



UTILIZATION OF VARYING PROPORTIONS OF UREA-TREATED MAIZE COBS AND GROUNDNUT HAULMS IN THE DIETS OF GROWING YANKASA RAMS

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ABSTRACT

The experiment was carried out to evaluate the growth performance, haematological and serum biochemical parameters of growing *Yankasa* Rams fed varying proportions of urea-treated maize cobs and groundnut haulms. Sixteen (16) *Yankasa* Rams were randomly allocated to four (4) treatments with four Rams per treatment in a completely randomized design (CRD) for a period of ten weeks (70days). Four experimental diet were formulated with varying proportions of urea-treated maize cobs (UTMC) and groundnut haulms (GH) at the ratio of MC10:40GH, MC20:30GH, MC30:GH10 and MC30:20GH respectively. The result of the study revealed a Significant ($P<0.05$) difference in total weight gain, daily weight gain and total feed intake with treatment one (1) having the highest values (4.60,65.71) respectively. Similarly, nutrients digestibility significantly ($P<0.05$) differed across the treatment except for dry matter. All values for haematological and biochemical parameters fell within the normal range for healthy animal. conclusively, treating maize cobs and groundnut haulms with urea up to 50% in the diets did not show any adverse effect on *Yankasa* Rams. Based on the result of this study, including maize cobs and groundnut haulms at 10% to 40% in the diets of growing *Yankasa* Rams is recommended.

Keywords: Feed, Growth, Maize, Groundnut, Nutrient

INTRODUCTION

Livestock is an important component in the agricultural production system, and plays a crucial role in the economy (Yakubu *et al.*, 2020). Small ruminants play a key role in bridging the wide gap in the supply of animal protein for human consumption (Ahmed *et al.*, 2021). *Yankasa* is one of the important sheep breeds in Nigeria, it is the most widely distributed and most numerous sheep breed in Nigeria (Umar, 2021) Small ruminants play a key role in bridging the wide gap in the supply of animal protein for human consumption (Ahmed *et al.*, 2021). *Yankasa* is one of the important sheep breeds in Nigeria, it is the most widely distributed and most numerous sheep breed in Nigeria (Umar, 2021) However, Major Constraint of livestock production is feed, which account for more than 60-65% total cost of production (Akinola *et al.*, 2021). However, Major Constraint of livestock production is feed, which account for more than 60-65% total cost of production (Akinola *et al.*, 2021). Therefore, Farmers in the rural areas depend on crop residues to feed their livestock during the period of feeds scarcity (Muhammad *et al.*, 2022). Crop residues such as groundnut haulms Maize cob offer cheap alternative sources feeds. (Salisu *et al.*, 2022)Therefore, Farmers in the rural areas depend on crop residues to feed their livestock during the period of feeds scarcity (Muhammad *et al.*, 2022). Crop residues such as groundnut haulms Maize cob offer cheap alternative sources feeds. (Salisu *et al.*, 2022). The broad objective of this study, therefore, was to assess the utilization of varying proportions of urea-treated maize cobs and groundnut haulms in the diets of growing *Yankasa* rams.



MATERIALS AND METHODS

Experimental Site

The experiment was conducted at the Small Ruminant Farm, Bauchi state College of Agriculture Teaching and Research Farm, Bauchi. Bauchi is located on Latitude 10° 17' N and longitude 9° 49' E, with an altitude of about 609.2 meters above sea level with average rainfall 700mm northern and 1300mm southern. (Nigerian Meteorological Agency, 2008).

Experimental Animals, Housing and Management

A total of sixteen (16) rams of average weight of 17 kg were bought from open market in a local market Bauchi and used for the study. Body condition of the animals was evaluated based on a 5-point scale during the purchase to take effective management decisions on the nutritional and health needs of animals in order to obtain optimum production performance and as an important tool in animal management systems whether one manages free-ranging populations, domesticated farm animals or captive zoo animal species or changing environments (Kung, L. (2015). Two weeks to the arrival of the animals, the experimental house was washed thoroughly using detergent and disinfectant (Izal) and allowed to dry. The feeding troughs and drinkers were also washed, sun-dried and kept in each compartment. After the arrival of the animals to the experimental site, all animals were thoroughly examined and closely monitored on the general health state (body temperature, food intake, behavior, internal and external parasites and signs of their presence), and then especially on the respiratory system as described (Ibhaze, 2015). The animals were quarantined for three weeks during which they were identified using numbered plastic ear tags for easy identification. On arrival to the farm, the animals were treated on arrival to the farm, the animals were treated against endo and ecto parasites using ivermectin and vaccinated against *Peste des petits ruminants* (PPR) disease using the PPR vaccine. The animals were weighed and randomly allotted into four (4) treatments groups and each treatment group had four (4) replicates. About 14 days were allowed for adjustment to the feed as well as the environment before data collection commenced. The animals were housed in individual pen equipped with concrete floor, feeders and drinkers under a common roof, constructed to minimize possibility of injury from aggressive behavior or escape, to provide adequate ventilation, to enable animal to gain weight and other performance traits that may be depressed as a result of over-crowding, to allow for protection from wastes and to make appropriate postural adjustments (salisu *et al.*, 2017)

Experimental Diets and Animal Feeding

Four (4) isonitrogenous diets (16% crude protein) were formulated in which Maize cobs and groundnut haulms were included at various levels such that the two ingredients collectively contributed 50% of the diets. Ingredient of the experimental diets are presented in Table 1.

Table 1: Gross Composition (%) of Experimental Diets

Feed Ingredients	Treatments			
	1	2	3	4
Maize cobs	10.00	20.00	30.00	40.00
Groundnut Haulms	40.00	30.00	20.00	10.00
Wheat Offal	30.20	37.52	44.98	43.21
Cotton Seed Cake	17.30	9.98	2.52	4.29
Bone meal	2.00	2.00	2.00	2.00
Salt	0.50	0.50	0.50	0.50
Total	100.00	100.00	100.00	100.00



Data Collection and Measurements

Parameters determined were proximate compositions of the experimental feed, dry matter intakes, and daily weight changes, digestibility of treatment diets, feed, nutrients utilization and hematological indices. Proximate compositions were determined using the methods described by AOAC (2005). In determining the feed and nutrients utilization, the diets under investigation were given to the animals in known amounts. Each of the animals was restrained in steel metabolism cages designed to collect urine and feces separately. Urine was collected in 10 N H₂SO₄ and the volume for each animal was measured and sampled daily for a period of fourteen days. Fecal outputs were also collected and weighed daily. The proximate compositions of faeces were determined using the methods described by AOAC (2005). Protein and Nitrogen levels in diets were determined by standard Kjeldahl procedure]. Two samples were collected from each treatment. Hematological parameters were determined by drawing 10mls of blood from jugular veins of each animal into a sample bottle containing anticoagulant, Ethylene Diamine Tetra acetic Acid (EDTA). These samples were used for the determination of the packed cell volume (PCV), Haemoglobin (Hb) concentration, Red blood cell counts (RBC) and White blood cell counts (WBC). The Total serum protein, Serum albumin, globulin and blood glucose were determined in the blood serum. The serum was obtained by allowing the blood to coagulate in order to separate the serum and cells.

Experimental Design

The experiment was conducted in a completely randomized design with four (4) treatments of four (4) animals each (Steel and Torrie, 1980).

Chemical Analysis of diets

The chemical composition of the experimental diets and faecal samples were determined in the Laboratory according to procedure described by AOAC (2005) and Van Soest *et al.* (1991).

Statistical Analysis

The data collected were subjected to analysis of variance (ANOVA) using SPSS software (2007). Significant differences among treatment groups were determined using least significant difference (LSD)

RESULT AND DISCUSSION

Chemical Composition of the Experimental Diets

The results of the chemical composition of the formulated diets are shown in Table2.

Table 2: Chemical Composition of the Experimental Diets

Parameters	Treatments			
	1	2	3	4
Dry matter	90.11	89.26	89.19	88.63
Organic matter	81.88	81.78	82.14	84.65
Crude protein	16.39	16.48	16.21	14.32
Nutrient Detergent Fiber	30.53	32.50	29.61	31.51
Acid Detergent Fiber	22.54	23.50	22.43	21.06
Hemicelluloses	7.99	9.00	7.18	10.45

The results indicated that the dry matter(DM) content ranged from 88.63 to 90.11% The value recorded for DM in the current study is similar to the 93.00-95% reported by Ochepo *et al.*, 2023. The values of CP is increasing across the treatment with treatment 2 having the highest value (16.48 %) followed by treatment 4 having the least value (14.32%).



Growth Performance

Growth Performance of *Yankasa* Rams Fed varying proportion of urea-treated Maize cobs and Groundnut Haulms is presented in Table 3.

Table 3: Growth Performance of *Yankasa* Rams Fed varying proportion of urea-treated Maize cobs and Groundnut Haulms

Parameters	Treatments				SEM	LOS
	T1	T2	T3	T4		
Initial weight (kg)	19.90	20.20	20.37	19.82	0.85	NS
Final weight (kg)	24.50	24.00	23.00	23.20	0.84	NS
Total weight gain (kg)	4.60 ^a	3.80 ^a	2.63 ^c	3.38 ^b	0.40	*
Daily weight (g)	65.71 ^a	54.20 ^b	37.57 ^c	48.23 ^b	6.01	*
Total feed intake (kg)	30.82 ^b	33.88 ^a	25.38 ^c	32.28 ^a	1.5	*
Daily feed intake (g)	440.39	435.67	330.91	420.31	28.05	NS
Daily water intake (L)	1.10	1.00	1.13	1.17	0.02	NS
Feed conversion ratio	6.70	8.04	8.80	8.71	1.85	NS

a, b, c: means with different superscript on the same row differ significantly at $p < 0.05$ *SEM: standard error of mean LOS: level of significant highest feed intake observed in the study with animals on treatment (1) 440.39g and 435.69g/day is in line with that of Adeola *et al.*, 2023 who found that the dry matter of treat rice straw improved the intake of dairy cows related to rice straw. All the animals increased in weight, which indicated that the intake of the protein and energy was above maintenance requirement .the highest daily weight gain of 65.71g/day observed in this study was similar to the DWG of 65.69g/day reported by Balogun *et al.* (2018) who fed urea treated gamba hay to *Yankasa* rams. The daily weight gain values of 37.57-65.71g/day in the current study had a close range and was similar with those of Ochepo *et al.*, 2023 reported DWG of 57.50-77.5g/day. Better feed utilization was recorded in animals diets 1(6.70) in the study, and is comparable with the work of kabir *et al.* (2020) who fed treated groundnut to rams and observed least feed conversion ratio FCR in the animal diets (6.8)

Haematological Indices

The influence of varying proportion of urea-treated maize cobs and groundnut haulms on the blood haematological parameters of growing *Yankasa* rams was indicated in Table4.

Table 4: Haematological Indices of *Yankasa* Rams Fed Varying proportion of urea-treated Maize cobs and Groundnut Haulms

Parameters	Treatments				R/Values
	1	2	3	4	
Packed Cell Volume (%)	37.00	35.50	40.80	29.00	27–45
Hemoglobin (g/dL)	11.80	12.45	9.30	10.40	9–16
White Blood Cell ($10^9/L$)	7.60	12.80	10.30	8.46	4–12
Red Blood Cell ($10^6/\mu L$)	7.50	9.40	7.90	8.40	5–12
MCV (fL)	37.90	29.10	33.50	36.80	28–40
MCH (pg)	9.84	10.10	11.71	10.93	8–12
MCHC (%)	30.60	31.10	25.99	33.50	31–34

R/value: Reference Values (Resource Animal Research, 2009).



Between the dietary treatment and the parameters examined, All values for haematological parameters fell within the normal range for healthy animals

Serum-biochemical

The influence of varying proportion of urea-treated maize cobs and groundnut haulms on the serum-biochemical parameters of growing *Yankasa* rams was indicated in Table4.

Table 5: Serum-biochemical of *Yankasa* Rams Fed Varying Proportion of Urea-Treated maize cobs and Groundnut Haulms

Parameters	Treatments				R/Values
	1	2	3	4	
Total protein (g/L)	5.76	5.10	6.20	5.20	5.9 -7.8
Glucose (mmol/L)	3.00	2.70	1.90	2.80	2.4 -4.5
BUN (mmol/L)	4.60	8.40	9.70	5.10	3.4-10.00
Cholesterol (mmol/L)	2.00	1.50	1.90	1.60	1.13-2.57
Albumin (g/L)	28.00	32.70	33.10	21.60	29-47
Creatinine (mmol/L)	94.10	90.90	85.50	107.50	28-100

R/Values: Reference Values = (Radostis *et al.*, 2000).

Between the dietary treatment and the parameters examined, All values for serum-biochemical parameters fell within the normal range for healthy animals

CONCLUSION AND RECOMMENDATION

From the results in this research, it was concluded that feeding urea treated maize cobs and groundnut haulms at varying proportions to growing *Yankasa* rams improved dry matter intake which resulted to increased daily weight gain of the animals. Therefore it may be recommended from this study that *Yankasa* rams fed the experiment, diet 1 (10.00%) Maize cobs 40.00% ground haulms which gave the highest daily weight gains of 65.71g/day and the best feed conversion ratio of 6.70 is recommended.

REFERENCES

- Adeola, E. A., Garba, Y., & Baba, M. (2023). Growth performance and in vivo nutrient digestibility of growing *Yankasa* ram lambs fed diets containing graded levels of groundnut haulms. *Journal of Animal Health Production*, **9**(2): 107-111.
- Ahamd, P., James, M., Victoria, C., Uriyapongson, S. and Rowlinson, P. (2021). Ruminal degradability y of tropical feed and their potential use in ruminant diets. *Asian-Australasian Journal of Animal Science*, **16**: 211-216.
- Akinola, S., Sommart, K., Vongpralub, T. and Pattarajinda, V. (2005). Insacco degradation characteriatics of energy feed sources in Brahman-Thainative crossbred steers. *Journal of Agricultural Technology*, **1**(2): 192-206.
- AOAC (2002). *Official Methods of Analysis of Official Analytical Chemists* (W. Horwtz ed.) 17th Edition, Association of Analytical Chemists, Washington .DC.
- Babayemi, O.J. (2009). Silage quality, dry matter intake and digestibility by African dwarf Sheep of Guinea grass (*Panicum maximum*) harvested at 4 and 12 week re-growths *African Journal of Biotechnology*, **8**: 3988-3989.



- Babayemi, O.J. and Igbekoyi, J.A (2008). In: Eric Tielkes (Eds.). .Comparison of *in vitro* gas production and nylon bag degradability of roughage in predicting feed intake in cattle, *Animal Feed Science Technology*, **40** (1): 109-119.
- Balogum, J.W. Ngongoni, N.T. and Hamudi k, H. (2003). The effect of state of growth and method of drying fresh herbage on in sacco dry matter degradability of three tropical forage legumes. *Livestock Research for Rural Development*, **15**(2): 1-7.
- Duncan, D. B. (1995). Multiple range and multiple F. test. *Biometrics* 11:1-42. Ehargava, P.K. and Orskov, E.R. (1987). Manual for the use of nylon bag techniques in evaluating feed stuffs. Feed Evaluation and Experimentation Development Services. The Rowett Research Institute, Bucksburh, Aberdeen, Scotland, Pp. 1-20.
- Ibhaze, J.E., (2015). Evaluation of specificv arable affecting *in situ* estimates of ruminal dry matter and protein digestion. *Journal of Animal Science*, **60**(3): 1347-1358
- Jibrin, M.U., Amoye, M.C., Akonyi, N.S. and Oyeleran, O.A. (2013). Design and development of a crop residue crushing machine. *International Journal of Engineering Inventions*, **2**(8): 28-34.
- Kabir, N. M., Abubakar, M. and Bello, K. M. (2023). Performance and nutrient intake of growing *Yankasa* rams fed graded levels of baobab (*Adansonia digitata*) seed meal as a replacement value for cowpea husks. *Journal of Agriculture and Environment*, **17**(2): 71-78.
- Kamarloiy, M. and Teimouri, Y. (2015). Effect of microbial inoculants o the nutritive value of corn silage For Beef Cattle. *Pakistan Journal of Biological Sciences*, **11**(8):1137-1141.
- Kung, L. and Shaver, R. (2002). Interpretation and use of silage fermentation analyses reports. Dept .of animal and food science, University of Delaware Newark, **DE** 19717.
- Muhammad. A, Fuguji, Y. G. and Gangwar S. K. (2014). Effect of urea treatment on chemical composition and oxalate content of sugarcane top .*International. Journal of Science Nature*, 5(1): 15-18. Tolera, A. and Sundstol, F. (2000). Supplementation of graded levels of *Desmodium intortum* hay to sheep feeding on maize stover harvested at three stages of maturity. 2. Rumen fermentation and nitrogen metabolism .*Animal Feed Science and Technology*, **87**(3-4): 215-229.
- Muhammad, I. R., Abdu, M. I., Iyeghe -Erakpotobor, G. T. and Sulaiman, K. A. (2022). Ensiling quality of Gamba fortified with tropical legumes and its preference by rabbits. *Research Journal of Applied Sciences*, **4**(1): 20-25
- NIMA (2008). Nigerian Meteorological Station Reports. Temperature Record Book and Management Unit. **11**:1-3
- Ochepo, G. O., Omotosho, O. B. and isa, M. (2023). The growth performance of *Yankasa* rams fed Gamba grass (*Andropogongayanus*) and various levels of ensiled urea treated groundnut shell meal supplementary diet. *African Journal of Agriculture and Food Science*, **7**(2): 32-42.
- Salisu, E. R. and Shand, W.J. (2022). Use of nylon bag technique for protein and energy evaluation and for rumen environment studies in ruminants. (*Panicum maximum*) Harvested at 4 and 12 weeks. *Africa Journal of Biotechnology*, **8**(16): 3983-398
- Steel, R.G.D. and Torrie, J. H. (1980). *Principles and procedures of Statistics A Biometrical Approach*. 2nd Edition, McGraw-Hill, new york 20-90
- Umar, T., Hassan, A and Ibrahim, B. (2021). Effect of varying level of sun-dried yam peels meal on growth performance, carcass characteristics of weaner Rabbit. In proceeding of 45th Annual conference of Nigerian Society of Animal Production held in ATBU, Bauchi. Pp.1474-1480



- Van soest, P.J., Robertson, J. and Lewis, B. (1991). Methods for dietary fibre, neutral detergent fibre, and non-starch polysaccharides in relation to animal nutrition. *Journal of Dairy Science*, **74**(10): 3583-3597.
- Yakubu, B. O., Ajolaosho, A. O. and Ayaknkoso, N. T. (2020). Effect of ensiling on physical features of Gamba fortified with Tropical Legumes and its preference b Rabbits-Research of Guinea grass (*Panicum maximum*) Harvested at 4 and 12 weeks. *Africa Journal of Biotechnology*, **8**(16): 3983-398