NUTRIENT INTAKE AND DIGESTIBILITY OF UDA BREED OF SHEEP FED THREE ENERGY DIETS IN THE SUDAN SAVANNAH ZONE OF NIGERIA

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ABSTRACT
The study was conducted to evaluate the proximate composition and nutrient intake of Uda breed of sheep fed three energy diets (low energy, medium energy and higher energy diets). Eighteen (18) adult sheep with an average weight of 28±1.25kg were allotted to three energy diets designated as T1, T2, and T3, respectively in a 2×3 factorial arrangement in a Completely Randomized Design (CRD). The trial was replicated three (3) times and lasted for 12 weeks. The results showed significant (P<0.05) difference across all treatments in nutrient intake. The results of nutrient intake indicated significant (P<0.05) differences in all parameters evaluated. However, nutrient intake was significantly (P<0.05) affected by the treatments except dry matter intake (DMI). There is general significant (P<0.05) difference in T2 (medium energy diets). Values of proximate composition were within normal ranges for healthy sheep production. Its concluded that, T2 with 55% levels of energy (MED) diets enhanced nutrient intake by the experimental animal without detrimental effects.
Keywords: Nutrient Intake, Uda Sheep, Energy Diets, Sudan Savannah Zone

INTRODUCTION

Sheep has the potential to significantly contribute to meeting animal protein demand. Growing human population and urbanization could lead to increased demand for substantial amount of feed resources needed to improve ruminant growth and production (Njidda *et al.*, 2018). The increasing global livestock production and animal population with limiting livestock feed resources portends great danger in the nearest future (Tona, 2018) In addition, poor feed utilization as a result of inefficient rumen fermentation is one of the challenges of ruminant nutrition in the tropics. The available feed resources are characterized by low proportion of protein and minerals and high lignocellulolytic forages especially during the dry season (Addas *et al*., 2011). Several factors affect livestock productivity, but the most important problem militating against ruminant production in the tropics is the scarcity of all year-round provision of feed (Tona, 2018). Feed resources for livestock in the tropics are natural pastures which are limited in supply during the dry season (Njidda *et al.*, 2018). It has been reported that in the dry season, ruminant livestock cannot meet their nutritional requirements due to scarcity of energy and protein feed stuffs (Adegbola, 2004). As a result, animals are unable to meet their energy and protein needs from the available poor-quality herbage with subsequent marked weight losses and productivity Adegbola, (2004).

Study Area

The study was conducted at Teaching and Research Farm of the Department of Animal Science, Aliko Dangote University of Science and Technology, Wudil, Kano State. Wudil is located within the Sudan savannah zone of Nigeria. The experimental site is located on latitude 11° 37 ' N and longitude 8° 58 ' E and at an altitude of 403m above sea level (Olofin *et al.,* 2008). It has an area of 138m^2 and a population of 185, 189 people at the 2006 census. The postal code of the area is 713101. The annual rainfall ranges from 850 mm – 870 mm with minimum and maximum temperature of 20°C and 43°C, respectively. The relative humidity of the region is always low and ranges between 40% - 51% (Olofin *et al.,* 2008). **Experimental Animals and their Management**

Eighteen (18) adult sheep with an average weight of 28±1.25kg consisting of 6 individual (Uda) breed was used for this study. Animals were treated against Endo and ecto parasites using Ivermectin + Clorsulon (Ivotek super®) at dose rate of 200 µg/kg body weight. They were vaccinated against *pnuemo-enteritis complex (peste-*

des-petits ruminants (PPR) at a dose rate of 1 ml/kg body weight subcutaneously at neck region. Experimental animals were quarantined for two (2) weeks and; water and mineral licks were provided *ad libitum*. They was kept in individual pens in a common shed to eliminate any variations attributed to environmental, management changes and for adaptation.

Experimental Procedure

Eighteen (18) sheep were randomly allotted to three groups of six animals per treatment. Each group consisted of 6 Uda breed of Sheep. Formulated feeds were offered to the experimental animals with varying levels of energy (45%, 55% and 65%) designated as low, medium and high energy, respectively. The experimentation lasted for 12 weeks. The composition of the experimental diets is shown in table1.

Experimental Design

A completely randomized design (CRD) with 2 x 3 factorial arrangements using individual breed as experimental unit with 3 energy levels per each group was used.

Determination of Proximate Composition of Diets

Samples of the experimental diets were collected for chemical analysis to determine their proximate composition according to AOAC (2006) to obtain the dry matter (DM), ash (minerals) and total nitrogen (to determine crude protein), crude fibre (CF), ether extract (EE) and nitrogen free extract (NFE).

Statistical Analysis

Data generated were coded and then subjected to analysis of variance (ANOVA) using the General lineal model (GLM) of statistical analysis system (2009). Where significant differences between the means were observed, Fisher's least significant difference (LSD) was used to separate them at 5% level of probability ($P<0.05$).

Proximate Composition of Experimental Diets (%)

The proximate composition of the experimental diets is presented in the table 1. There were significant ($P<0.5$) differences across treatments in CP. Also there were significance ($P<0.5$) difference across treatments in EE. Significant ($P<0.5$) difference was also observed across treatments in moisture content. Significant ($P<0.5$) was also observed across treatments except T2 (9.45) and T3 (93.94) which shows no significant difference recorded on dry matter. However there were significant ($P<0.5$) difference across all the treatments values recorded on Crude fiber. Moreover Significant ($P<0.5$) differences was observed across all the treatments values recorded on Ash. Significant ($P<0.5$) differences was also observed across all the treatments values recorded on NFE. Lastly there were significant ($P<0.5$) differences across all the treatments values recorded on Metabolize energy respectively.

Table 1: Proximate Composition of Experimental Diets (%)

	Treatments			
Parameters	**T1(LED)**	**T2(MED)**	**T3(MED)**	**SEM**
Dry matter (%)	93.55^{c}	94.45^{b}	93.94^{b}	0.079
Moisture (%)	6.450^{a}	5.540^{c}	6.060^{b}	0.079
Ash (%)	9.770^{a}	9.366^{b}	7.89^{c}	0.097
CP (%)	14.62^{a}	14.05^{b}	13.35^{c}	0.121
CF (%)	26.43^{a}	21.06^{b}	18.390^{c}	0.142
EE (%)	4.316^{b}	4.50^{a}	4.056^{c}	0.026
NFE (%)	38.40^{c}	45.42^{b}	50.160^{a}	0.319
Metabolize energy (%)	2238.2^{c}	2479.5^{b}	2581.2^{a}	7.411

abc means within the same row with different superscripts differ significantly ($P<0.05$); SEM=Standard error mean; CP=Crude protein; EE=Ether extract, NFE=Nitrogen free extract.

Nutrients intake of Uda Breeds of Sheep fed three Energy Diets

The results of nutrients intake by Uda breeds of Sheep is shown in table 2. There were significant ($P<0.5$) differences in all parameters evaluated. Dry matter intake was significantly ($P<0.5$) higher inT3 (743.78g/day) other treatments were similar ($P<0.5$). Crude protein intake were significant ($P<0.05$) higher in T1, T2 and T3. Crude fiber intake were significantly ($P<0.5$) higher in T. other treatment were significant ($P<0.05$) difference. Either extract intake values were significantly ($P<0.05$) higher in T2 followed by T1, other value in T3 were not significant ($P>0.05$). mean value for ash intake was significant ($P<0.05$) higher in T3, other treatments were similar ($P>0.05$).

Table 2: Nutrients intake of Uda Breeds of Sheep fed three Energy Diets (g/day)

	Treatments			
Parameters	**T1 (LED)**	**T2 (MED)**	**T3 (HED)**	**SEM**
DMI	622.56^{b}	638.99^{b}	743.78^{a}	27.70
CPI	111.50	108.81	111.94	4.19

CFI	316.27[a]	227.68[c]	274.54[b]	12.57
EEI	32.49[b]	39.71[a]	27.35[c]	1.12
AshI	81.71[b]	79.08[b]	107.18[a]	4.06
NFEI	134.01[c]	229.22[b]	268.83[a]	9.05

abc means within the same row with different superscript differs significantly (P<0.05), SEM= standard error of means; DMI (dry matter intake), CPI (crude protein intake), CFI (Crude fiber intake), EEI (either extract) ashI (Ash intake), NFEI (nitrogen free extract intake)

RESULTS AND DISCUSSION

Proximate Composition of Experimental Diets (%)

The experimental diets in this study had DM values similar to values (94.43-94.45%) reported by Garba and Muhammad (2010) at 0% and 15% inclusion levels of energy diets of small ruminants. The values were also similar to those (94.00-95.00%) reported by (Tona, 2018) for the diets containing graded levels of poultry litter waste use as energy diet supplementation. The CP values obtained from the diets were below the critical level CP obtained in the present study in the diet were above 14% CP recommended by NRC (1998) for ruminant in the topics, recommended 10-12% CP as the moderate level of CP for ruminant productions. The CF values obtained in this study were similar to the values (18.77%) reported by Tona, (2018). However, the value obtained was lower than that (21.50%) reported by Garba and Muhammad (2010) for energy diet levels fed to goats in complete diets. The NFE values reported in present study were similar to the value (50.35%) reported by Garba and Muhammad (2010) The ash and EE content obtained in this study were lower than value (5.23%) ash, (5.18%) EE and 8.42-9.78% ADF reported by Njidda *et al.*, (2018). The differences might occur possibly as a result of different experimental location and stage of maturity of the test material. The values of ash obtained in present study were lower than the values (9.10%) reported by Tona, (2018) when wheat offal was replaced with rice milling residue in the diets of yankasa rams.

Nutrient intake of Uda Breeds of Sheep fed three Energy Diets

The dry matter intake (DMI) of the present study was lower in Uda breed than 735.53g/day reported by Garba, and Muhammad, (2010) for growing Uda rams fed levels of *Tamarindus indica* leaves as sources of energy diet. This probably due to differences in the experimental diets fed as sources of energy. The CPI value obtained in the present study was lower than 138.08-151.32 g/day Devant *et al*., (2000) reported for Uda sheep fed different energy levels. However, the results in the present study showed lower crude protein intake (CPI) value compared to the value of 174.87 g/day reported by Devant *et al*., (2000) for growing Uda rams fed urea treated and untreated acha straw as sources of energy diets. This could be as a result of differences in the experimental diet, breed of sheep and study location. This could be suggested that the experimental animals accepted and appreciated the diet due to its palatability and available energy sources. These translate to the reason which may have brought about the outcome of these results. High feed intake as observed with the medium energy diet levels from Uda breeds was supported by (Devant *et al*., 2000). Therefore, the improvement or increased nutrient intake in a broad sense may be due to the ration having less lignified cell wall tissue (Devant *et al*., 2000). The values for ether exact, ash and nitrogen free extract intake observed in present study were lower than 32.40-34.37%, and 142.02- 145.33% reported by Adegbola, (2004) fed red sokoto goats three different energy diet on performance and reproductive parameters. The differences observed could be as the result of differences in breeds of experimental animals, location of the experiment and/or test materials respectably.

CONCLUSION

It was concluded that with energy diet enhanced nutrient intake by the Uda sheep. Treatment 1 with lower energy levels having higher values of Crude protein, Crude Fiber, Moisture content and Ether extract compared with other treatments. Treatment 2 with medium energy level is the best by the experimental animals without detrimental effect for healthy ewe sheep production.

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