ISSN NO: 2770-0003
Date of Publication: 10-01-2022

Growth And Reproductive Performance of Yankasa Ewes Fed Varying Levels of Dietary Premix

[1*] Ramalan, S. M., [2*]Adama, T. Z., [2*] Alemede, I. C., [2*] Tsado, D. N., [2*]Alabi, J. O. and [3*]Alagbe, J. O.
[1] Veterinary Teaching Hospital, Faculty of Veterinary Medicine, University of Abuja. Nigeria
[2*] Federal University of Technology, Department of Animal Production, Minna, Nigeria
[3*] Department of Animal Nutrition and Biochemistry, Sumitra Research Institute, Gujarat- India
*Author for Correspondence; bebeji203@aol.com; 08036260770

Abstract: The study was conducted to determine the effects of dietary premix on growth and reproductive performance of Yankasa ewes on confined pen. The design of the experiment used was Complete Randomized Design (CRD), whereby twenty-five (25) Yankasa lambs were randomly allocated to five (5) treatment groups comprising of five animals per treatment. The animals were randomized by their weights and placed into their groups fed basal diets, and 4 levels of industrially and locally compounded premix. 1 kg of the basal feed were given on daily basis (5 % of the ewe's body weight) throughout the period. Dietary premix was administered in feed to the animals at 4 inclusion levels (0.25, 0.50, 0.75 and 1.) with clean water provided *ad-libitum* in the morning in a confined environment; the feed offered and left over were recorded daily. The sheep were weighed at the beginning of the study and were-weighed weekly. The findings of this study showed that dietary treatments had effect ($P<0.05$) on final weight, total weight gain and feed conversion ratio. However, the average daily weight gain, total feed intake and average daily feed intake were not significantly affected ($P>0.05$) by the dietary treatments. The results also showed that as the premix supplementation increases in the diet, the final and total weight gain increases. The Feed conversion ratio (FCR) results in T5 differs significantly from those in T1 and T2 but statistically the same with those in T3 and T4. However, animals on T5 (14.86) had better ($P<0.05$) feed conversion ratio compare to those on T2 and T1.
The growth trial lasted for a period of four months or 120 days. The entire Yankasa ewes were transferred to an open hall and Lutalyse (dinoprost tromethamine) injection was administered at 1ml per ewe, in order to synchronize estrous cycles. After 24 hours the entire flock came up on heat and 3 well fed, proven fertile rams were introduced for natural mating. The result obtained for reproductive performance of Yankasa ewes in this study show that there were no significant ($P>0.05$) differences in all the parameters measured except for lamb weight and sex ratio values which were significantly ($P<0.05$) different. Ewes fed 0.75 and 1 kg dietary supplemented locally premix had significantly higher litter weight compare to other treatment groups.

Key Words: Growth, Reproduction, Performance, Yankasa and Dietary.

Introduction

The demand for animal protein for citizenry has been the main goal and focus of livestock production and development in Nigeria. Production of mainly sheep, goats and large ruminants remains the mainstay of the economy of Nigeria and most of the rural populace depends on livestock and their by-products (Ben-salem and Smith, 2008). The small ruminants apart from meat supply also contribute to the leather industry through production of skin which has been estimated at 7,500 tonnes annually Food and Agricultural Organization (Mubi *et al*., 2012). The short generation interval of sheep coupled with high frequency of multiple birth allowed for rapid increases in animal numbers (Markos, 2006). Small ruminants which represent about 63.7 % of total grazing domestic livestock in Nigeria are widely distributed in rural, urban and peri-urban areas. The vast majority of these small ruminants 70 % are found in the Northern part of the country. The indigenous breeds of sheep in order of importance are Yankasa 60 %, West African Dwarf 20 %, Uda 10 % and Balami 10 %. The Yankasa breed is estimated to constitute about 60% of the national sheep population of 39 million, make sheep the second most important livestock species in the country (FAOSTAT, 2013; Sudi *et*

ISSN NO: 2770-0003
Date of Publication: 10-01-2022

al., 2019). Yankasa breed of sheep is the most numerous breed in Nigeria and also has the widest distribution, being found throughout the sub humid and semi-arid zones. In Nigeria, 96 % of traditionally managed sheep are under the free roaming and tethering system and chronic feed deficit represent major constraints to animal production in many developing countries of the world (Ibrahim *et al*., 2014). One of the major constraints to livestock production in the country is lack of feeds, especially during the dry season. There is growing use of cereals in biofuel production, which has pushed the prices of most cereals to record levels (Ahmed, 2020). These facts highlight the need to design diverse strategies in animal nutrition to utilize alternative sources of nutrients and decrease cereal use. The incorporation of concentrates into ruminant diets is intended to increase dietary energy, proteins, minerals and vitamins and to optimize the efficiency of feed utilization (FAO, 2008) However, grain supplementation may decrease digestibility of forage containing diets for cattle and sheep. The Reproductive performance is reported to be an important determining factor for profitability in sheep breeding (Musa *et al*., 2018). Sheep traditional fattening, feeds are always provided ad hoc and in an unregulated fashion, which is rather wasteful (Houndjo *et al*., 2018). Energy and protein are often the most limiting factors for ruminants and have received the most attention in evaluation systems (Mapato *et al.*, 2010). In the formation of diets for ruminants, it is important to optimize the balance between the energy and protein contents of the feed, so that balanced rumen fermentation occurs and maximum voluntary intake and feed utilization can be achieved (Anusorn *et al*., 2010).

The nutritional quality of many traditional products can be improved by value via addition to formulate products high in protein, energy, minerals, vitamins, fiber, etc or to produce low calorie or low carbohydrates products (Dachana *et al.*, 2010; Gupta and Prakash, 2011a; 2011b; Dhinda *et al*., 2012). This study was designed to establish the effects of dietary premix on growth and reproductive performance of Yankasa ewes.

Materials And Methods

Experimental Location

The study was conducted at the Teaching and Research Farm of University of Abuja. Abuja is the capital city of Nigeria located in the centre of the country; the area is geographically located on latitude 9.0724^{o}, longitude 7.4912^{o}, and elevation of 491 m (Euromonitor, 2010). The rainy season begin from April and ends in October, the day time temperatures range between 28 °C - 30 °C, while the night temperature range 22 °C - 23 °C. In the dry season, day time temperatures goes up to 40 °C, while the night temperatures could reduce to 12 °C (Euromonitor, 2010).

Experimental Animals, Diets And Their Management

Twenty five Yankasa ewes with average live weight of 10-15 kg and aged (six to seven) 6-7 months were used for the study. The animals were purchased from the local markets across the six Area Councils of Federal Capital Territory. Their ages were confirmed through dental identification. Upon arrival of the Yankasa ewes to the teaching and research farms, the animals were quarantine for two weeks during which period they were treated against ecto- and endo- parasites using Ivermetin® as a dewormer, with a broad spectrum antihelmintic (Albendazole®), and also an injectable antibiotic oxytetracycline to prevent infections and boost the animals to withstand the experimental rigours. The sheep were also vaccinated against Peste de Petis Ruminantes (PPR) vaccine injected intramuscularly; this is relevant to provide immunity against Peste de Petis Ruminantes (PPR) which is a common disease of sheep in the study area. After the acclimatization period, the sheep were housed individually in concrete floored pens measuring 1.2 m^2 they were all tagged and screened to ensure that they were not pregnant while stool and blood were also collected for baseline analyses. Feeding and watering troughs were provided for each of the pen and wood shavings were spread on the floor to serve as litters which were changed every two weeks.

Feed Formulation And Experimental Design

The basal feed were given on daily basis, at the rate of 5 % of their body weights throughout the period. The dietary premix was administered in feed to the animals at 5 inclusion levels of 0, 0.25, 0.50, 0.75 and 1. The animals were randomized by their weights and placed into their groups fed basal diets, and 4 levels of industrially and locally compounded premix. Twenty-five (25) Yankasa lambs were randomly allocated to five (5) treatment groups comprising of five animals per treatment and a Complete Randomized Design (CRD) was used for the study.

ISSN NO: 2770-0003
Date of Publication: 10-01-2022

Data Collection

Feed intake

Clean water were provided *ad-libitum* in the morning in a confined environment. The feed offered and left over were recorded daily. The sheep were weighed at the beginning of the study and weighed weekly.

Source Of Experimental Materials

Industrial compounded premix for ewes

The industrial compounded premix was purchased from a commercial animal feed company named Agri-dom Agricultural Freedom located at 20/22, Kolawole Shonibare Street, Ajao Estate Lagos State, Nigeria. The premix contained a mix of minerals, vitamins and other chemicals essential for sheep (Table 1).

Raw ingredients for locally prepared premix for ewes

The raw ingredients was purchased from the local market around Federal capital territory and Kaduna central market, the raw ingredients used were cauliflower leaves (Brassica oleracea) cumin seeds (Cuminum cyminum), wheat (Triticum aestivum) flax seeds (Linum usitatissimum) and fenugreek seeds (Trigonella foenum) and the ingredients were all cleaned before us.

Premix was formulated by mixing the ingredients in the following proportions

Dehydrated greens powder- 200 g,
Roasted flaxseed powder - 200 g,
Roasted cumin seed powder - 100 g,
Sprouted and dried fenugreek seed powder- 100 g.
These were mixed well stored under refrigeration in airtight Polyethylene terephthalate (PET) containers and used for further studies.

Methods

The study involved preparation of dry premixes utilizing natural ingredients for possible incorporation to different recipes for value addition. All the raw ingredients and formulated premixes were analysed for nutritional composition. The shelf stability of premixes was determined by moisture sorption isotherm. To study the efficacy for value addition, the premixes were evaluated for their sensory acceptability and nutritional quality by incorporating into a traditional product.

Preparation of premix

The greens were cleaned and washed in tap water. The edible portion was again rinsed in glass distilled water and oven dried at 60 ^{O}C for 8 hours. The dried leaves were powered using a mixer and stored in clear PET (polyethylene terephthalate) containers. Flaxseeds and cumin seeds were cleaned and roasted at low flame for 5 minutes and then powdered using a mixer. Fenugreek seeds were soaked in water for 5 hours and water was drained from seeds. Seeds were placed over a wet cloth in a germinating chamber with humidity control at room temperature (28 ^{O}C) and allowed to germinate for 3 days in dark condition. The sprouted fenugreek seeds were dried in an oven at 60 ^{O}C for 10 hours, powdered and stored. Wheat was cleaned and milled into flour, and stored for later use (Table 2).

The basal diet formulation and inclusion of the premix

The basal diet was prepared using locally sourced feed ingredients including maize offal, Brewer's Dried Grains (BDG), Cassava peel, Cowpea husk, Salt, and the industrially produced premix (Table 3)**.**

Body weight changes

The body weight of the lambs was measured in kilograms, the respective weight of each lamb weighed at the beginning of the study and subsequently on a weekly basis throughout the study were recorded. The changes in the body weight was eventually computed and allocated into five treatment groups. The live weight changes were determined by difference between the final and initial, the daily record of the feed intake was obtained by subtracting the quantity of left over from the feed offered the previous day.

Nutrients digestibility trial

Three animals per treatment were randomly selected for the digestibility trial at the termination of the growth study. The selected animals were transferred to a set of metabolic cages with slatted floors made for faecal and urine collection. A period of seven days adjustment was allowed before faecal sample collection for the next seven days. Faeces from lamb in each treatment were bulked thoroughly mixed and sub-samples

ISSN NO: 2770-0003
Date of Publication: 10-01-2022

were taken. The feed intake was also measured by finding the difference between the amount of feed offered and the amount refused. Both feed and faecal samples were dried at 65 ^{o}C to constant weight, milled and kept in air tight containers until required for analysis. The apparent digestibility of the diet was calculated as the difference between nutrient intake and excretion in the faeces expressed as percentage of the nutrient intake.

Data Analysis

All data generated in this study were subjected to Analysis of Variance (ANOVA) using the General Linear Model (GLM) procedure of SAS (2008). Means were separated using Least Significant Difference (LSD) test of the same package.

Results And Discussion

Table 1 Proximate composition of the basal experimental diets fed the Yankasa lambs indicated that the Dry matter (DM) contents of the experimental diet of this study ranges between 95.67 % in (T3) and 96.72 % in (T1). The basal feeds dry matter values obtained in the present study was not in agreement with the result reported by Usman *et al.* (2008) who's finding values range between 61.39 % and 84.37 % when fore stomach digesta and poultry waste was fed to Uda lambs. The crude protein (CP) contents of the basal diets value in this study (14.10 -14.65 %) were higher than the range 10.80 % reported by Longe (1987), Ademola *et al.* (2003), Olayeni *et al*. (2007), 11.40 % obtained for *Ficus polita* (Ndamitso *et al*., 2010), which was lower than 15.40 % reported by Lanyasunya *et al*. (2006), 20.3 % Onimisi and Omage (2006). These values were not within the range of recommended crude protein levels for growing sheep (16-19%) by ARC (1990). The crude protein (CP) value of (14.10-14.65 %) in this finding, which is lesser than the recommended value, justifies the need for dietary supplementation. Crude fibre (CF) contents were considerably different in values being highest in T3 (12.49 %) and lowest in T1, T5 with same values of (11.63 %) each. This study Ash content with higher value of 14.24 % in (T5) and lower value of 8.72 % in (T1) is not in agreement with Garba *et al*. (2010b) who reported that Ash values of 5.27 - 7.46 % intake was statistically significant for Yankasa rams fed graded levels of *Guiera senegalensis*. The intake of Ether extract in this study was highest for ewes on T3 (4.71 %) and lowest for those on T1 (3.41 %). On contrary Abubakar *et al.* (2016) reported lowest Ether extract value of 1.48 in T1 and highest value of 2.95 in T3 on nutrient intake, digestibility and growth performance of Yankasa sheep fed varying proportions of ficus polita and pennisetum pedicellatum supplemented with wheat- offal, in which generally the values are lower than the findings of this study. The Nitrogen Free Extract (NFE) in this study were 28.48, 38.36, 28.53, 28.95 and 29.61 in treatments 1 to 5 respectively which is lower than 63.50, 86.77, 44.30, 30.30 and 26.90 in treatment 1 to 5 reported by (Bello *et al.*, 2013) in treatment 1-5. The lower in NFE could probably be due to the presence of anti- nutritional factor such as cyanide which might have interfered with the use of available nutrients in the diets by the animals (Ndamitso *et al*., 2010). The ME values varied from 1822.78 to 1898.00 MJ/kg in treatment 1 to 5 which is not in agreement with the report of Eniolorunda *et al*. (2011) who reported 5.73 MJ/kg in intake and Growth performance of West Africa Dwarf Goats fed moringa oleifera Gliricidia sepium and leucaena leucocephala Dried leaves as supplements to cassava peels.

Table 2 results showed that dietary treatments had effect ($P<0.05$) on final weight, total weight gain and feed conversion ratio. However, the average daily weight gain, total feed intake and average daily feed intake were not significantly affected ($P>0.05$) by the dietary treatments. The results also showed that as the premix supplementation increases in the diet, the final and total weight gain increases. The Feed conversion ratio (FCR) results in T5 differs significantly from those in T1 and T2 but statistically the same with those in T3 and T4. However, animals on T5 (14.86) had better ($P<0.05$) feed conversion ratio compare to those on T2 and T1.

Table 3 result obtained for reproductive performance of Yankasa ewes in this study show that there were no significant ($P>0.05$) differences in all the parameters measured except for lamb weight and sex ratio values which were significantly ($P<0.05$) different. Ewes fed 0.75 and 1 kg dietary supplemented locally premix had significantly higher litter weight compare to other treatment groups (Table 3).

Table 4 give results of the pre-weaning performance parameters of lambs from Yankasa ewes fed varying levels of dietary premix are presented in Table 4. The result of average weight of lambs at birth

ISSN NO: 2770-0003
Date of Publication: 10-01-2022

(AWLB) value was significantly highest in T3 and significantly (P<0.05) lowest value in T5 groups. Average weight of lambs at weaning (21 days postpartum) was significantly (P<0.05) lowest in T5 (2.06) and highest statistically T1 to T4 (3.00– 3.64). Total weight gain of the lamb ranged between 7.40 – 10.98 kg were significantly lowest in ewes fed 1 and 0.75 kg dietary local premix (7.40 and 8.80) respectively. Ewes fed 0.75 of dietary local premix recorded significant number of males at weaning (1.00 and 3.00) compare to other treatment groups. Similarly ewes fed 0.75 and 1 kg supplemented local premix recorded significant average lamb size at weaning (2.00 and 4.00) respectively.

Conclusion And Recommendations

The results of this trial, showed that effects of dietary premix on growth and reproductive.Performance of Yankasa ewes fed varying levels of dietary premix. Base on the finding from this study, it is concluded that, Yankasa ewes fed locally dietary premix at 0.50 to 1kg inclusion level had satisfactorily growth, body condition score, reproductive performance recorded. Also haematological, biochemical parameters and carcass characteristic were evaluated.
The diet contained the most excellent feed utilization, increase in live weight gain,
feed intake and apparent digestibility values. The diet is recommend for sheep feeding and nutrition management. Dissemination of the practice of premix supplementation and its adoption as an improved livestock feeding practice and health care through government services and private-public partnerships. Further studies focusing on the elucidation of the effect of minerals and vitamins premix on digestibility of energy and fibre rich feed resources in Nigeria that can be used for intensive sheep production and management.

Table 1: Composition and proximate analysis of the basal experimental diets fed the Yankasa lambs

Parameters	T1	T2	T3	T4	T5
Maize offal (kg)	25.00	25.00	25.00	25.00	25.00
BDG (kg)	32.00	32.00	32.00	32.00	32.00
Cassava peel (kg)	19.50	19.50	19.50	19.50	19.50
Cowpea husk (kg)	23.00	23.00	23.00	23.00	23.00
Salt (kg)	0.50	0.50	0.50	0.50	0.50
Premix (kg)	0.00	0.25	0.50	0.75	1.00
Proximate Analysis					
Dry matter (%)	96.72	96.19	95.67	96.02	95.69
Crude protein (%)	14.40	14.50	14.44	14.65	14.10
Crude fibre (%)	11.63	12.49	11.98	12.11	11.63
Ash (%)	8.72	10.90	12.08	13.60	14.24
Ether extract (%)	3.41	4.11	4.71	3.92	3.98
Nitrogen Free Extract (%)	28.48	38.36	28.53	28.95	29.61
Metabolizable Energy (kcal/kg)	1822.78	1879.47	1932.37	1890.43	1898.00

ISSN NO: 2770-0003
Date of Publication: 10-01-2022

Table 2: Growth performance of Yankasa ewes fed varying levels of premix supplemented diet

Parameter	T1	T2	T3	T4	T5	SEM	P-values
Initial Weight (Kg)	10.20	10.34	10.36	10.34	10.26	0.44	0.79
Final weight (Kg)	16.74^{e}	19.50^{d}	21.30^{c}	22.90^{b}	24.10^{a}	0.54	0.001
Total weight gain (Kg)	6.54^{c}	9.16^{bc}	10.94^{b}	12.56^{a}	13.84^{a}	0.53	0.001
Average daily weight gain (Kg)	0.05	0.07	0.08	0.09	0.10	0.04	0.358
Total feed intake (Kg)	185.36	185.07	184.52	186.22	222.01	6.91	0.358
Average daily feed intake (kg)	1.32	1.32	1.32	1.33	1.59	0.04	0.360
Feed conversion ratio (FCR)	28.55^{c}	20.21^{bc}	16.89^{b}	16.49^{b}	14.86^{a}	1.12	0.001

$^{abcde\ **}$ Means in the same row with different superscripts differ significantly (P<0.05)

Table 3: Reproductive performance of the Yankasa ewes fed varying levels of supplemented premix diets

Parameters	T1	T2	T3	T4	T5	SEM	LS
Gestation Length (days)	148.00	147.80	146.60	149.20	148.60	12.87	NS
Gestation Gain (kg)	2.74	3.88	3.00	4.34	3.66	0.46	NS
Lambing Loss (kg)	0.20	0.20	0.20	0.20	0.20	0.07	NS
Lamb Weight (kg)	1.08^{b}	1.60^{b}	1.96^{b}	2.56^{a}	2.50^{a}	0.23	**
Lambs per Ewe	1.00	1.00	1.00	1.00	1.00	000	NS
Neonatal Mortality	2.00	1.00	1.00	1.00	1.00	0.07	NS
Sex Ratio (M: F)	2:3	4:1	3:2	4:1	1:4	0.00	**

$^{abde\ **}$ Means in the same row with different superscripts differ significantly (P<0.05)

Table 4: Pre-weaning performance of Yankasa ewes' lambs fed varying levels of supplemented premix

Parameters	T1	T2	T3	T4	T5	SEM	LS

ISSN NO: 2770-0003
Date of Publication: 10-01-2022

Av. wt. of lamb at birth (kg)	1.92[b]	1.94[b]	2.04[a]	1.60[b]	1.00[c]	0.17	**
Av. wt. of lamb at weaning (kg)	3.56[a]	3.50[a]	3.64[a]	3.00[a]	2.60[b]	0.32	**
Total wt. gain of lamb (kg)	10.36[a]	10.38[a]	10.98[a]	8.80[b]	7.40[b]	0.98	**
Av. no. of males at weaning	1.00[b]	1.00[b]	1.00[b]	3.00[a]	1.00[b]	0.08	**
Av. no. of female at weaning	1.00	1.00	2.00	1.00	2.00	0.08	NS
Av. lamb size at weaning	2.00[b]	2.00[b]	2.00[b]	3.00[a]	4.00[a]	0.10	**

[abcde] ** Means in the same row with different superscripts differ significantly (P<0.05)

References

1. Abubakar, N., Bature, S., Adamu, G. & Adamu, N. (2016). Haematological and biochemical indices of Yankasa sheep fed graded levels of *Fiscus polita* and *Pennisetun pedicellatum* with wheat offal supplement. ATBU, *Journal of Science, Technology and amp; Education (JOSTE);* Vol. 4 (1), March, 2016.
2. Ademola, S. G., Olayeni, T. B. & Oyedapo, L. O. (2003). Effect of antibiotics on the utilization of wild sunflower leaf meal fed to laying birds. *Proceedings of 28th Annual Conference, Nigeria Society of Animal Production* pp. 162-165
3. Ahmed, J. O. (2020). The effect of biofuel crops cultivation on food prices stability and food security-A Review. *EurAsian Journal of BioScience*; 14, 613-621.
4. Anusorn, C., Metha, W., Phongthorn, K. Ruangyote, P. & Pichad, K. (2010). Rumen Fermentation, Microbial Protein Synthesis and Cellulolytic Bacterial Population of Swamp Buffaloes as Affected By Roughage to Concentrate Ratio. *Journal of Animal and Veterinary Advances.* Volume: 9:P. 1667 – 1675.
5. ARC, (1990). Agricultural Research Council. The nutrient requirement of ruminant livestock. Commonwealth Agriculture Bureaux, Farnham Royal, U.K.
6. Bello, A. W. A & Tsado, D. N. (2013). Haematological and Biochemical Profile of Growing Yankasa Rams Fed Sorghum Stover Supplemented with Graded Levels of Dried Poultry Droppings Based Diets. *Pakistan Journal of Biological Science,* 16: 1922-1928.
7. Ben salem, H. & Smith, T. (2008). Feeding strategies to increase small ruminant production in dry environments. *Small Ruminant Research*, V.77, P. 174- 194.
8. Dachana, K. B., Rajiv, J., Dasappa, I. & Prakash, J. (2010). Effect of dried moringa (Moringa Oleifera Lam) leaves on rheological, microstructural, nutritional, textural and organoleptic characteristics of cookies. *Journal of Food Quality* 33(5):660 - 677
9. Dhinda, F., Prakash, J., & Dasappa, I. (2012). Effect of ingredients on rheological, nutritional and quality characteristics of high protein, high fibre and low carbohydrate bread. *Food and Bioprocess Technology*, 5(8), 2998-3006.
10. Eniolorunda, O. O., Apata, E., Fajemisin, A. N. & Okubanjo, A. O. (2011). Performance and carcass characteristics of Yankasa ram fed with variable levels of biscuit waste and Leucaena leucocephala based diets. *African Journal of biotechnology* 10 (22):4619-4623.
11. Euromonitor (2010). "World's Fastest Growing Cities are in Asia and Africa". Archived from the original on October 2015. Retrieved 26 October.
12. FAO (2008). Food and Agricultural organization Nigerian statistics for live animal from 1998-2008. Food and Agricultural Organization, Rome, Italy.
13. FAO (2013). FAOSTAT. Food and Agriculture Organization of the United Nations. Provides time - series and cross sectional data relating to hunger, food and agriculture for approximately 245 countries and 35 regional areas from 1961 through the present.
14. Garba, Y., Muhammad, A. S., Muhammad, I. R. & Nasiru, A. (2010b). Intake and Nutrient digestibility by Yankasa rams fed graded levels of Guiera senegalensis as a complete diet in Babayemi, O. J., Abu, O. A. and Ewuola, E. O. (eds). Fastracking Animal Agriculture in a challenged Economy. Proceedings

ISSN NO: 2770-0003
Date of Publication: 10-01-2022

of the 35th annual conference of the Nigerian Society for Animal Production held at University of Ibadan, Ibadan, Oyo State, Nigeria: 143 – 146.
15. Gupta, S. & Prakash, J. (2011a). Utilization of micronutrient rich dehydrated green leafy vegetables in formulation of traditional products. Advances in Food Science 33 (1): 34-43.
16. Gupta, S. & Prakash, J. (2011b). Nutritional and sensory quality of micronutrient-rich traditional products incorporated with green leafy vegetables. International Food Research Journal 18: 653-661.
17. Houndjo, D. B. M., Adjolohoun, S., Gbenou, B., Saidou, A., Ahoton, L., Houinato, M., &Sinsin, B. A. (2018). Socio-demographic and economic characteristics, crop-livestock production systems and issues for rearing improvement: A review. *International Journal of Biological and Chemical Sciences*, 12(1), 519-541.
18. Ibrahim, K., Shamsudin, M.N., Yacob, R. & Radam, A.B. (2014). Technical efficiency in maize farms across agro ecological zones in Northern Nigeria. *Trends in Agricultural Economics*, 7(2): 57-68.
19. Lanyasunya, T. P., Rong, W. H., Abdulrazak, S. A., Kaburu, P. K., Makori, J. O., Onyango, T. A. & Mwangi, D. M. (2006). Factors limiting use of poultry manure as protein supplement for dairy cattle on smallholder farms in Kenya. *International Journal Poultry Science*, 5:75-80.
20. Longe, G. O. (1987). Replacement Value of biscuit waste for Maize in broiler diets. *Nigeria Journal Animal Production* 13(1-2): 70-78.
21. Mapato, C., Wanapat, M. & Cherdthong, A. (2010). Effects of urea treatment of straw and dietary level of vegetable oil on lactating dairy cows. *Tropical Animal Health Production*, DOI: 10. 1007/s 11250-010-9613-3.
22. Markos, T. (2006) Productivity and Health of Indigenous Sheep Breeds and Crossbreds in the Central Ethiopian Highlands. PhD Dissertation, Department of Animal Breeding and Genetics, Faculty of Veterinary Medicine and Animal Sciences, Swedish University of Agricultural Science (SLU), Uppsala, Sweden, 74 p.
23. Mubi, A. A., Bibithuwan, B., Augustine, C., Midau, A., & Bube, M. M. (2012). Performance of Yankasa sheep grazing natural pasture supplemented with maize offal. *Current Trends in Technology and Science*. 2(2), 216-221.
24. Musa, S. I., Bitto, I. I., Ayoade, J. A., & Oyedipe, O. E. (2018). Effects of vitamin E and selenium on fertility and lamb performance of yankasa sheep. Open Journal of Veterinary Medicine, 8(09), 167.
25. Ndamitso, M. M.., Jacob, J. O., Idris, S. & Jimoh, T. (2010): Prospects in the Use of Ficus Polita as a Local Ruminant Feed. *African Journal of Biotechnology* 9 (21): 3116-3121.
26. Onimisi, P. A. & Omage, J. J. (2006). Evaluation of poultry litter as feedstuff for growing rabbits.- *Livestock-Research-Rural-Development*, Vol.-18.
27. Olayeni T. D., Farinu G. O. & Ojebiyi O. O. (2007). Replacement value of biscuit waste on the performance and egg quality parameters of laying hens. Proc. 32 nd Ann. Pp. 313-330.
28. SAS (2008). Statistical Analysis System Users Guide Statistics. SAS Institute Inc., Cary, NC, USA.
29. Sudi, I. Y., Shuaibu, M., & Tizhe, M. A. (2019). Alpha S1-Casein Gene Polymorphısm in Nigerian Balami Sheep Breed Indigenous to Mubi. International Journal of Life Sciences and Biotechnology, 2(3), 231-242.
30. Usman H. B., Maigandi, S. A., Hassan, W. A. & Daneji, A. I (2008). Growth performances and Nutrient Utilization by Sokoto red goat Kids fed fore stomach digesta as replacement for cowpea husk. *Nigerian Journal of Basic and Applied Science* 16(1):62-70