



Forage accumulation in brachiaria grass under continuous grazing with single or variable height during the seasons of the year

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ABSTRACT - The objective of this study was to evaluate grazing management strategies of *Brachiaria decumbens* cv. Basilisk managed with different heights under continuous grazing with cattle. Two grazing management strategies were evaluated: maintenance of pasture with an average height of 25 cm throughout the experimental period and maintenance of pasture on the average of 15 cm in height during winter, up to 25 cm from the beginning of spring. The split-plot scheme and the randomized block design with four replications were adopted. The grazing management strategies corresponded to the primary factor, while the seasons (winter, spring and summer) corresponded to secondary factor. The reduction of the average sward height to 15 cm in the winter resulted, when compared with pasture maintained at 25 cm, in overall higher growth rates (95 kg/ha.day DM) and leaf blade (66.1 kg/ha.day DM), as well as higher rates of total accumulation (81.5 kg/ha.day DM) and leaf blade (52.6 kg/ha.day DM). The accumulated forage production (from winter to summer) was higher in the pasture lowered to 15 cm in winter (25.6 t/ha DM) compared with that managed with an average height of 25 cm (22.2 t/ha DM). Regarding the seasons of the year, in the winter, there were lower rates of overall growth (6.4 kg/ha.day DM), leaf blade (5.6 kg/ha.day DM) and pseudostem (0.8 kg/ha.day DM), and also lower total (-6.6 kg/ha.day DM) and leaf blade (-7.5 kg/ha.day DM) accumulation rates. In the spring there was a higher rate of leaf senescence (22.4 kg/ha.day DM). The accumulation of forage is incremented when the pasture of *B. decumbens* is lowered to 15 cm during the winter, and in the spring and summer, its average height is increased to 25 cm.

Key Words: *Brachiaria decumbens*, grazing management, growth, senescence

Introduction

The predominance of production systems based on the use of pastures is mainly due to lower production cost in these conditions. In the pastoral environment, the animal performs the forage harvest through grazing, and this way, expenses with hand labor, fuel and machinery with the operations involved in their feeding is dispensable.

In Brazil, from the 70s, forage plants of the genus *Brachiaria* have represented a milestone for livestock and became the most used for pasture establishment. Currently, this genus occupies about 85% of pastures planted in the *Cerrado* ecosystem and, in this scenario, *B. decumbens* participates with approximately 25% of this total (Macedo, 2005).

In general, *B. decumbens* has been managed predominantly under continuous grazing, which is a grazing method of great operational ease. Under continuous grazing, grazing management strategies based on scientific research have been studied, so far, with few tropical forages (Pinto et al., 2001; Canto et al., 2008; Faria, 2009). In general, the results of these studies revealed

forage accumulation patterns similar to those described for perennial ryegrass (Bircham & Hodgson, 1983), in which during the season of greatest growth, forage accumulation is reduced because of its smaller leaf area. In high pastures, forage accumulation is also lower due to high leaf senescence. In pastures with intermediate heights, forage accumulation is nearly constant and close to the maximum.

In addition, in the majority of studies on tropical pastures (Pinto et al., 2001; Faria, 2009) the interaction between the seasons and the strategies of grazing management on the determining processes of forage production were noticed. Thus, one can infer that grazing management must be seasonal in order to achieve advantages in terms of forage production and animal productivity during the year. However, such information is scarce in the scientific literature with tropical grasses managed under continuous grazing.

Thus, the present study was conducted to verify if grazing management, characterized by average heights of pastures differentiated between the seasons, results in increased forage accumulation of *B. decumbens* pastures under continuous grazing.

Material and Methods

The experiment was carried out from June 2008 to March 2009 in the Forage Sector of the Animal Science Department at Universidade Federal de Viçosa, located in Viçosa, Minas Gerais, Brazil. A *Brachiaria decumbens* cv. Basilisk (brachiaria grass) pasture, established on an Oxisol of clay texture and mildly undulating relief (Embrapa, 1999) was used in the study. The brachiaria grass restored naturally in this area in 1997 and since then this pasture has been used for developing research projects with cattle, in which different management strategies were evaluated, such as nitrogen fertilization, from 2001 to 2003 (Moreira et al., 2011), pasture deferment in 2004 and 2005 (Santos, 2007) and average heights of pasture as a criterion for grazing management in continuous grazing in 2006 and 2007 (Faria, 2009). The pasture area was composed of eight paddocks, 0.25 to 0.40 ha, plus a reserve area, with a total of approximately 3.0 ha.

The climate of Viçosa is Cwa type, with annual rainfall around 1,340 mm and average relative humidity of 80% (Köppen, 1948). The average maximum and minimum temperatures were 22.1 and 15 °C. Climate data recorded during the experiment were obtained from the meteorological station of the Agricultural Engineering Department at UFV, located about 500 m from the experimental area (Table 1).

Because there were few weeds on the pasture, their control was done mechanically and manually, by mowing in November 2009.

Two grazing management strategies were evaluated. In one, the forage was maintained at 25 cm height throughout the experimental period. The other corresponded to the maintenance of the pasture at 15 cm height on average during winter, with an increase to 25 cm from the beginning of spring.

Table 1 - Monthly means of average daily temperature, insolation, precipitation and monthly total evaporation from June 2008 to March 2009

Month	Average air temperature (°C)	Insolation (hours/day)	Precipitation (mm)	Evaporation (mm)
June/2008	16.7	6.2	12.7	55.9
July/2008	15.4	8.2	10.2	73.9
August/2008	16.7	7.3	15.4	87.1
September/2008	18.7	4.4	150.0	101.5
October/2008	21.6	5.6	41.4	89.0
November/2008	21.0	3.7	223.8	65.8
December/2009	21.3	11.1	626.0	270.8
January/2009	22.5	13.2	250.7	137.0
February/2009	23.0	6.6	222.5	63.3
March/2009	22.8	5.8	231.9	60.1

The split-plot scheme and the randomized block design with four replications were used in this experiment. The grazing management strategies corresponded to the primary factor (plot), characterized by average heights where the pastures were kept in continuous grazing during the seasons (winter, spring and summer). The latter corresponded to the secondary factor (subplot) and consisted of measures throughout the experimental period. The criterion used to define the blocks was the relief variation existing in the experimental area.

The eight paddocks of the experimental area had been managed under continuous grazing with variable stocking rate since June 2007 to maintain the average pasture height of 25 cm. Thus, to implement treatments in mid-June 2008, the four previously described paddocks had the average height lowered to 15 cm. For this, the stocking rate was increased therein by rearing cattle weighing on average 200 kg. Thus, it was possible that, in a period of about 15 days, the height targets desired (15 cm) were reached. On the other hand, the four other paddocks remained with the pasture at about 25 cm height, with absence of animals since May 2008. Only from the beginning of October 2008 were all paddocks used again concomitantly, with animals and the pastures were managed under continuous and variable stocking rate to maintain their height at about 25 cm.

Cattle were properly vaccinated according to the health schedule of the region. The control of endoparasites and ectoparasites was also done during the months of June 2008, November 2008 and February 2009.

The monitoring of the height of the pastures was done by measuring 50 points of each paddock by using an instrument constructed with two PVC tubes, one inside the other. The inner tube had scale with divisions of 1 cm and a fixed rod made of metal (nail) which slides along a slot in the outer tube. The criterion for measuring the pasture height corresponded to the distance from the surface of the soil to the leaves located at the upper sward. During spring and summer, the measurements of the pasture heights occurred twice a week, while in the winter the frequency of these measurements was reduced to once a week. To control the height of the pasture, cattle with about 200 kg of body weight were removed or placed in paddocks when the grass heights were respectively below or above the desired value.

In the winter, because of the negative accumulation of forage in pastures, the animals were taken from the eight paddocks. However, in spring and summer, the animals remained in the eight paddocks and were managed in continuous grazing, with change in stocking rate twice a week, whenever necessary. Animals were weighed at

the beginning of October 2008, in January and in March 2009. With this, the pastures with 25 cm average height throughout the period showed forage allowance of 5.23 and 4.95 kg DM/kg of body weight in spring and summer, respectively. The pastures kept with 15 cm in winter and 25 cm in the spring and summer also showed similar forage supply, corresponding to 5.05 and 4.37 kg DM/kg of body weight in spring and summer, respectively.

The fertilizer management, based on soil chemical analysis, conducted in October 2008 showed the following results: pH in H₂O: 4.79, P: 1.5 (Mehlich-1) and K: 86 mg/dm³, Ca²⁺: 1.46; Mg²⁺: 0.32 and Al³⁺: 0.19 cmol_c/dm³ (KCl 1 mol/L). Fertilization was performed throughout the experimental area with the application of 100 kg/ha of N and K₂O and 25 kg/ha P₂O₅, using the formulate 20-05-20. These doses were divided in two equal applications, which occurred on 11/11/2008 and 12/15/2008.

From the beginning of July 2008 until the end of March 2009, the estimates of growth, senescence and forage accumulation were performed according to the technique described by Bircham & Hodgson (1983). For this, the elongation of leaf blade and pseudostem and leaf senescence were evaluated in 16 tillers marked per experimental unit. The choice of tillers was made with the aid of a 1 m long wood ribbon, graduated every 20 centimeters. The ribbons (four per plot) were allocated in the sites of experimental unit representative of the condition of the pasture and its location was traced with the use of two wood stakes at their ends for easy identification. For each ribbon, four tillers were selected, spaced every 20 inches, and marked with colored plastic rings. At every cycle of data collection, of a minimum of four weeks, a new group of tillers was selected elsewhere in the pasture also representing their average condition.

Aiming to express rates of growth and senescence of leaf blades and the growth rate of the pseudostem (stem + leaf sheath) in kg/ha.day of dry matter, conversion factors were generated. On the last day of each period of evaluation, all tillers were collected at the soil surface, placed in labeled plastic bags and immediately taken to the laboratory. The tillers had the lengths of the leaf blade and pseudostems measured similarly to the method used in the field. Subsequently, all leaf blades and pseudostems were separated manually, grouped according to the source paddock and taken to an oven at 65 °C for 72 hours.

After drying, the morphological components were weighed and their mass was divided by their total length. Thus, the conversion factors (in mg/mm) used were obtained to transform the values obtained with the readings performed in the field (which were expressed in cm/tiller.day) to the

unit of mg/tiller.day. With the multiplication of the values of growth and senescence of leaf blades and pseudostems, expressed in mg/tiller.day, by the average population density of live tiller (tiller/ha) in each experimental unit, it was possible to obtain the rates (in kg/ha.days) growth of the leaf blade: daily increase of leaf blade mass per unit area; growth of pseudostem: daily increase of the mass of pseudostems per unit area; total growth: the sum of the growth rates of leaf blade and pseudostem; leaf senescence: daily mass of leaf blade that senesced per unit area; leaf blade accumulation: difference between growth rates and leaf senescence; total accumulation: sum of the pseudostem growth rates and leaf blade accumulation rate.

Forage accumulation throughout the experimental period was calculated by summing the forage accumulation in each season. These, in turn, were calculated by multiplying the daily rates of total accumulation per season and duration of the season.

For data analysis, firstly, an analysis of simple averages of the responses to identify the months where their patterns were similar variations was conducted. On that basis, the results were grouped according to the seasons in winter (July, August and September 2008), spring (October, November and December 2008) and summer (January, February and March 2009).

For each characteristic, the objective was the analysis of variance in a randomized block design in a split-plot, with the aim of deploying the sum of squares of treatments in parts due to each factor, and in the part due to interaction between the factors. When the interaction between the factors was not significant, there was a comparison between the average marginal levels of primary (grazing management strategy) or secondary factor (season of the year), according to their significance. When the interaction between the factors was significant, the levels of one factor were compared separately for each level of the other factor. Primary factor means were compared by the F test, while the secondary factor ones, by Tukey's test, adopting $\alpha = 0.10$ for statistical analysis.

Results and Discussion

The pasture height during the experimental period was close to the goals set, according to the grazing management strategies recommended (Table 2). However, there was heterogeneity in the height of the grass, which was proven by standard deviations of 6.7 and 7.3 cm, respectively, in pastures grazed at 25 cm throughout the experimental period and those with 15 cm and 25 cm in winter, spring and summer. This occurred because cattle do not graze

evenly. This variation was also observed by Moreira et al. (2011) in *B. decumbens* pastures under continuous grazing. The management in continuous grazing allows for greater occurrence of uneven grazing as compared with rotational grazing (Barthram et al., 2005).

Growth rates, senescence and forage accumulation of brachiaria grass were influenced ($P<0.10$) independently by season and by grazing management strategy (Table 3).

Brachiaria grass pastures showed lower leaf blade growth rate (LBGR) ($P<0.10$) in winter compared with spring and summer. In addition, pastures with 15 cm height in winter expressed greater LBGR than those handled with fixed height and equal to 25 cm in all seasons (Table 4).

The reduced availability of growth factors in winter (Table 1) justifies the lower value of LBGR this season.

Table 2 - Mean values of fortnightly heights and standard deviations (cm) of brachiaria grass managed under continuous grazing, according to the months of evaluation

Month/Year	Fortnight	Pasture height (cm)	
		25	15-25
June/2008	1st	25.29±7.86	21.69±7.54
	2nd	24.73±8.01	17.26±5.96
July/2008	1st	24.01±7.12	15.24±6.05
	2nd	23.98±5.87	14.59±5.82
August/2008	1st	23.66±5.66	15.28±5.70
	2nd	23.62±5.81	14.86±4.98
September/2008	1st	23.03±6.80	15.03±6.07
	2nd	23.98±7.35	19.82±5.34
October/2008	1st	29.78±8.07	28.44±9.74
	2nd	25.29±6.13	25.00±8.42
November/2008	1st	24.95±5.67	24.67±10.85
	2nd	22.45±6.09	25.67±15.35
December/2008	1st	25.89±6.57	25.20±6.81
	2nd	26.60±6.12	25.12±6.41
January/2009	1st	25.37±6.67	23.91±6.56
	2nd	25.68±6.48	24.64±6.32
February/2009	1st	25.51±6.94	25.34±7.44
	2nd	25.49±7.01	25.49±7.11
March/2009	1st	25.98±7.24	24.82±7.12
	2nd	26.66±6.34	25.89±6.60

Table 3 - Effects of the season of the year, pasture height and their interaction on growth, senescence and forage accumulation rates in brachiaria grass pastures managed under continuous grazing

Characteristic (kg/ha.day of DM)	P-value		
	Season of the year	Pasture height	Interaction
Leaf growth rate	0.051	0.064	0.122
Pseudostem growth rate	0.045	0.055	0.167
Total growth rate	0.048	0.071	0.144
Leaf senescence rate	0.073	0.087	0.219
Leaf accumulation rate	0.069	0.066	0.137
Total accumulation rate	0.055	0.074	0.151

DM - dry matter.

The processes of formation and growth of leaves and tillers are sensitive to unfavorable weather conditions (Fagundes et al., 2006a; Moraes et al., 2006), because the division, and especially the growth of the cells are sensitive, among other factors, to the cell turgor (Ludlow & NG, 1977), which is affected by soil water deficit in the typical soil during winter.

The higher LBGR in pastures grazed lower in winter can be attributed to the intense tiller turnover, especially in the spring, which occurred with this management strategy, which increased the population density of vegetative (Santos et al., 2011) and younger tillers on pastures. Besides the increase in tillering, younger tillers have higher leaf elongation rate (Paiva et al., 2011), which also contributes to raising the LBGR with this strategy of grazing management.

Regarding pseudostem growth rate (PGR), we can conclude that their values increased ($P<0.10$) from winter to summer. However, grazing management strategies did not affect ($P>0.10$) the PGR of brachiaria grass (Table 4).

Reduced PGR in winter (Table 4) can be explained by morphogenetic and structural characteristics of brachiaria grass, evaluated by Santos (2009) and Santos et al. (2011) in the same area during the experimental period of this experiment. In fact, there was smaller number of tillers (Santos et al., 2011) and lower pseudostem elongation rate (Santos, 2009) in the winter. During the winter, in some tillers, the youngest leaf ligule was below the fully expanded leaf ligule that had appeared earlier, reducing the length and elongation of the pseudostem, and thus PGR. This fact was also reported

Table 4 - Leaf blade growth rates, pseudostem and the total (leaf blade plus pseudostem) in brachiaria grass pastures managed under continuous grazing, and variable or fixed height during the seasons of the year

Pasture height (cm)	Season of the year			Mean
	Winter	Spring	Summer	
Leaf blade growth rate (kg/ha.day DM)				
25	4.6	71.5	99.1	58.4±12.6B
15-25	6.5	94.3	97.6	66.1±12.9A
Mean	5.6±0.48b	82.9±5.48a	98.4±6.61a	
Pseudostem growth rate (kg/ha.day DM)				
25	1.2	28.5	41.3	23.7±5.37A
15-25	0.5	31.5	54.5	28.8±7.00A
Mean	0.8±0.16c	30.0±1.39b	47.9±4.84a	
Total growth rate (kg/ha.day DM)				
25	5.8	100.0	140.5	82.1±18.0B
15-25	7.0	125.8	152.1	95.0±19.5A
Mean	6.4±0.39c	112.9±7.00b	146.3±10.38a	

Means followed by the same lowercase letter in the row and uppercase letter in the column do not differ ($P>0.10$).

DM - dry matter.

by Sbrissia (2004) with marandu grass managed under continuous grazing.

However, the greater PGR in summer was a result of the more favorable weather conditions during this season (Table 1). Similar results were found by Fagundes et al. (2006b) in fertilized pastures of *B. decumbens* cv. Basilisk managed in continuous grazing with cattle.

Total growth rate (TGR) had similar results to those described for leaf blade and pseudostem growth rates (Table 4), which is consistent when TGR is the sum of LBGR with PGR. Total growth rate values were lower ($P<0.10$) in the winter, intermediate in spring and higher in the summer. Moreover, the lowering of grazing in winter to 15 cm resulted in higher TGR compared with pastures grazed at a fixed height (25 cm) over the entire period (Table 3). Again, this result was mainly due to the higher TGR of spring pastures grazed low (15 cm) in the winter.

The variable TGR over seasons of the year demonstrates the typical seasonal growth of brachiaria grass. In fact, regardless of the grazing management used, only 2.4% of the total growth of brachiaria grass occurred in the winter, while in spring and summer, these values were, respectively, 42.8% and 54.8%.

Another important piece of information concerns the relative share of pseudostem in the total growth of brachiaria grass. Overall, the participation was lower in winter (14.0%) than in spring (26.8%) and summer (32.4%), with interaction ($P<0.10$) between season and grazing management strategy. In winter, the pasture managed lowest (15 cm) had lower ($P<0.10$) pseudostem contribution in total growth (7.8%); however, in spring and summer, there was no difference between grazing management strategies.

The lower relative share of pseudostem total growth during winter was due to the lower pseudostem growth rate this season (Table 4). On the other hand, the lower contribution of the pseudostem to the growth of brachiaria grass pasture lowered to 15 cm in winter may be due to the smaller size of these tillers pastures (Santos, 2009). A smaller tiller has shorter pseudostem and possibly lower rate of elongation of this organ, which may have reduced the contribution of the pseudostem at the expense of increasing the participation of leaf growth in total pasture.

On average, the share of pseudostem in total growth of brachiaria grass was 24.4%. This value can be considered low and indicates that grazing managements evaluated in this study were suitable for brachiaria grass, because they prevented the increase of relative growth of pseudostem.

In tropical grasses, pseudostem growth happens early, still during the vegetative stage and may result in worse nutritional value of forage (Santos et al., 2008)

and in the formation of unfavorable pasture structure to ingestive behavior and animal intake (Trindade et al., 2007). However, it is important to emphasize that the pseudostem of brachiaria grass has reduced diameter, and thus its possible detrimental effect for animal consumption must be minimized when compared with forage plants that have thicker stems, like most species of *Panicum* and *Pennisetum*. Moreover, the stem is an important component of forage produced on pastures.

Regarding the leaf senescence rate (LSR), the highest values ($P<0.10$) occurred in spring as well as on the pasture kept with 25 cm height (Table 5). The greater LSR in the spring can be explained by the renewal of leaves (Santos, 2009) and tillers (Santos et al., 2011), which remained alive in the winter. It is possible that the leaves immediately started senescence to provide nutrients via translocation and thereby assist the expansion of new leaves for the spring.

Additionally, in early spring (09/21/2008 to 10/13/2008) pastures of brachiaria grass initiated regrowth, but in that same period, grazing was not used because it was necessary to wait about 20 days for their average heights return to 25 cm, as recommended in the experimental design. In this situation, the higher rates of leaf growth (Table 3), coupled with the absence of grazing, accentuated the senescence.

The lower LSR on pasture managed with lower height (15 cm) in the winter compared with the pasture maintained at 25 cm height can be attributed to more intensive grazing management in the first condition, which provided greater removal of not synthetically active tissues and, indeed, it may have increased the photosynthetic rate of the pasture (Leriche et al., 2001). Thus, the lower pasture in the winter probably had lower negative energy balance, which explains their lower LSR.

The growth and senescence rates together determined the leaf blade accumulation rate (LAR), which was negative in winter and positive in spring and summer, but higher ($P<0.10$) in the latter. Higher LAR was also found in pastures kept low (15 cm) in the winter (Table 6).

Table 5 - Leaf senescence rate (kg/ha.day DM) in brachiaria grass pastures managed under continuous and variable or fixed height during the seasons of the year

Pasture height (cm)	Season of the year			Mean
	Winter	Spring	Summer	
25	16.72	26.44	15.70	19.62±1.78A
15-25	9.36	18.39	12.78	13.51±1.74B
Mean	13.04±1.8b	22.42±2.4a	14.24±1.5b	

Means followed by the same lowercase letter in the row and uppercase letter in the column do not differ ($P>0.10$).

DM - dry matter.

In the winter, senescence was higher than the growth of leaf blades (Tables 4 and 5), which resulted in negative value of LAR. This result may be related to the mechanisms used by brachiaria grass to limit the respiratory surface and slow the worsening of water stress, which changed its development pattern.

Among the seasons evaluated, the longevity of leaves and tillers was greater in the winter, but even so, leaf senescence and tiller mortality rates were generally higher than the elongation leaf rate and tiller appearance in the winter, as observed by Santos (2009), morphologically evaluating *B. decumbens* cv. Basilisk. As a result, there was negative forage accumulation in this season (Table 6). However, when climatic conditions were favorable to the development of pasture (spring and summer), the growth of leaf blades was higher than senescence, which led to higher values of LAR in these seasons.

The higher leaf blade accumulation on the pasture kept at 15 cm in winter, as compared with pasture managed with an average height of 25 cm throughout the experimental period was due to the lower rate of senescence (Table 5), and the higher leaf blade growth rate (Table 4) obtained with the adoption of the first management strategy. In addition, the higher tillering in pastures in the winter (Santos et al., 2011) also contributes to higher leaf blade and total forage accumulation.

The response of total forage accumulation rate (total growth minus leaf blade senescence) was similar to that seen for LAR, i.e., its values were increased ($P<0.10$) from winter to summer. Moreover, the strategy of keeping the brachiaria grass pasture low in the winter also resulted in greater ($P<0.10$) total forage accumulation rate (Table 6). These results demonstrate the advantage of keeping the

brachiaria grass pasture at a lower height (15 cm) in the winter to obtain greater forage accumulation.

The values of total forage accumulation rate in brachiaria grass pastures were high in spring (90.5 kg/ha.day on average) and summer (132.0 kg/ha.day on average), when there was fertilization (100 kg N/ha and K_2O) and with environmental conditions favorable to plant growth. It is possible that these values of forage accumulation were overestimated by the count, in assessments of population density, of very young and small tillers which had not yet expressed high yield potential or which died due to shading by larger tillers. However, the values obtained in this study were similar to those reported by Moreira (2000), who, using the agronomic difference method, had, on average, 141.7 kg/DM ha.day during summer on pastures of *B. decumbens* managed under continuous grazing and fertilized with nitrogen.

The sum of total forage accumulation in each season allowed for the calculation of forage accumulation throughout the experimental period for each pasture management strategy. Thus, the lowering of brachiaria grass pasture in early winter to 15 cm resulted in higher ($P<0.10$) forage accumulation (25.6 t/ha of DM) than the maintenance of pasture at a fixed height and equal to 25 cm in all seasons (22.2 t/ha of DM).

Pastures managed at a lower height in the winter produced 3400 kg/ha more forage dry matter than those managed at 25 cm in all seasons. Considering a grazing efficiency of 80% and a daily forage intake per animal unit (AU) of 12 kg of dry matter, this additional primary productivity reveals the possibility of increased stocking rate up to 1.2 AU/ha during spring and summer seasons, when forage accumulation was greater.

Conclusions

Grazing management of *Brachiaria decumbens* cv. Basilisk, characterized by the maintenance of pasture with an average height of 15 cm during the winter and 25 cm from the beginning of spring optimizes forage accumulation, which is advantageous as compared with the maintenance of pasture at an average height of 25 cm during the seasons of the year.

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Table 6 - Leaf blade and total forage accumulation rates (leaf blade plus pseudostem) in brachiaria grass pastures managed under continuous grazing and with variable or fixed height during the seasons of the year

Pasture height (cm)	Season of the year			Mean
	Winter	Spring	Summer	
Leaf blade accumulation rate (kg/ha.day DM)				
25	-12.1	45.0	83.5	38.8±12.37B
15-25	-2.9	75.9	84.8	52.6±12.10A
Mean	-7.5±2.1c	60.5±6.7b	84.1±5.6a	
Total forage accumulation rate (kg/ha.day DM)				
25	-10.9	73.6	124.8	62.5±17.66 B
15-25	-2.3	107.4	139.3	81.5±18.72A
Mean	-6.6±2.0c	90.5±7.7b	132.0±9.5a	

Means followed by the same lowercase letter in the row and uppercase letter in the column do not differ ($P>0.10$).

DM - dry matter.

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