Winter Forage Yield of Signal Grass (*Brachiaria brizantha* (Hochst. Ex. A. Rich) R.D. Webster) at Different Cutting Frequency and N Fertilization

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Introduction

Signal grass (*Brachiaria brizantha* (Hochst. Ex. A. Rich) R.D. Webster) is widely grown in sub-humid tropical environments. In winter, shorter photoperiod and lower rainfall and temperatures reduce grass forage yield. Cutting frequency and N fertilization might reduce this negative effect (Whitehead, 1995; Pereira *et al*., 2014). The objective of the study was to determine winter forage yield total and by components of Signal grass under different cutting frequency and N fertilization.

Materials and Methods

Six treatments *viz*. three cutting frequency at plant heights of 8, 16 and 32 cm, and 2 nitrogen levels of 0 and 12.5 kg N/ha after each cut were tried in completely randomized design replicated four times with a plot size of 2x2 m. Plots were in a pasture established two years before; experiment lasted from January to April 2013, started with an homogenization cut to 4 cm stubble of all plots.

Three plant heights per plot were taken every three days, cut was done when average of plots under the same frequency reached ±0.5 cm the target plant height, cutting was to 4 cm stubble. Five days after each cut, N as per treatment was given by spraying a solution of urea at a rate of 200 l of solution/ha with a hand sprayer hold 70-80 cm above ground level. Total forage yield and by components and season mean of forage crude protein were statistically analyzed by analysis of variance and means were compared by Tukey and '*t*' test

Results and Discussion

N fertilization increased (P<0.05) 16% season total forage yield above Signal grass without N, frequency and the interaction did not influence (P>0.05) this variable (Table 1).

Table 1. Total (January-April)forage yield (kg DM/ha) of Signal grass at different cutting frequency and N level

		N (kg/ha/cut)		
Cutting frequency (cm)	**Number of cuts**	**0**	**12.5**	**Average**
8	5	2392	2449	2421
16	2	2790	2991	2891
32	1	2323	3272	2797
Average		2502b	2904a	
EEM	410.2			

a,b…means with one letter in common are not different (α>0.05). Cutting frequency and the interaction cutting frequency X N level showed no significant effect (P>0.05).

Leaf yield increased (P<0.05) 14% if N was added; and decreased (P<0.05) 20% at the 32 cm frequency compared to the mean of the other two frequencies that showed no difference (P>0.05) between them; interaction was not significant (P>0.05). Signal grass with N fertilization and under 32 cm frequency gave the maximum (P<0.05) stem yield, three times more than the mean of all the other treatments that showed no difference (P>0.05) among them. N fertilization increased (P<0.05) 19% dead matter only at the 32 cm frequency; dead matter increased steadily from the 8 to the 32 cm frequency (Table 2).

Cutting frequency influenced forage composition but not total yield. Leaves made 86 and 63% of the forage yield at 8 and 32 cm frequency, respectively. While dead matter provided 8 and 21% of the forage yield at these same frequencies.

N fertilization promoted higher total forage yield across frequencies; however, relative impacts were cutting frequency dependent. Signal grass cut at 32 cm frequency with addition of N increased 41, 31 and 1 % and 1.5 times total forage, dead matter, leaf and stem yields, respectively compared to the grass without N. At the 8 cm frequency N addition increased 2 and 4 % total and leaf yields, respectively with no change in stem and dead matter yields; then, at this frequency higher total forage yield was explained by higher leaf yield; while at the 32 cm frequency higher total yield came from higher stem and dead matter yields with almost no change in leaf yield.

Table 2. Season (January-April) yield (kg DM/ha) by component of Signal grass at different cutting frequency and N level

	N (kg/ha/cut)		
Cutting frequency (cm)	**0**	**12.5**	**Average**
a) Leaves			
8	2036	2127	2081a
16	2262	2581	2421a
32	1573	1993	1783b
Average	1957B	2233A	
EEM	321.9		
b) Stems			
8	190b	100b	145
16	293b	215b	254
32	242b	614a	428
Average	241	309	
EEM	163.9		
c) Dead matter			
8	167c	223c	195B
16	236c	196c	216B
32	508b	665a	587A
Average	304	361	
EEM	75		

a, b, c… and A, B… means within component with one letter in common are not different (α>0.05).

Crude protein decreased (P<0.05) 6.6 percent units from the maximum found at the 8 to the lowest found at the 32 cm frequency

Table 3. Crude protein concentration in Signal grass cut at different frequency

Cutting frequency (cm)	**Crude protein (%)‡**
8	13.0a
16	9.0b
32	6.4c
EEM	1.1

‡ Average of over two levels of added N and of 5, 2 and 1 cuts for frequencies 8, 16 and 32 cm, respectively. a,b,c means with one letter in common are not different (α>0.05).

The two times higher crude protein concentration at the 8 over the 32 cm frequency, could be explained on basis of the 17 % higher leaf yield across both levels of added N of the former relative to the latter frequencies, and the three times more dead matter accumulated in the 32 compared to the 8 cm frequency.

Conclusion

Nitrogen fertilization improves Signal grass winter total forage yield; while cutting frequency determines forage quality and the proportion of leaves, stems and dead matter in the total forage yield.

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