FERTILIZER EFFECTS OF BOVINE RUMEN CONTENT ON PERFORMANCE OF *GAMBA GRASS (ANDROPOGON GAYANUS)* IN SEMI-ARID REGION, BORNO STATE, NIGERIA

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ABSTRACT

Animal waste in developing countries like Nigeria due to its bulky, low-grade composition and high water content. Research on the use of this waste as a plant nutrient source is limited, but Gamba grass has shown potential as a high-yielding option for utilizing these wastes. Therefore, the objective of the study was to determine the effects of bovine rumen content as fertilizer on growth components, yield and quality of Andropogon gayanus (Gamba Grass) in semi-arid region of Borno state. A Nine plots measuring 3m x 3m each were laid in a completely randomized design (CRD) Three levels (0, 8 and 12t/ha-1) of bovine rumen content were applied into the soil with three replication. Gamba grass tiller crown were transplanted at 50cm x 50cm intra and inter row spacing. The parameters measured were plant heigh, plant width, leaf width, leaf length and number of tillers while a cutting of 10cm from each treatment (replicate) was done at different age after transplanting (4,6 and 8 weeks) and yield harvesting was done at 97 days. The results indicated that bovine rumen content significantly (P<0.05) influenced growth components of A.gayanus. There wass no significant (p>0.05) effect on all growth components at weeks 4 and 10 between the treatment (0, 8, and 12t/ha-1) respectively. However, it was observed that plant height increasde with increase in number of cutting interval with the higher regrowth at 10 WAT with 108.60 at 8ton/ha, and lowest with 96.60 regrowth height at 0ton/ha respectively. Based on the findings of this study, it was suggested that rumen contents at the rate of 12ton/ha is recommended. The study recommended that further studies should be carried out during the raining season to ascertain the potential yield and herbage quality of A. gayanus on different rumen contents rates.

Keywords*:* Bovine rumen content, growth components, *andropogon gayanus,* semi-arid

INTRODUCTION

Managing animals waste (rumen content) from abattoirs is a common problem in developing countries such as Nigeria. putting rumen content in to effective agrarian use is also often a problem because they are bulky low grade fertilizers of variable composition and frequently have high water content thus, not easy to transport far from point of collection on farm management problem and associated offensive odor further complicate its utilization Stevenson and col., (1999). Rumen contents are waste from abattoir that are presently a menace in most urban cities of developing countries like Nigeria. The use of these wastes as plant nutrient sources has not received much research attention in Nigeria. Gamba grass adapts well to the soil of the semi-arid. It also grows on a variety of soils (sandy clays, sandy loams to loamy sands, sands to black cracking clays) in areas situated below an altitude of 980 m. Gamba grass is one of the high-yielding grasses of West Africa. Na Allah *et al.* (2020) reported the herbage dry matter yield of 2.037 t/ha *Andropogon gayanus* in the semi-arid zone of Sokoto, Nigeria. *A. gayanus* is a grass with low P and N requirements and tolerant of low fertile soils that is free of Aluminium or Magnesium (DAF, 2020; Cook *et al*., 2020; FAO, 2009). It grows well in a place with the annual rainfall ranging from 400 to 1500 mm with a marked 5-6- (9) month dry season. The **objectives of this study is to evaluate** the effect of Bovine Rumen content as a fertilizer on growth components and yield and Regrowth height at different intervals of *Andropogon gayanus*

MATERIALS AND METHODS

Experimental Site

The experiment was carried out at Teaching and Research Farm, Department of Animal Science, University of Maiduguri. Maiduguri is located between latitude 11^0 50'42"North and longitude 13^0 9'35" East with an altitude of 354m above the sea level. Maiduguri is characterized with by a short period of rainfall (June-September) and long period of dry season (October-February). The ambient temperature range from 20^0 during the cold dry season to 44^0C during the hot dry season relative humidity is about 30%-45% in august which usually falls to about 5% in December and January and day length varies from 11-12 hours (Alaku, 1983).

Source of Seedlings and Organic Fertilizer

Two weeks old young tillers of gamba grass was obtained from Teaching and Research Pasture Farm, Department of Animal Science, University of Maiduguri. The organic fertilizer (bovine rumen content) was obtained from Maiduguri central abattoir and has been sun dried and analyzed for nutrient content as presented in Table 1before application**.**

Table 1 Composition of nutrients present in bovine rumen content

Nutrient	Concentration
Nitrogen	0.0044(cm/kg)
Phosphorus	0.066%
Potassium	1.17%

Experimental design and treatments

The experiment was laid out in a completely randomized design (CRD) with three treatments replicated three times. The treatments were 0, 8 and 12 t/ha of bovine rumen contents.

Land preparation, Treatment application and transplanting

The experimental land was cleared of thorns, dry weeds, shrubs, trees with hoe, cutlass, axe, andrake. The land was harrowed using hoe and was divided into plot of 3x3m ($9m^2$), young tillers of gamba grass were transplanted at 50x50cm between and within the rows. Each plot consist of five rows with 5 plants per row with the total of 25 plants per plot, while the net plot size was $3m^2$. 2kg of top soil (0-15cm depth) was collected in a polythene bag and used for soil nutrients analysis for suitability of the soil for planting.

The treatments (bovine rumen contents) were applied 2 weeks before transplanting. Using the formula below to calculate the amount of fertilizer to be used

$$x = \frac{\text{rumen content(kg)}}{\text{10,000m2}} \text{ X } 9m^2$$

Before transplanting, the land was tilled and irrigated. Four (4) seedlings (tillers) were planted per hole at the depth of 5cm with the spacing of 50x50cm inter and intra rows.

Watering of the plot was daily in first (1) month of transplanting and after establishment of the plants the intervals of one day was adjusted afterwards to avoid water logging in the plots and 2 days intervals until the plants reached maturity.

Growth Parameters

Plant height (cm), Number of tillers per plant, leaf length (cm), leaf width (cm), fresh herbage yield, and dry herbage yield were obtained

Assessment of regrowth and chemical composition

Five plants were randomly selected and measured plant regrowth height at a cutting interval of 6, 8, and 10 weeks after transplanting (WAT) for regrowth and chemical analysis.

Statistical Analysis

Data were subjected to Analysis of Variance (ANOVA) using Complete Randomized Design (CRD) (Steel and Torrie,1980) and significant difference between treatments means were separated using Least Significant Difference (LSD) at 0.05 level of significance.

RESULTS AND DISCUSSION

Table 2 presents the chemical composition of andrpogon gayanus grown as affected by level of bovine rumen content. The crude protein obtained from this study is ranges from 6.42 - 7.12) the results showed that there was significant difference ($p<0.05$) difference among the treatments means at 0, 8

and 12t/ha-[1]. The highest value was obtained from the 12h/ha-[1] and the lowest value was recorded from the control. The value obtained are lower than (11.20) as reported by Mbah et Al. (2016) who carried out the experiment on utilization of Andropogon gayanus as a basal diet. The ether extract results obtained from this study ranged from 3.83-7.17. The results showed that there was significant ($p<0.05$) difference among the treatments means at 0, 8 and 12h/ha-[1]. The highest values was recorded from the 8t/ha-[1] and the lowest was obtained from the 12h/ha-[1]. The values obtained is highest than (9.20) as reported by waziri (*et al.*, 2013). Who carried out an experiment on comparative analyses of nutrient and mineral elements content of andropogo gayanus kunth and pennisetum pedicellatum trim. The values obtained are highest than 36.61 as reported by Mbah (*et al 2016)* who carried out an experiment on utilization of andropogon gayanus as basal diet.

Table 2: Effect of bovine rumen contents on chemical composition of *A. gayanus* at varying cutting interval

	chemical composition of *A. gayanus*							
Treatment	DM	CP	CF	ASH	EE	NFE	NDF	ADF
0	67.00	6.42	35.17	8.33	5.17	14.97	52.30	41.51
8	67.67	6.98	38.17	8.50	7.17	14.02	54.00	44.24
12	72.83	7.12	38.67	8.67	3.83	18.39	54.33	44.70
SEM	13.20 NS	0.59 *	6.02 NS	2.56 NS	2.23 *	11.14 NS	3.95 NS	5.49 NS

*=significant difference (P>0.05), NS=Non-significant difference (P>0.05), SEM=Standard Error of mean, DM=Dry matter, CP=Crude protein, EE=Ether extract, CF=Crude fibre, NFE=Nitrogen free extract, NDF=Neutral detergent fibre, ADF=Acid detergent fibre.

Table 3 shows the growth components as influenced by rates of fertilizer at influenced by rates of fertilizer at 4 weeks after planting (WAP). A non-significant (P>0.05) difference was observed for all the growth component except leaf length with a highest (P>0.05) value of 0.48cm at 8 ton/ha-[1] fertilizer. at 6th week after planting. However, highest 1.44, 0.56, and 2.82 were recorded for plant width, leaf width and leaf length at 8 ton/ha-[1] respectively. The highest value for tiller number was recorded at 12 ton/ha fertilizer; and the lowest (6.60) was at 8 ton/ha-[1] At 8 weeks there was

Table 3. Effect of bovine rumen contents on growth components of *A. gayanus* at varying growth stage

Weeks	Treatment	Plant height	Plant diameter	Leaf width	Leaf length	Tillers number
4	0t/ha-[1]	71.40	1.10	0.26^{b}	1.90	5.20
4	8t/ha-[1]	68.40	1.40	0.48^{a}	2.26	4.60
4	12t/ha-[1]	58.00	1.34	0.36^{ab}	2.48	5.00
	SEM	9.00_{NS}	0.09_{NS}	0.06*	0.28_{NS}	0.06_{NS}
6	0t/ha-[1]	73.80	1.14^{b}	0.28^{c}	2.12	7.60^{b}
6	8t/ha-[1]	73.00	1.44^{a}	0.56^{b}	2.8	6.60^{b}
6	12t/ha-[1]	62.20	1.32^{b}	0.38^{a}	2.56	9.4^{a}
	SEM	9.20_{NS}	0.09 *	0.07*	0.21_{NS}	0.72*
8	0t/ha-[1]	132.00	1.16^{b}	0.36^{c}	2.60	12.00^{b}
8	8t/ha-[1]	140.00	1.46^{a}	0.54b	2.84	10.20^{b}
8	12t/ha-[1]	148.00	1.32^{ab}	0.72a	2.70	17.00^{a}
	SEM	15.66_{NS}	0.08*	0.08	0.22_{NS}	1.47*
10	0t/ha-[1]	132.40	1.16^{b}	0.36^{c}	2.64	15.00^{b}
10	8t/ha-[1]	141.80	1.46^{a}	0.54^{b}	2.86	14.00^{b}
10	12t/ha-[1]	151.00	1.32^{ab}	0.72a	2.72	22.60^{a}
	SEM	15.58_{NS}	0.08*	0.08*	0.25	2.26*

significant (P>0.05) difference in all the parameters. Highest values for plant width was 1.46cm at 8 ton/ha plant height 148.00 at 12 ton/ha-[1], leaf width 0.72 at 12 ton/ha-[1], leaf length 2.84 at 8 ton/ha and tiller number 17.00 at 12 ton/ha respectively. At 10 weeks there was significance (P>0.05)

difference among all the growth components measured with the range of 132.40 - 151.00 for plant height at, highest 1.46 for plant width at 8 ton/ha-^{1} leaf width was high at 0.72 at 12 ton/ha, leaf length recorded a range of 2.64 - 2.86 while tiller number was highest at 12 ton/ha with 22.60 respectively
This regrowth height at cutting intervals of 4, 6, 8 and 10 weeks after planting is presented in table 10. There was no significant (P>0.05) difference. However, it was observed that plant height increased with increase in number of cutting interval with the highest regrowth at 10 WAP with 108.60 at 8ton/ha, and lowest with 96.60 regrowth height at 0ton/ha respectively. Furthermore, a range of 70.20 - 78.00, 79.00 - 89.20 and 86.80 - 99.80cm height were obtained at cutting interval of 4, 6 and 8 weeks.

Table 4.Effect of bovine rumen contents on regrowth height (cm) of *A. gayanus* at varying cutting interval (weeks)

	regrowth height (cm)			
Treatment	PH (4W)	PH (6W)	PH (8W)	PH(10W)
0t/ha	70.20	79.00	86.8	96.60^{b}
8t/ha	78.00	89.20	99.80	108.60^{a}
12t/ha	70.80	81.60	93.40	99.00^{ab}
SEM	8.32$_{NS}$	6.98$_{NS}$	5.99$_{NS}$	6.98*

PH =plant height

CONCLUSION

Based on the findings of this study, it could be concluded that the productivity of *A. gayanus* as influenced by level of bovine rumen content application. *A. gayanus* performed best at the application of 12ton/ha-^{1} as it produced appreciable yields and quality herbage. It was suggested that rumen contents at the rate of 12ton/ha is recommended.

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