Weights of By-Products of Carcass of West African Dwarf Goats Fed *Panicum maximum* and Bambara Nut Offal and Cereal Spent Grains Based Supplement Diets.

[1]Abalaka E.O" [2]Yahaya , B [3]Effienokwu, J.N, [4]Adegbe, J.Y [1]Oyibo, A, and [1]Alih, P.A
[1] Department of Animal Production, Kogi State University, Anyigba, Nigeria
[2]Department of Animal Science , Federal University, Kashere , Nigeria
[3]Department of Science Laboratory Technology , Delta State University, Ogwashi-Uku, Nigeria
[4]Department of Agricultural Technology,Federal Polytechnic, Oko, Nigerria
(Abalaka, E.O : ezraabalaka@gmail.com)

ABSTRACT
The study evaluated the weights of some by-products of sixteen yearling West African dwarf bucks fed Panicum maximum and bambara nut offal and cereal spent grains based supplement diets. The goats were allotted into four (4) treatments of four goats each. The goats were fed Panicum maximum at 250g/goat/day and a concentrate supplement diet at 150g per goat/day for each of the treatments for a duration of fifty (50) days. Known volume of water was served , feed and water intake were monitored and recorded The experimental design was a completely randomized design ,data were analysed using a one- way analysis of variance and least significant difference to separate the significant means using SPSS statistical package for windows 23 , 2015 version .Concentrate and browse samples were analysed using the methods of AOAC (2000). Daily forage intake , daily supplement intake and total daily feed intake values were all not significantly (p<0.05) different across the treatment means . The water intake(350.00 – 380.00ml) showed significant (P>0.05) difference. .All the by-product weights were not significant (P<0.05),It was therefore concluded that Panicum maximum and the supplement diets had no influence on the weights of by-products of yearling West African dwarf goats. Further research using other breeds and classes of goats as well as other species of ruminants such as sheep and cattle was also recommended.
Keywords: By-Products, Fed intake, Skin, Supplement, West African Dwarf Goats.

INTRODUCTION

The demand for protein of animal origin increased over the years due to increased human population and economic growth (Nkwocha *et al* ,2011) . According to Rosegrant and Thornton (2008), the challenge that lies ahead is to sustain the livestock industry amidst food shortages so as to boost animal protein intake world wide. The down turn in the Nigerian economy with its attendant high unemployment rate and high poverty level calls for redoubling of efforts at searching for other revenue sources for the Government, families and individuals (Ocheja *et al*, 2019). One of the ways of doing this is to harness some by-products of livestock that before now were considered as waste materials and therefore discarded, as well as paying more attention to some of the by-products that attracted little attention hitherto. Some of these by-products include , horns, hooves, skin, fat, hair, stomach contents, feathers, bones, blood, egg shell, etc. These by-products can now be put to good use by collecting them for sale locally , for export , for processing and value addition (Ocheja *et al*,2019)

Ocheja *et al* (2019) reported the weights of abdominal fat to range from 0.17 – 0.24,%, hooves ,(0.18 – 0.20%), blood weight(2.91 – 3.10%) gut content (17.09 – 19.91%) for West African dwarf goats fed bamboo leaves and cashew nut shell based diets.

Steele (1996) reported that the weight /value of goat skin represents 8% of the total weight/value of the goat.

Previous works on carcass characteristics as well as internal organs of goat carcasses (Ahamefule *et al*,2005; Odoemelem *et al* 2014; Okpanachi *et al* 2018 ; Ozung and Anya 2018) did not specifically tailor their research along the line of by-products and their role in improving the Nigerian economy but focused on carcass characteristics.

From the forgoing it is important to determine the weighs of the by- products of the carcass of ruminant animals , with a view to encouraging their use, sale, Processing and value addition, so as to help in diversifying the revenue base of Nigerian economy and provide employment opportunities. Further more studies on the evaluation of the by-products of ruminant animals are very scanty, thus making this research work quite justifiable.

The aim of this work therefore was to assess the weights of some by-products of carcass of West African dwarf goats fed, *Panicum maximum* supplemented with Bambara nut offal and cereal spent grains based concentrate diets.

2.0 MATERIALS AND METHODS

2.1 Experimental Location: The experiment was conducted at the Small Ruminant unit of the Livestock Teaching and Research farm, Kogi State University, Anyigba, located in the derived Guinea Savannah zone of Nigeria on latitude $7^0 15^{'}$ and $7^0 29^{'}$ N of the equator and longitudes $7^0$11' and $7^0$32'E of the Greenwich meridian. The zone lies in the warm humid climate of the tropics with distinct wet and dry seasons in April to October and November to March respectively. Annual rainfall ranges from

1400-1500mm with an ambient temperature of about 25^0C with the highest in March and April (Kowal and Knabe 1972). The average altitude is 420 meters above sea level (Ifatimehin *and* Ufuah 2006).

2.2 Feed preparation, Experimental Animals, and Management:

Sixteen yearling West African dwarf bucks were used for the study. The animals were housed individually and treated with Ivomec, for endo and ecto parasite control at 0.3ml each and oxytetracycline, hydrochloric and procaine penicillin at 2.0ml each as prophylactic treatment to provide a good and common health status. The *Panicum maximum* used for the study was obtained from within Kogi State University campus, Anyigba, wilted for 24hours to reduce the moisture content before feeding The supplement components were Bambara nut offal (BNO), cereal spent grains (CSG), bone meal (BM), and Table salt . The goats were allotted in a Completely Randomized Design (CRD) into four (4) treatments. Each treatment had four (4) goats. Each goat was fed 150g of the supplement diet per day**.**

The grass was wilted for 24 hours and fed at 250g /goat/day for each treatment, the concentrate was fed 1 hour later

Feed served the goats was weighed daily and the left over was also weighed and subtracted from the quantity of feed served to determine the feed intake. Known volume of water was served and the water intake of the goats recorded. The study duration was fifty (50) days, after a preliminary feeding period of 7 days.

Table 1: Composition of Supplement Diets (% Dry matter)

Ingredients	**Composition/Treatments**			
	T_1	T_2	T_3	T_4
Bambara Nut Offal	66.00	48.00	32.00	30.00
Cereal Spent Grains	30.00	48.00	64.00	66.00
Table salt	1.0	1.0	1.0	1.0
Bone meal	3.0	3.0	3.0	3.0
Total	100	100	100	100
Calculated nutrient content (% DM)				
Crude protein	19.50	19.90	19.85	19.60
Crude fibre	17.60	16.80	17.00	16.90
ME (Kcal/kgDM)	2860	2810	2820	2800

2.3 By-products Weights Determination

On the last day of the experiment two goats were slaughtered from each treatment, bled, eviscerated and dressed. the horns, hooves , abdominal fat, rumen content, full gut, blood and skin were removed , they were weighed and their weights converted to percentage of slaughter weight

2.4 Proximate Chemical Analysis; Samples of *Panicum maximum* and the supplement diets were analyzed for their proximate composition using standard procedure according to the methods of AOAC (2000)

2.5 Experimental design and Statistical Analysis

The experimental design was a completely randomized design (CRD). Data were analysed using a one-way analysis of variance (ANOVA) and treatment means with significant differences were separated using least significant difference (LSD) with the aid of SPSS version 23 , 2015 edition

3.0 RESULTS AND DISCUSSION

3.1 Proximate Composition of *Panicum maximum* and the Concentrate Diets

The proximate composition of the grass and concentrate diets are summarized in Table 2.

The protein content of the concentrate diets fell within the values of 12-18% recommend for growing ruminants in the tropics while that of the grass fell below (NRC, 1996), but also all above the critical value of 8% required to provide adequate ammonia for normal rumen functions (Lakpini , 2002). The fibre and energy of the supplement were within recommended values (Lakpini *et al*, 2002). The energy value of the grass was below recommended values for goats, but compensated for from the supplement.

Table 2: Proximate Composition of *Panicum maximum* and supplement diets (%DM)

Nutrients	Treatment				
	T_1	T_2	T_3	T_4	Panicum
Crude Protein	18.65	18.55	18.20	17.94	10.73
Crude Fibre	8.60	8.50	8.66	8.80	21.80
Nitrogen Free Extracts	58.32	58.60	58.40	58.20	46.85
Ether Extracts	6.60	6.89	6.05	6.35	4.80
Ash	6.70	6.80	6.80	5.75	15.60

3.2 Feed Intake and Water Intake of Experimental Animals

The feed and water intake records of the experimental goats is presented in Table 3.

The values for daily supplement intake,(81.30 – 85.33g) daily forage intake (240.60 – 245.50g), total daily feed intake (325.52 – 329.87g) were all not significant($P<0.05$), these values were higher than .62.40g – 98.51g(daily supplement intake) which were significant ($P>0.05$) , 182.75 – 187.63g , which were not significant ($P<0.05$) (daily forage intake) and 249.98 – 285.10 g , which showed significant ($P<0.05$) difference (total daily feed intake) reported by Ocheja *et al* (2021), but lower than 145.00 – 150.00g , 240.00 – 245.00g and 387.00 – 395.00 g respectively , which were all not significant reported by Ahmed *et al*(2020), who fed bamboo leaves and cashew nut shell based supplement diets to yearling West African dwarf goats. These differences could be due to differences in the forages and supplement diets fed.

Water intake (350.00 – 380.00 ml) showed significant ($p<0.05$) difference, this trend could however not be explained since the total dry matter intake were similar across the treatments.

Table 3: Feed Intake Records

Parameters	Treatments				SEM
	T_1	T_2	T_3	T_4	
Daily Supplement Intake (g)	84.43	81.30	85.33	82.40	2.66
Daily Forage Intake (g)	245.44	244.22	240.60	245.50	4.98
Total Daily Feed Intake (g)	329.87	325.52	325.93	327.90	6.55
Water intake (ml)	380.00^a	355.90^b	356.50^b	350.00^b	20.80

a, b, Treatment means on the same row with different superscripts differ significantly ($p<0.05$)
SEM Standard Error of Means

3.3: Weights of By-Products of the Experimental Goats

All the by-product weights determined were not significantly ($P<0.05$) different, all the values also did not follow a definite trend. This result was almost at par with that obtained by Ocheja et. al., (2019), who recorded no significant($P<0.05$) differences in all the by-products evaluated except abdominal fat , when they fed Bamboo leaves and supplement diets containing graded levels of cashew nut shell to West African dwarf goats. The abdominal fat value of 0.16 – 0.17% , were lower than 0.17 – 0.24% reported by Ocheja et al (2019) and 0.51 – 1.82% reported by Ahamefule et al (2005*) for West African dwarf goats fed _pigeon pea–cassava peels based diets. The full gut value* of 28.90 – 20.60% were higher than 24.15 – 26.50% reported by Ocheja et al (2019) and 18.94 – 27.21% reported by Ahamefule et al (2005) these differences may have arisen due to

differences in the classes of goats used as well as ration . However, Ozung and Anya (2018), reported significant($P<0.05$) values in the weights of some internal organs and by-products when they fed West African dwarf goats with cassava peels meal based diets with African yam bean concentrate. Odoemedem et. al.,(2014), also obtained significant ($P<0.05$) differences in the weights of the internal organs and some by-products in West African dwarf bucks fed Panicum maximum supplemented concentrate containing bambara nut meal. The observed differences could be attributed to differences in the concentrates and forages fed to the goats.

Table 4: Weights of By-Products (% of Slaughter Weight) of Yearling West African Dwarf Goats Fed *Panicum maximum* and a supplement Diet

	Treatments				
By-Products	T_1	T_2	T_3	T_4	SEM
Skin	8.10	8.00	7.95	8.05	1.01
Full Gut	29.50	28.90	29.60	29.75	1.09
Hooves	0.20	0.22	0.21	0.20	0.10
Horns	0.15	0.16	0.17	0.16	0.40
Blood	3.80	4.00	3.90	3.80	0.75
Abdominal Fat	0.16	0.17	0.17	0.16	0.35
_Rumen Content	14.00	14.40	15.05	15.10	0.09

SEM= Standard Error of the Means.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1CONCLUSION

Panicum maximum as well as bambara nut offal and cereal spent grain based supplement diets did not influence the weights of the by-products of West African dwarf goats.

4.2 RECOMMENDATIONS

Feeding and management practices should be developed tailored towards the production of some of these by-products. Further research should be carried out using other species of livestock such as poultry, rabbits, pigs, sheep and cattle.

REFERENCES

Ahamefule, F. O., Ibeawuchi J.A and Ibe S.W (2005) Performance of West African Dwarf bucks fed pigeon pea-cassava peel based diets. *Journal of Animal and Veterinary Advances*, 4 (12): 1010- 1015.

Ahmed, S.H, Ajagbe, A.D, Torhemen, M, Uguru, J.U, Edward, C.D, Eniolorunda, S.E, and Emmanuel, A.T (2020). Digestibility of Nutrients and Performance of Yearling West African Dwarf Goats fed Diets Containing Graded Levels of Cashew Nut Shell. Nigerian Journal of Animal Science and Technology. 3(4):38 – 45.

AOAC (2000) Association of Official Analytical Chemists. Official methods of Analysis 17th edition Washington, D.C. Pp. 3 – 22.

.Ifatimehin, O. O, and Ufuah M .E (2006) The effect of a spatial Structure on Rural Economy ;A Case of Kogi State University on Anyigba and its Environs Confluence Journal of Environmental Studies 1(2);61-70

Kowal J.M and Knabe D.T (1972) An Agro-climatological Atlas of the Northern States of Nigeria University press ABU Zaria

.Lakpini, C. A. M. (2002). Feeds and feeding strategy for small ruminants in various physiological states In: Lakpini CAM, Adamu A.M Ehoche O.W and Gefu O.J. (Editors) Manual for training workshop on small ruminant production held at NAPRI, Zaria, Nigeria 13th – 18th Jan. 2002 Pp. 40-48.

.Lakpini, C. A. M., Adamu, A. M., Ehoche, O. W. and Gefu, J. O. (2002). Manual for Small Ruminant Production in Nigeria. Compilation for a Training Workshop on Small Ruminant production held at the National Animal Production Research Institute, Zaria Nigeria 13th – 18th January 2002 Pp. 55 – 62

Nkwocha, G. A., Anukam, K. U. and Nkwocha, V. I. (2011) Evaluation of the Nutritional Potentials of selected multipurpose fodder Tress for use in Livestock diets. In: Adeniji A. A, Olatunji, E. A and Gana E. S (Editors), Value re-orientation in Animal Production: A key to National Food Security and Stable Economy. Proceeding

of 36th Annual Conference Nigeria Society for Animal Production, 13th – 16th March 2011 University Abuja, Nigeria Pp. 568 – 571.

NRC, National Research Council, (1996). Nutrient requirements of beef cattle 7th Rev. Ed. National Academy Press Washington, DC. P. 27.

Ocheja, J.O, Halilu,A, Shittu, B.A, Eniolorunda, S.E, Ajagbe, A.D, and Okolo, S.E(2021). Haematology and Serum Biochemistry of Yearling West African Dwarf Goats Fed Cashew Nut Shell Based Diets. Veterinary Medicine and Public Health Journal. 2(1):17 – 22

.Odoemedem, V.U., Ahamefule, F.O., Aluwe E.U., Ekwe, C.O and Obi J.I (2014) Carcass Yield and Organ Characteristics of West African Dwarf Bucks fed panicum maximum, supplemented concentrate, containing bambara nut meal Nigerian Journal of Agric, Food and Environment 10 (4) 18.24 .

.Okpanachi, U, Ayoade, J .A, and Tuleun, C.D. (2016). Carcass Characteristics , Internal Organs and Economics of Feeding Sun Dried yellow Cashew pulp Based Diets to West African Dwarf Goats. Animal and Veterinary Sciences 4(3):1 – 6, June 2016

Ozung. P.O, and Anya M.I. (2018). Performance and Carcass Characteristics of West African Dwarf Goats, Fed Cassava Peel Meal based diets Supplemented with African yam bean concentrate. Journal of Advances in Agric. Science and Technology 5 (7): 95-108

Rosegrant, M. W. and Thornton, P. K. (2008). The growing demand for food. Insights, 17:381 – 385.

SPSS (2015) Statistical package for social sciences. Version 23.0 SPSS Inc. Pp. 16 – 19.

Steele, M. (1996). Goats. The Tropical Agricultural Series. CTA/Macmillan Pp. 110 – 114.