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Utilization of Andropogon Gayanus (Gamba grass) as Basal Diet

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ABSTRACT
A feeding trial was conducted to determine the effect of feeding Andropogon gayanus (Gamba grass) hay with groundnut haulms as supplement on the performance of Yankasa rams. Sixteen yakasa rams aged from 8-10 months with average live-weight of 18kg were subjected to four treatment diets each consisting of four replicates in a randomized complete block design. The four dietary treatments were T1 (sole Andropogon gayunus), T2 (Andropogon gayanus + 100g groundnut haulms), T3 (Andropogon gayanus + 200g groundnut haulms) and T4 (Andropogon gayanus + 300g). The result showed that rams fed T1 recorded the least feed intake and weight gain than T2, T3 and T4 which were supplemented with groundnut haulms. The live-weight gain of yankasa rams was not significantly ($P<0.05$) different. The water intake of rams was not significantly ($P<0.05$) affected by groundnut haulms supplementation but increases with levels. The nutrients digestibility were significantly ($P<0.05$) different with supplementation except the crude fibre. The result showed that supplementation of Andropogon gaayanus hay with groundnut haulms could lead to improved feed intake, weight gain, digestibility and nutrients intake.
Key words: Yankasa rams, Andropogon gayanus, Groundnut haulms, Digestibility, Performance.

I. INTRODUCTION

Insufficiency of feed year round is the major problem of ruminant animal production in Nigeria (Osinowo, 1992 and Schoenia, 2011) which is mostly aggravated by high cost of conventional concentrates during the dry season. Ruminant animals feeding on poor quality roughages exhibits decreased feed intake, weight loss, increased susceptibility to health risk and reduced productive performances (Aganga and Tshwenyane, 2003). Small holder farmers cannot afford the cost of establishing a pasture as such depend solely on natural pastures and agro-industrial by-products to feed their animals (Smith *et al.,* 1991). The animals are fed on poor quality feed resources during post harvest and peak dry season when these feed resources became their main sources of energy (Kibon and Orskov, 1993). These feed resources which consist mainly of grasses, legumes, browse and cereal crop residues vary widely and spread across the major ecological zones of the country (Shiawoya and Tsado, 2011). The rate of population growth in Nigeria calls for intensification for improvement of domestic livestock for meat supply to the populace in order to meet FAO recommendation of 35g/capt/day of animal protein (Uza *et al.*, 1999 and NPC, 2006). Sheep along with goats are meat producing animals that have simple management requirements compared to poultry and other livestock (Adu, 1985 and Uza *et al.*, 1999). They are economical converters of browse, grasses, concentrates and crop residues into profitable products such as meat, milk and wool, although these feeds are normally scarce during the dry season and can not meet the maintenance requirements of the animals without any form of supplementation. Therefore, there is need for legume forage that improves the livestock nutrition during the period of scarcity.

2. MATERIALS AND METHODS

2.1 Site of study

The study was conducted at the Teaching and Research Farm of the Department of Animal Science and Range Management, Modibbo Adama University of Technology, Yola, Adamawa State. Yola is located in the North Eastern part of Nigeria. It is situated within the Savannah region and lies between latitude $9^0$19' North and longitude $12^0$301' East and altitude of about 185.9m above sea level. Yola has a tropical climate marked by rainy and dry seasons. Maximum temperature can reach 40^0c particularly in April, while minimum temperature can be as low as 18^0c with annual rainfall of less than 1000mm (Adebayo and Tukur, 1999).

2.2 Experimental Animals and Management

Sixteen Yankasa rams aged between 8-10 months with an average weight of 18kg were purchased at Girei sheep and goats market of Adamawa State. They were adapted for fourteen days and treated with Albendazole and ascaricides against endo and ecto- parasites.

2.3 Experimental diets and Design

Andropon gayanus was fed as basal diet and groundnut haulms as supplement with four
treatments. The sixteen animals were allotted to the four treatment diets and replicated four times in complete

randomised block design (CRD). The treatment combinations are shown below:
T1= sole Andropogon gayanus
T2=Andropogon gayanus+100g groundnut haulms
T3= Andropogon gayanus+200g groundnut haulms
T4= Andropogon gayanus+300g groundnut haulms

2.4 Data Collection

2.4.1 Feeding Trial

Feeds were offered twice daily in the morning and evening (8.00am and 4.00pm), while salt lick and water were provided ad lib. The left over of feed were weighed every morning before the next feeding. The growth performance of the rams was determined by weighing them with scale on weekly basis.

2.4.2 Digestibility Study

The digestibility study was concluded immediately after feeding trial. Twelve yankasa rams were selected from all the treatments and taken to the metabolic crates for the digestibility study. They were alloted to the same treatment diets used in the feeding trial and adapted for fourteen days after which the animals were fitted with an improvised bag to facilitate the trapping of the faeces. The collection of faeces lasted for five days. Feed offered and refusals were weighed daily. Total faecal output was measured daily using a weighing scale and 10% sub-sample were dried and stored for dry matter determination before chemical analysis.

2.4.3 Chemical Analysis

Proximate analysis of the feeds and faecal samples were determined by the standard method according to A.O.A.C (2004). Acid detergent fibre and Neutral detergent fibre according to Goering and Van Soest (1990).

2.4.4 Statistical Analysis

Data collected from the study were subjected to analysis of variance (ANOVA) and least significant difference (F-LSD) test was used to separate significantly different treatment means (Steel and Torries, 1980).

3. RESULTS

3.1 Chemical Composition

The chemical composition of the experimental diets fed to Yankasa rams is presented in Table 1. The gamba grass contains 94.0% DM, 11.2% CP, 25.0% CF, 3.2% EE, 12.5% Ash, 42.1% NFE and 2168.15 kcal/kg ME, while the groundnut haulms contains 95.0% D M, 19.3CP, 19.5%CF, 5.2%EE, 11.5% Ash, 39.5%NFE and 2537.53 K cal/Kg ME.

Table 1: Chemical Composition of the Experimental Diets (% DM)

Constituents %	Gamba grass hay	Groundnut Haulms
Dry Matter (DM)	94.0	95.0
Crude Protein (CP)	11.2	19.3
Crude Fibre (CF)	25.0	19.5
Ether Extract (EE)	3.2	5.2
Ash	12.5	11.5
Nitrogen Free Extract (NFE)	42.1	39.5
ME (Kcal/kg	2168.15	2537.53

The performance characteristic of yankasa rams fed Guinea grass and groundnuts haulms as supplement is presented in Table 2. Feed intake was highly significant ($P<0.05$) with the highest value of 449.23g/h/d was obtained among rams fed *Andropogon gayanus* hay with 300g groundnut haulms (T4), while the least intake of 381.83g/h/d was recorded among rams fed *Andropogon gayanus* hay only (T1). The average daily water intake of the rams was not significantly ($P^{>}$ 0.05) different across the treatments, but highest value of 2.72liters was obtained in T5 and least in T1.

Feed conversion ratio was not significantly different ($P>0.05$), but improves with increase in supplement level up to 300g in T4 which is significantly superior than others.

Live-weight gain was not significant ($P>0.05$) showing that the treatment diets showed no influence, but numerically higher value of 3.22kg was obtained in T4 and the least value of 2.25kg in T1 (control). Average daily weight gain was significantly different ($P<0.05$) with the highest value of 40.78g was obtained in T_4, while the least value of 25.00g was in T_1 (control).

Table 2. Performance of Yankasa Rams Fed *Andropogon gayanus* hay Supplemented with Groundnut Haulms

Parameter	**T_1**	**T_2**	**T_3**	**T_4**	**LSD**
Dry matter intake (kg/hh/d)	381.83	401.45	437.58	449.23	27.56**
Water intake (L)	2.51	2.70	2.53	2.72	2.91^{ns}
Feed conversion ratio	15.46	12.50	12.26	11.80	2.38*
DMI as % BW	1.69	1.38	1.37	1.23	0.142**
Initial live-weight (Kg)	18.75	18.87	18.75	18.87	1.47^{ns}
Final Live-weight (Kg)	21.000	21.77	21.77	21.97	1.35^{ns}
Live-weight gain (kg)	2.25	2.90	2.90	3.22	4.01^{ns}
Average Daily Weight Gain (g)	25.00	32.22	35.78	40.78	6.79*

NS= not significant
LSD= Least significant difference

The nutrients intake of yankasa rams is summarized in Table3. Significant difference (P<0.05) occur in dry matter, crude protein, organic matter and ash intake with increase in level of the supplement, while no significant difference (P>0.05) occur in crude fibre intake across the treatment groups.

Table 3: Nutrient Intake of Yankasa Rams Fed *Andropogon gayanus as* Basal Deit with Groundnut Haulms as Supplement.

Parameter	**Treatments**				
	T_1	**T_2**	**T_3**	**T_4**	**LSD**
DMI (g/h/d)	360.83	379.37	413.50	424.52	2.14*
OMI(g/h/d)	315.01	331.2	360.99	370.61	8.79*
CPI (g/h/d)	57.27	60.22	65.64	67.38	4.36*
CFI(g/h/d)	84.00	88.32	96.27	98.83	9.62^{ns}
Ash (g/h/d)	45.82	48.17	52.51	53.91	2.28*
ME /MJ/d	9.16	9.63	10.50	10.78	0.10**

Table 4 shows the digestibility of nutrients by yankasa rams fed *Andropogon gayanus* with groundnut haulms as supplement. Significant difference (P>0.05) occour with digestibility of dry matter, crude protein, nitrogen free exrtact, while no significant difference occurs with crude fibre digestibility across the treatment groups with increase in supplement levels.

Table 4**:** Nutrient Digestibility of Yankasa rams Fed *Andropogon gayanus* Supplemented with Groundnut Haulms.

Parameter (%)	**Treatments**				
	T_1	**T_2**	**T_3**	**T_4**	**LSD**
Dry matter Digestibility	62.72	64.23	65.18	68.25	2.74*
Crude protein digestibility	53.00	56.00	54.01	53.10	5.37*
Crude fibre digestibility	63.71	59.97	44.81	44.45	13.90^{NS}
Nitrogen free extract digestibility	36.61	38.25	18.61	21.40	19.84*

4. DISCUSSION

The chemical composition of the basal diet (Andropogon gayanus) shows that the dry matter content of 94% obtained was slightly higher than 92.4% reported by Ibrahim, 2007, and this author also reported 33% crude fibre which is higher than the 25% obtained in this study. The ether extract content of 3.20% was similar to 3.07% reported by Babayemi *et al*., 2006. The nitrogen free extract of 42.10% in the study is lower than 50.30% reported by Bello and Tsado, 2013, but higher than 25.18% reported by Babayemi *et al*., 2006. The differences in value may be attributed to variation in soil fertility, time of harvest, curing and method of processing which usually affect the chemical composition as reported by Fuglie, 1991. The supplement (groundnut haulms) contains 19.30% CP which is higher than 16.16% reported by Olache *et al*., 2013, but is within the range values of 10.88-19.3% reported by Ayantude *et al*., 2007. A lower range values of CP (16.04-17.85%) was reported by Maigandi *et al*., 2004 and 15.56-18.67% by Fasino, 2012. However, Ndubueze *et al.,* 2006 and Abdul *et al., 2008* reported higher CP values of 26.60% and 28.20% than obtained in this study and concluded that the differences could be due to factors like soil fertility, stage of harvest, rainfall level and method of processing.

The DM intake was similar to the report by Ibrahim and Tibin (2003) and stated that supplementation generally improves dry matter intake than un-supplemented. Chakeradza *et al*. (2002) also reported that supplementation of maize straw with cowpea hay, groundnut haulms and cotton seed meal enhances total dry matter intake. Tsado *et al*. (2013) in a similar study reported a range value of feed intake from 808.08-

1661.00g/h/d and attributed this higher intake to conducive rumen environment as a result of the supplementation with little amount of green forage, which improves the rumen ecosystem (Preston and Leng 1987). A similar work was also reported by Yashim *et al.* (2011) who fed *Crotalaria retusa* with different supplements to goats and obtained high dry matter intake. A similar result was reported by Navas Camacho *et al.* (1993) who supplemented legume tree forages to a basal diet of hay in different amounts. Tolera and Said (1997) also fed different levels of legumes to a basal diet of maize stover and discovered that supplementation with stylo (*Stylosanthes guianensis*) resulted in significantly higher dry matter intake and in a similar study by Jabbar *et al.* (2008) reported an increase in dry matter intake as a result of supplementation. Phimphachanvonsod (2001) in a separate study reported no significant effect on total dry matter intake when *Gliricidia sepium* in was fed to goats as supplement and this is comparable to the report by Mpairwe *et al.* (1998) who fed goats with elephant grass as basal diet with legumes as a protein source and reported no significant effect on intake. The water intake in this study was numerically higher than reported by Ajiji *et al*. (2013) who fed Gamba grass with acacia pods as supplement and this could be due to weather condition, while Osuhor *et al.* (2004) reported a similar result with maize stover-lablab mixture and concentrates fed to Yankasa rams. The live-weight gain agrees with the report by Ojo *et al.* (2001) that supplementation enhances growth of small ruminants. The daily weight gain obtained was similar to the report by Phonepaseuth and Inger (2003) who reported significant increase in daily weight gain of goats fed Andropogon gayanus hay with stylosanthes guinensis as supplement which agrees with Vanguez *et al*. (2000) who reported that energy-protein balanced ration enhances live-weight gain. The feed conversion ratio in the study was better than the values of 20.6-50.6 reported by Aye and Adegun (2010). The nutrient intake agrees with the earlier report by Makkar and Sigh (1997) and Smith *et al.* (2007) who reported that starch and nitrogen in supplement when fed with treated maize stover induced better utilization of non-protein nitrogen than any other carbohydrate source. A similar finding by Tolera and Sundstol (2000) was reported that as supplementation increases nutrients intake of sheep fed a basal diet of maize stover also increases and agrees with Abdu *et al.* (2013) who reported that most basal diets must be supplemented in order to achieve the required results. The digestibility of nutrients in this study was similar to the report by Adams *et al*. (1995) who fed rams with high fibre

feed with protein supplement and also Vanquez and Smith (2000) in a similar study reported a comparable result and stated that crude fibre digestibility can be improved through energy-protein balance of a diet. Also, Yahaya (2009) and Nyako *et al*. (2012) in separate study reported similar results with sheep, but contrary to the report by Faisal *et al*. (2005) who reported lower digestibility values.

5. Conclusion

Groundnut haulms when used as a supplement to gamba grass base diet could improve the dry matter intake, nutrients digestibility, nitrogen utilization and enhanced growth rates of rams. The guinea grass is the most commonly available and abundant along river sides during the dry season in Northern Nigeria and its utilization by farmers could be a solution to scarcity of feed when fed together with forage legume such as groundnut haulms.

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