CHEMICAL COMPOSITION AND DEGRADABILITY CHARACTERISTICS OF SIGNAL GRASS *(Brachiaria decumbens)* GRASS

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ABSTRACT

Three ruminally fistulated Balami rams were used to evaluate the nutritive value of signa *Brachiaria decumbens)* grass harvested in the 1st 3 months northern Guinea Savannan using the *In Sacco* degradability method. The grass was incubated for periods of 6, 12, 18, 24, 36, 48, 72 and 96 have the result of the proximate analysis should varied up with highest 11.24% in the 1st month and lower 9.54% in the 3rd month. The highest potential degradability (a + b) was in the 1st month which was significantly ($p<0.05$) higher than the 2nd and 3rd months, respectively. The rate of degradation constant (c) was significa`ntly ($p<0.05$) lower in the 1st month (0.03) followed by the 3rd month (0.05) and the highest (0.06) was in the 2nd month. Effective dry matter degradation significantly ($p<0.05$) decreased with increase in outflow rate across the months' time of cutting (harvest) with the 1st month having the highest, followed by the 2nd and the third month. From the result of this study the 1st month had the highest degradation characterizes over the last two months. Signal grass has up content of 9.54% at 3 months of age which is an indication that is met the minimum requirement of 8% CP for maintenance of ruminant.

INTRODUCTION

The de facto reference method to determine rumen degradability of feed components is the *in situ* nylon bag technique (NBT). Therefore, the use of the *in situ* nylon bags feed evaluation technique developed by Qrskov and McDonald (1979) is an important tool in the measurement of quality of ruminant feeds. The objective of this study was to evaluate the degradation characteristics of signal grass *Brachiaria decumbens* grass for the first three (3) months of growth.

Materials and Methods

Samples Collection: The *Brachiaria decumbens* grass (leaves) harvested for the 1st three (3) months were used in this study. It was then oven diet at 105^0C per 24h to constant weight and ground to pass through a 1.0mm sieve.

In Sacco Procedure

Management and feeding of animals

Three ruminally annulated Balami rams were used for the study. The rams were housed in individual pens with concrete flour bedded with wood shavings. The rams were fed maize offal, cowpea husk and salt lick as supplements on daily basis. Similarly, water was offered adlibitum the diets offered increase rumen microbial population to meet their requirement for essential nutrients and also to provide optimum rumen environment for degradability (Njidda *et al*, 2015). Also the area around the cannula was cleaned regularly with warm water and detergent to prevent infection by pathogens.

***In sacco* DM degradability study**

The rate of nutrient disappearance of *Brachiaria decumbens* grass (leaves) was determined with the use of nylon bag technique.

Milled (1.0mm) samples (5g) from each month were placed in the nylon bag tied at the neck with undergradable string and arranged serially. The samples were then inserted into the cannula and incubated in triplicates. A bag was removed from each of the three animals at 6, 12, 18, 24, 32, 48, 72 and 96 hours for the *Brachiaria decumbens* nutrients disappearance. After each withdrawal, the samples were washed under tap water until clear water was obtained and allowed to drip. The bags plus samples were then oven dried at 65^0c for 48hrs and the weight of the bags plus residues measured and recorded. Soluble portion of the feed was determined by weighting 5g of the feed samples into nylon bags in triplicates it was soaked in warm tap water at 40% for one hour. It was removed and washed under a running tap for 15 minutes in two circles till clear water was obtained. The bags were tried in the Thermofisher oven at 60^0 for 48hrs to constant weight (Orskor *et al*, 1980). The computation of degradability was done using exponential equation as described by (Orskov *et al*, 1980).

$P = a+b\ (1 - e^{-ct})$., where p = potential degradability after time 't', a = water soluble fraction (zero hour). b = insoluble but degradable fraction after time, c= rate of degradation of slowly degradable fraction b, t = incubation length ie 6, 12, 18, 24, 32, 48, 72 and 96 hours; e = exponential. The effective ruminal degradability of DM (EDDM) was calculated according to Orskov and McDonald (1979): $EDD = a+bx\ (^c/_c +K)$ where $k=0.12h^{-1}$

CHEMICAL ANALYSIS

The samples were analyzed in triplicates for dry matter (DM) and crude protein (CP), Ash, E.E. according to AOAC (2002) procedures, Neutral Detergent Fiber (NDF), Acid Detergent Fiber (ADF) according to Vansoest *et al* (1994).

STATISTICAL ANALYSIS

For rumen degradability the NEWAY EXCEL package for processing data from feed degradability and *in-vitro* gas production was used to compute the data obtained (Chen and Gomes, 1992). The dry matter degradability of each sample for the disappearance of dry matter from the bag after incubation and washing loss according to the equation by Orskor and McDonald (1979).

RESULTS AND DISCUSSION

Chemical Composition

The result of the proximate composition is presented in Table 1. The dry matter content of *Brachiaria decumbens* ranged between 92.63% for the third month to 95.64% in the first month which is higher than 90.5% and 91.05% reported by Ibrahim (2014). The range of CP content of 9.54% for the 90 days post-emergence to 11.24% for 30 days post emergency falls within the range of different cut of 10.9 to 13.32% reported by Maja *et al*. (2014). The NDF content (54.25%) in the second month and 56.23% in the 1st month is lower than the range of 68.35 to 69.14% reported by Maja *et al* (2014). The ADF range of 43.63 to 46.39% in the second and first months respectively slightly agrees with 36.32 to 44.99% revealed by Maja *et al* (2014). The variation might be due to variations in species and maturity of the grasses at harvest. Table 3 shows the washing loss fraction which significantly ($p<0.05$) decreases with increased in age with the lowest in the third month (18.42%) while the highest was recorded in the first month (40.01%). This could be attributed to increased in fibre content as the plant grows. The **c** value of *Brachiaria decumbens* grass (0.05) slightly agrees with 0.039 revealed, by Bagoro (1997) for sorghum stover. The potential degradability, significantly ($p<0.05$) followed the same sequence with 60.0% as the lowest value in the third month and the highest value of 96.20% in the 1st month Table 3. This is not in line with 83 to 87%

reported by Andell *et al*, (2012) who compared the degradability characteristics of different forages. The variations also occurred in the actual dry matter disappearance due to differences of age at harvest. This findings agree with Deschamps (1999) that reduction in DM degradability with advanced maturity as the main factor restricting grass utilization in diets of high producing animals. The actual dry matter disappearance (Table 2) of 40.76% to 52.00% at 24 hrs incubation 55.12 to 62.2% at 48hrs and 58.8 to 67.33% at 72 hrs incubation periods is in agreement with values reported by Luis *et al* (2008) as 42.9 to 52.7% at 24 hrs 54.8 to 63.6% at 48 hrs and 58.9 to 68.9% at 72 hrs incubation period when the authors evaluated the degradability characteristics of Elephant grass at four harvest stages of maturity. Effective DM degradability decreased with increase with age of harvesting in this study.

CONCLUSION

It was observed that *Brachiaria decumbens* grass has CP context of 9.5% at 3 months of age which is an indication that it met the minimum requirement of 8% CP required for maintenance of ruminant animals. The actual dry matter disappearance of 55.12% of incubation period of 48 hrs is an indication of good digestible grass.

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Table 1: Proximate analysis of *Brachiaria decumbens* signal grass (2kg IDM)

Months	DM	CP	ASH	EE	ADF	NDF
1	95.64	11.24	8.16	1.12	46.39	56.23
2	93.84	10.16	10.37	1.35	43.63	54.29
3	92.63	9.54	9.28	1.20	44.51	55.39

Table 2: Actual Dry Matter Disappearance (%) of signal grass (*Brachiaria decumbens*) Incubation periods (hrs)

Months	0	6	12	18	24	32	48	72	96
1	26.04^{a}	22.22 ^{b}	34.11^{c}	37.00^{d}	52.00^{e}	57.24^{f}	62.23^{f}	67.33^{g}	7.35^{h}
2	20.76^{a}	30.12 ^{b}	31.32^{c}	36.00^{d}	40.76^{e}	52.21^{f}	58.76^{f}	61.11^{g}	62.65^{h}
3	18.42^{a}	29.82^{b}	32.62^{c}	36.11^{d}	43.50^{e}	48.33^{f}	55.12^{f}	58.90^{g}	60.00^{h}

a,b,c means different superscripts with the same column differ significantly ($p<0.05$)

Table 3: Degradation characteristics and effective degradation of signal grass (*Brachiaria decumbens*) incubated in the rumen of rams.

Months	a	b	a+b	C
1	46.01^{a}	50.19^{a}	96.20^{a}	0.03^{a}
2	34.30^{b}	39.95^{b}	74.25^{b}	0.06^{b}
3	18.42^{c}	41.58^{c}	60.00^{c}	0.05^{c}

a,b,c means different superscripts with the same column differ significantly ($p<0.05$)

Table 4: effective degradability of (Dry Matter) of Signal grass (*Brachiaria decumbens)* grass calculated at three months different outflow rates.

Months	0.02	0.05	0.08	RSD
1	43.63^{a}	34.26^{a}	29.97^{a}	3.12^{a}
2	65.17^{b}	57.33^{b}	52.16^{b}	2.23^{b}
3	82.39^{c}	71.76^{c}	65.94^{c}	3.87^{c}

a,b,c means different superscripts with the same column differ significantly ($p<0.05$)