post	897,39	751,56	35,39	824,48

Averages compared by the F-test at 5% probability; (DM) dry mass, (VC<sup>1</sup>) variation coefficient.

In the pre-grazing, the stalk mass was higher than the leaf mass, which diverges from the results found in literature (Pedreira *et al.*, 2009; Voltolini *et al.*, 2010). However, it should be noted that the pasture used was not yet fully established, since it was introduced at the end of the rainy season of 2012 and the experiment began in November of the same year.

Thus, the elongation of stalks, to increase light harvesting efficiency by the more shaded leaves, could partially explain the greater participation of this component in the total forage mass, in pre-grazing conditions. Additionally, the leaf shape and stalk mass in pre-grazing condition (cutting close to the soil) promoted a greater amount of stalk mass in the sample. This fact probably would not have occurred if the cutting had been done at the recommended grazing time, that is, respecting the remaining 20% of leaf area.

Regarding the structural variables (Table III), there was no effect between management strategies for leaf/stalk (F/C), canopy height, number of tillers and leaf area index (LAI) in pre and post-grazing conditions. However, for LI there was a significant effect between the management strategies under study.

The leaf/stalk ratio (L/S) results emphasized the similarity between management strategies for this variable, both in the pre and post-grazing. The observed reduction for L/S during pre and post-grazing conditions was 38.55 and 37.93% for LI and FD treatments, respectively. This response is in agreement with the results presented for masses of forage, leaf and stalk (Table III), which did not present difference between treatments. In this sense, it can be stated that the animals had pastures with similar conditions, regardless of the treatment submitted, where production was not limited by any of the evaluated strategies.

The lower values of L/S for both treatments in this study, when compared to the results reported by Anjos (2012), should be related to the establishment time of the pasture. In this work the pasture was still in the formation stage (characterized as uneven and with a low plant stand per area), since it was used in the first year of its implantation. These results suggest that newly established pastures need time for their agronomic

components to settle, which is likely to occur from the second or third year of implantation.

Regarding the height of the pasture, no influence was detected for any management strategies studied, both in pre and post-grazing conditions. In pre-grazing, this response is related to the small difference between the rest periods obtained in the two treatments (1.8 days), which culminated in similar pastures for both grazing strategies. In post-grazing, as the pastures did not differ in the pre-grazing condition, and the occupation period and the animal load were similar between the treatments, there was also no effect among the management strategies.

The comparison of pasture height of xaraés grass in pre-grazing condition, in the present work, with the values reported by Pedreira *et al.* (2007) (evaluating the same forage) showed great difference for this variable. Values reported by the authors for treatments with 95% LI (29.5cm) and 28 FD (34.2cm) were lower than the results obtained in the present study for the same treatments, LI (63.63cm) and FD (62.25cm). Thus, higher pasture height in this study may be associated to the fact that pasture was still in formation phase. In this case, it is speculated that from the second or third grazing, when the pasture is adequately formed, the height of the xaraés grass will probably be the same as reported in the literature at 95% LI (approximately 30cm).

For the LI variable, a significant difference was observed between the management strategies, where FD treatment presented a lower value (92.99% LI). In the literature it has been reported that LI values in treatments with fixed days of rest are generally superior to treatments with 95% LI, since the FD usually presents a greater interval of grazing (Voltolini *et al.*, 2010; Anjos, 2012). However, it is worth noting that the small difference in LI in this study was not enough to influence the variables: forage dry mass, leaf, stalk and dead material, which did not differ among the treatments studied.

Regarding the number of tillers, there was a similarity between the management strategies, which is consistent with the pasture response observed for

**Table III. Structural averages and light interception of xaraés grass subjected to intermittent grazing strategies** (Médias estruturais e interceptação leve da grama xaraés submetidas a estratégias intermitentes de pastagem).

Component	Grazing strategy		VC <sup>1</sup> (%)	Average
	Light interception	Fixed days		
L/S pre	0,83 a	0,87 a	26,35	0,85
L/S post	0,32 a	0,33 a	33,34	0,33
Height pre	63,63 a	62,25 a	26,59	62,94
Height post	46,75 a	46,00 a	22,20	46,38
LI	95,72 a	92,99 b	2,33	94,35
Tiller	345,75 a	330,13 a	22,51	337,94
LAI pre	5,31 a	5,01 a	25,4	5,16
LAI post	2,21 a	1,99 a	22,64	2,10

Letters indicate statistical difference between averages compared by the F-test at 5% probability (L/S= leaf/stalk ratio; LI= light interception; LAI= Leaf area index; VC<sup>1</sup>= variation coefficient).

availability of forage dry mass. Carnevalli *et al.* (2006) reported a higher number of tillers in mombaça grass, in a treatment with 95% LI when compared to 100% LI. This fact may have occurred due to the greater emergence of tillers and lower stalk senescence in the treatment with lower LI. As forage canopy structure in this work was similar between grazing strategies, the shade at the base of the forage was also similar, and thus, it maintained close to the tillering rate among all treatments.

For the leaf area index (LAI), the non-observation of a treatment effect is associated to the also absent effects on L/S ratio, forage canopy height and number of tillers. In this case, the response highlights the condition of equality between pastures under both management strategies.

For the bromatological characteristics of xaraés grass in pre-grazing condition, submitted to both grazing strategies, no significant effect was observed for dry matter (DM), fiber in neutral detergent (FND), fiber in acid detergent (FAD) and ash. For the crude protein content (CP) a significant effect was observed, where the highest content was found in the FD treatment (Table IV).

The DM, FND, FAD and Ash contents did not differ between the treatments due to the conditions of the pastures at the moment of entry of the animals in the pickets. Considering that there was no effect on L/S ratio, pre-grazing height and number of tillers, the DM, FND, FAD, and pasture ash contents were also not affected by the grazing management strategies.

Euclides *et al.* (2005) observed values of CP and FND for xaraés grass, in the rainy period, of 10.4 and 72.4%, respectively, with a yield of 4.6 t ha<sup>-1</sup> of total dry mass. In this case, the reported CP values are consistent with the literature and the FND values presented in this study were lower than those exposed by these authors, but with a similar total dry mass. Araújo *et al.* (2019) studying the in situ dry matter degradability of two cultivars of *Urochloa brizantha* cvs. Xaraés also did not observe differences for some of the chemical analyzes carried out on the forage stems.

As for pasture dry mass consumption (kg of forage/day and in % of live weight), no effect was observed, neither for grazing strategies, strategies interactions nor occupation days. However, for days of occupation of the pickets there was a significant difference. The results are presented in Table V.

The lack of effect for forage DM consumption on evaluated management strategies can be justified by the structural similarity of the pasture and the availability of dry forage mass in the pre and post-grazing conditions in the LI treatments (4309,08 and 3071,29 kg MS.ha<sup>-1</sup>) and FD (3865.11 and 2699.45 kg MS.ha<sup>-1</sup>), respectively (Table V). The fractions potentially available for animal consumption (difference between pre-grazing and post-grazing mass), without considering any grazing losses, the values for LI and FD were 1237.79 and 1165.66 kg DM ha<sup>-1</sup>, respectively.

The difference between the masses potentially available in the two treatments was 72.13 kg MS ha<sup>-1</sup>, which represented only 1.8% of the total forage mass produced for the two management strategies (4087.09 kg MS ha<sup>-1</sup>). This value evidenced the similarity between the production of forage mass potentially available to the animals among the treatments studied.

Regarding dry matter consumption, expressed in kg of DM per day<sup>-1</sup> (CDM<sub>1</sub>), according to the days of occupation, it presented a mean value of 9.84 kg of DM on the first day, with decreases of 8.54% for the second (9.00 kg DM) and 36.90% (6.21 kg DM) for the third day of occupation.

The difference in consumption along the days of occupation should be related to the availability of quality forage mass, especially leaf mass, which during the grazing progressively reduces with the intensification of the forage consumption. Thus, during the first day of occupation, the supply of leaf in relation to stalk and dead material was high, which allowed higher consumption in relation to the other days of occupation. However, on the third day, the supply of leaf was greatly reduced in relation to the quantities of stalk and dead material, which led to a considerable reduction in consumption. The higher amount of stalk and dead material in forage mass can reduce the voluntary consumption of grazing animals due to apprehension difficulties (Difante *et al.*, 2011). Brâncio *et al.* (2003) stated that animals that are accustomed to consuming leaves continue to seek them, even when they are in low availability, which probably occurred in this study during the third day of occupation.

Additionally, as the management adopted in this study was intermittent, the highest DMI on the first day may also have been influenced by the exacerbated appetite of animals coming from a day of food restric-

**Table IV.** Bromatological composition of pre-grazing xaraés grass subjected to intermittent grazing strategies (Composição bromatológica da grama xaraés pré-pastagem submetida a estratégias intermitentes de pastagem).

Component	Grazing strategy		VC <sup>1</sup> (%)	Average
	Light interception	Fixed days		
DM (%)	23,26 a	22,39 a	8,42	22,82
CP (% DM)	9,58 b	10,66 a	14,60	10,12
FND (% DM)	65,01 a	64,04 a	3,73	64,53
FAD (% DM)	31,26 a	35,15 a	23,52	33,21

Letters indicate statistical difference between averages compared by the F-test at 5% probability (DM= dry mass; CP= crude protein; FND= fiber in neutral detergent; FAD= fiber in acid detergent; VC<sup>1</sup>= variation coefficient).

**Table V.** Consumption of dry matter (kg.day<sup>-1</sup> and %LW) of xaraés grass by heifers submitted to two grazing strategies, depending on the days of occupation of the picket (O consumo de matéria seca (kg.dia<sup>-1</sup> e %LW) de grama xaraés por novias submetidas a duas estratégias de pastagem, dependendo dos dias de ocupação do piquete).

Days	Dry matter consumption (kg day <sup>-1</sup> )			VC <sup>1</sup> (%)
	LI	FD	Average	
1	10,51 A	9,17 A	9,84	22,59
2	10,13 AB	7,88 AB	9,00	
3	6,97 B	5,46 B	6,21	
Averages	9,20	7,50	8,35	
Days	Dry matter consumption (%LW)			VC <sup>1</sup> (%)
	LI	FD	Average	
1	2,59 A	2,27 A	2,43	14,59
2	2,53 A	1,97 A	2,25	
3	1,76 B	1,36 B	1,56	
Averages	2,29	1,87	2,08	

Letters indicate statistical difference between averages compared by the F-test at 5% probability.

tion (third day of occupation) to a picket that presented pasture availability with good nutritional quality.

The average value observed for forage consumption (kg DM/animal.dia<sup>-1</sup>) among treatments, expressed as a percentage of the animals' mean live weight, was 2.08. Flores *et al.* (2008) worked with xaraés grass under different grazing intensities and reported average pasture dry matter intake close to the value obtained in the present study (2.11% of the LW). According to the NRC (2000), growing animals can present a variable consumption between 2 and 2.5% of the live weight, being the same interval in which the result of the present study is found.

Several studies (Carnevali, *et al.*, 2006; Pedreira *et al.*, 2009; Anjos, 2012) allowed us to observe that pasture management with the adoption of rest intervals on fixed days results in low quality pastures in relation to management based on concepts of light interception. However, the vast majority of these studies compared the two grazing strategies using longer resting periods for their FD treatments, which certainly negatively influences pasture characteristics when compared to LI treatments. Other works have also compared management strategies with different percentages of light interception (90, 95 and 100% LI), which indirectly incites longer resting periods for the greater levels of LI (Barbosa *et al.*, 2007 and Pedreira *et al.*, 2007). The increase in rest period, in addition to the critical point for LAI (95% LI), leads to an increase in dead and stalk masses, a reduced leaf/stalk ratio, a decreased nutritional value and, consequently, a reduction in the consumption of leaf blades, directly reflecting in the performance of the animals. In this sense, we tried to evaluate both management strategies under optimized conditions, where no treatment presented inferior conditions in relation to the other. Thus, based on pre-experimental evaluations, made under regional conditions, and with

regard to specific edaphoclimatic characteristics, we tried to adopt a rest period that allowed for a good pasture quality, so that a more coherent comparison could be made among the evaluated treatments. In this context, the use of 24 days of rest was justified.

When doing a joint analysis of the evaluated parameters, the results obtained in this study were similar for the two management strategies evaluated. In this way, the results showed that if the management of the pasture on fixed days is intensified, mainly in relation to the regrowth period, the benefits of the light interception management are reduced and, therefore, the management strategies become equivalent. In this perspective, the focus of research should no longer be concentrated in grazing strategies alone, but rather, in understanding that the pasture is a dynamic environment, subject to large variations that must be minimized in order to maintain its equilibrium.

Evaluating the management strategies with 95% LI and 24 FD, both present similar results for mass availability, pasture agronomic characteristics, forage bromatology and dry mass consumption. Considering the practicality for implementation and the lower labor requirement, the management of pastures with fixed days of rest, under optimized conditions, presents great potential to be used as an intermittent grazing strategy and an interesting alternative to intensify animal productivity.

## CONCLUSIONS

Evaluating the management strategies with 95% light interception and 24 fixed days of mass observation, agronomic characteristics of the pastures, bromatological mass and dry mass consumption.

Grazing management with intensification of fixed days presents great potential to be used as an intermittent grazing strategy.

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