

FEED COMPOSITION AND NUTRIENT INTAKE OF YANKASA BREED OF SHEEP FED THREE ENERGY DIET LEVELS IN THE SUDAN SAVANNAH ZONE OF NIGERIA

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ABSTRACT

A study was conducted to evaluate the proximate composition and nutrient intake of Yankasa 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 T3 (higher energy diets). Values of proximate composition were within normal ranges for healthy sheep it's concluded that, 65% higher energy diet enhanced nutrient intake by the experimental animal without detrimental effect.

Keywords: Nutrient Intake, Yankasa Sheep, Energy Diets, Sudan Savannah Zone

INTRODUCTION

Livestock play a vital role in Nigerian agriculture, contributing up to 12.7% of the total Gross Domestic Products (GDP) (Nayawo *et al.*, (2010). Nigeria is one of the four leading livestock producers in sub-Saharan Africa with an estimated livestock population of 20.6 million cattle, 43.1 million sheep, 74 million goats and 279,802 camels. Sheep are kept in almost all parts of Nigeria because they are easy to handle and manage (Akubor and Badifu 2004). However, over 80% of sheep populations are largely found in arid and semi-arid regions of Northern Nigeria (Akubuo *et al.*, 2020). Small ruminants largely depend on forages which are essential to maintain their health and production at various stages of their growth and development (Nayawo *et al.*, (2010). The attention has been paid to small ruminant production in the tropics as their advantages are becoming more understood than ever before, particularly for their ability to produce meat, milk and skin, even in hostile environments (Okoruwa *et al.*, 2012). The aim of the research is to determine the effect of three energy diets levels on feed composition and nutrients utilization of yankasa breeds of sheep in sudan savannah zone of Nigeria.

MATERIALS AND METHOD

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 138m² 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). Wudil is an agrarian area with sorghum, millet, cowpea and groundnut being the major crops cultivated. The residues obtained from these crops support livestock production in the area. The common livestock species reared in the area include White Fulani, Yankasa and Red Sokoto Breeds of Cattle, Sheep and Goats, respectively (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 (Yankasa) 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 (pestes-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 were 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 Yankasa 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 linear 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<0.05) differences across treatments in CP. Also there were significance (P<0.05) difference across treatments in EE. Significant (P<0.05) difference was also observed across treatments in moisture content. Significant (P<0.05) 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<0.05) difference across all the treatments values recorded on Crude fiber, Ash, NFE and ME.

Table 1: Proximate Composition of Experimental Diets (%)

Parameters	Treatments			SEM
	T1(LED)	T2(MED)	T3(MED)	
Dry matter (%)	93.55 ^b	94.45 ^a	93.94 ^c	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.

Nutrient intake of yankasa breed of sheep fed three energy diets

The result of nutrient intake by yankasa breed of sheep was presented in Table 2. Significant (P<0.05) difference was observed across parameters evaluated except dry matter intake (DMI) and (CFI). The crude protein intake (CPI) value was significantly (P<0.05) higher in T3 (183.88 g/day) similar to those of T1 and T2 and significantly (P<0.05) treatment 2 and 3 were significantly (P<0.05) higher in term of ether extract intake (EEI) similar (P>0.05) to the value recorded in T1 (22.41 g/day). The ash intake was significantly (P<0.05) higher in T2 (106.21 g/day). The nitrogen free extract value obtained in T3 (460.99 g/day) and significantly (P<0.05) lower in T1 (367.64 g/day) and T2 (425.23 g/day).

Table 2: Nutrient intake of yankasa breed of sheep fed three energy diets

Parameters	Treatments			SEM
	T1 (LEI)	T2 (MEI)	T3 (HEI)	
DMI	988.03	1042.32	1088.58	45.60
CFI	211.55 ^c	255.26 ^a	225.29 ^b	43.71
CPI	165.19 ^b	162.08 ^c	183.88 ^a	22.64
EEI	22.41 ^c	24.23 ^a	23.29 ^b	3.650
AshI	92.61 ^b	106.21 ^a	87.41 ^c	29.63
NFEI	367.64 ^c	425.23 ^b	460.99 ^a	30.36

abc means with different superscript within the same row are significantly ($P<0.05$) different. SEM = standard error of means. DMI=dry matter intake; CPI= Crude protein intake; CFI= crude fiber intake; EEI= ether 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 (Okoruwa *et al.*, 2012) 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, Gatenby (2002) 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 Chauhan (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 Akindahunsi and Salawu (2005). 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 Garba and Muhammad (2010). 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 Nayawo *et al.*, (2010) when wheat offal was replaced with rice milling residue in the diets of yankasa rams. Nutrient intake of yankasa breed of sheep fed three energy diets. The result of nutrient intake by yankasa breed of sheep was presented in table 2. Significant ($P<0.05$) difference was observed across parameters evaluated except dry matter intake (DMI). Treatment 2 and 3 were similar in terms of crude fiber intake (CFI) values but significantly ($P<0.05$) higher than the values recorded in T1. The crude protein intake (CPI) value was significantly ($P<0.05$) higher in T3 (183.88 g/day) similar to those of T1 and T2 and significantly ($P<0.05$). Treatment 2 and 3 were significantly ($P<0.05$) higher in term of ether extract intake (EEI) similar ($P>0.05$) to the value recorded in T1 (22.41 g/day). The ash intake was significantly ($P<0.05$) higher in T2 (106.21 g/day). The nitrogen free extract value obtained in T3 (460.99 g/day) and significantly ($P<0.05$) lower in T1 (367.64 g/day) and T2 (425.23 g/day).

CONCLUSION

- (i) It was concluded that with energy diet enhanced nutrient intake by the Yankasa sheep.
- (ii) Treatment 2 with medium energy levels having higher values of Crude protein, Crude Fiber, Moisture content and Ether extract compared with other treatments.
- (iii) Treatment 3 with higher energy level is the best by the experimental animals without detrimental effect for healthy ewe sheep production.

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