WEIGHTS OF WHOLE SALE CUTS AND CARCASS BY-PRODUCTS OF RED SOKOTO GOATS FED DIFFERENT FORMS OF NEEM *(Azadirachta indica*) LEAVES , SUPPLEMENTED WITH A CONCENTRATE DIET.

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ABSTRACT

The study evaluated the weights of whole sale cuts and weights of by products of the carcass of red sokoto goats fed different forms of neem (Azadirachta indica) leaves and concentrate diet. The experiment was carried out at the small ruminants unit Teaching and Research Farm, Federal University of Kashere. Sixteen red sokoto goats (bucks) were allotted into four (4) treatments of four goats each. The goats were fed fresh neem leaves, neem leaves hay, neem leaves meal and neem leaves silage at 300g/goat/day for treatments 1, 2, 3 and 4 respectively; and concentrate diets at 125g/goat/day for a duration of sixty three (63) days. Water was served the goats ad libitum The experimental design was a completely randomized design; data were analyzed using a one way analysis of variance. The significant means were separated using Least Significant Difference contained in SAS 9.4 statistical packages, 2018 edition. The concentrate and the neem leaves were analyzed for their proximate composition using the method of AOAC(2000)The neem leaves were fed at 300g/goat/day and the concentrate at 125g/goat/day. On the last day of the feeding trial, three bucks /treatment were slaughtered , bled, eviscerated and the required whole sale cuts and by-products were cut off , weighed and the weights converted to percentage of slaughter weight Values for loin and belly were significantly (P>0.05) different, while the values for rib cage , neck, shoulders thigh and head were not significantly (P> 0.05) The values for shoulder and thigh ranged from 3.83 – 4.51% and 3.97 – 4.94% and were both lower than 7.66 to – 8.10 and 8.55 – 9.00% . The by-products determined did not show significant differences It was concluded thatThe different forms of the neem leaves had no significant effects on the determined by products of red Sokoto goats. The different forms of neem leaves had only a negligible effect on the examined by products of red Sokoto goats. Itwas recommended that further studies be carried out using other classes and breeds of goats as well as other species of ruminants.Treatment/processing of neem leaves may not be necessary if whole sale cuts and by- products improvement are the focus

Keywords: By-Products, Whole sale Cuts, Feed Intake, Red Sokoto Goats, NeemLeaves,

INTRODUCTION

The feeding of goats reflects in their carcass quality and by extension their whole sale cuts, internal organs and by-products (Egbunu,*et al* 2021; Abalaka *et al*, 2021; Oguche *et al* (2018) ;Oguche *et al*, (2017) 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 concerted 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 and /or indiscriminately disposed , there by posing hazards to the environment as well as bringing to the fore 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, manure 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) these non food by-products are raw materials for industries that will help to develop the Nigerian economy.(Abalaka*et al*, 2021).In line with the above an assessment of whole sale cuts and weights of carcass by- products is important to serve as guides in harnessing these carcass parts with a view to putting them to good use.

This study therefore is aimed at evaluating the weights of whole sale cuts and by-products of the carcass of Red Sokoto Goats.

2.0 MATERIALS AND METHODS

2.1 Experimental site

The study was conducted at the Teaching and Research Farm, Faculty of Agriculture, Federal University of Kashere in Gombe State, Nigeria. The state is situated within latitude 9º54'46N and longitude 9º 46º'27E and 10º57º E and altitude of 349m above sea level. The annual rainfall of Kashere ranges between 800mm-900mm per annum and is characterized by distinct dry season (October-May) and rainy season (June-September) The annual mean temperature ranges from 30-32^0 C and it experiences a relative humidity of 17-90% (National Geospatial Intelligence Agency, 2012).

2.2 Experimental Animals, Management, Feed preparation and Experimental procedure

Sixteen (16) red sokoto goats aged between 7-9 months were sourced from within Kashere and its environs and randomly allocated into four (4) Treatments of four (4) goats each. The animals were treated with Ivomec for endo and ecto parasites control at 0.3ml each and oxytetracycline, hydrochloride and procaine penicillin at 2.0ml each to take care of scouring and nasal discharge and to provide a common health status. The Neem (*Azadirachta indica)* leaves used for this experiment were collected from within the Federal University of Kashere Campus. The concentrate consisted of Bambara nut offal (BNO), Beans offal meal (BOM), Cassava peel meal (CPM), Yam peel meal (YPM), Maize offal (MO), Full fat soya bean (FFSB), Egg shell meal (ESM), Wood ash (Ash). These components were thoroughly mixed after pounding and grinding as the case may be.

Each treatment had (4) goats, each goat was fed 125g of the concentrate per day, and the Neem leaves at 300g per goat per day of which the Neem leaves was fed first, then the concentrate one hour later, the Goats were served water *Ad-libitum.*

Treatment one (T_1) was fresh neem leaves; treatment two (T_2) was neem leaves hay; treatment three (T_3) was neem leaf meal and Treatment four (T_4) was neem leaves silage.

The concentrate offered the goats were weighed daily and the left over was also weighed and subtracted from the quantity of feed that was served to determine the feed intake of the animal. The experiment lasted for sixty three (63) days.

2.3 Whole Sale Cuts Evaluation

At the end of the sixty three days, a total of 12 bucks (i.e. 3 bucks per treatment) were starved for about 12 hours prior to slaughter but were given water. And then slaughtered, then bled and eviscerated and the carcass cut into whole sale cut parts (head , rib cage , shoulder , thigh, loin , belly , neck , the parts were weighted and converted to percentage of live weights

2.4 By-Products Determination

The by-product parts to be determined (full gut, empty gut, hooves, horns and blood were cut off , weighed and the weights converted to percentage of slaughter weights

Table 1 Composition of Experimental Diet

Feed ingredients	Value (%)
Bambara nut offal	15.00
Beans offal meal	1.50
Cassava offal meal	4.50
Sweet potato peel meal	3.00
Maize offal	56.00
Yam peel meal	10.25
Full fat soya bean meal	5.00
Egg shell meal	1.00
Wood Ash	0.75
Table salt	2.00
Total	100.00
Calculated nutrient content:	
Crude protein	16.15
Crude fibre	11.30
Metabolizable energy (Kcal/kg diet)	2,700

2.5 Chemical Analysis

Samples of the Neem leaves and the concentrate diet were analyzed for their proximate composition using the method outlined by AOAC (2000).

Crude Protein: The usual method employed in determination of protein in feed stuff was Kjeldahl method of nitrogen determination. The known quantity of sample was digested with sulphuric acid (H_2SO_4 and NaSO4 in the ratio of 1:20). The digested sample was then distilled after neutralizing excess of acid with alkali (40% NaOH), and thus the released ammonia was trapped either in N/10 (in macro) or in 2% boric

acid solution. The distillate was collected in standard acid (N/10 H2SO4 or standard N/10 HCl) and titrated against standard alkali (N/10 NaOH), the distillate was collected in 2% boric acid (micro method) this was titrated against standard acid (N/100 H2SO4 and crude protein was calculated by multiplying by factor 6.25).

Crude fibre in feeding stuffs was estimated through digestion of dry and fat free amount of feed sample by boiling it in a weak solution of acids for 30minutes, followed by boiling in weak solution of alkali for 30minutes and then deducting the ash from the residue obtained.

Ether extract was estimated by extracting the amount of feed sample through fat solvents like petroleum ether for a period of 5-6 hours at 55-60^{0}C in specially made Sophlet apparatus.

Moisture: The moisture content of feed sample was determined by heating it to constant weight at 100^{0}C under atmospheric pressure the water content of feed is removed as vapour.

Ash: The feed contains both organic and inorganic matter in it. The sample was heated at 550^{0}c for 5 hours. The organic matter got oxidized as CO_2. The remaining material left was the inorganic matter.

Nitrogen Free Extract (NFE): Contains soluble carbohydrate, hemicellulose, part of lignin and acid insoluble ash. Value of NFE was derived by deducting the total value of crude protein, crude fat, crude fibre, moisture and ash from 100.

2.6 Experimental Design and Statistical Analysis:

The experimental Design was Completely Randomized Design (CRD). Data obtained was analyzed using a one-way Analysis of variance (ANOVA), means with significant differences were separated using Least Significant Differences (LSD) with the aid of Statistical Packages identified as SAS (2018), Statistical Analysis System ,9.4 , SAS , 2018 edition

3.0 RESULTS AND DISCUSSION

3.1 Proximate Composition of Neem (*Azadirachta indica*) Leaves and Concentrate Diet

The proximate composition of neem leaves and concentrate diet is summarized in Table 2.

The protein content of 6.44-9.19% for the neem leaves were lower than the values of 12-18% recommended for growing ruminants in the tropics by (NRC 1996). However, the supplement is expected to take care of this deficiency while the protein content of the concentrate diet (16.80%) was within the range of 12.18% recommended by NRC (1996). The crude fibre content of 9.5% for the supplement diet and 18.00% to 23.80% for the neem leaves were adequate for the goats (Lakpini *et al*., 2002). The ether extract values of 3.60% for the Neem leaves were within recommended values for ruminants while that of the concentrate diet was at par with the upper limits values of 5-6% recommended by Maithison *et al*., (1997). which if exceeded may impede appetite and fibre digestion (Maithison *et al*., 1997).

Table 2: Proximate Composition of Experimental Diets

Nutrient	Treatments				
	T1	T2	T3	T4	Conc
Crude protein	9.19	8.55	6.44	7.88	16.80
Crude fiber	18.50	19.30	18.00	23.80	9.50
Ash	11.50	11.80	8.00	14.50	3.15
Ether extract	3.60	3.70	3.00	4.80	5.85
Moisture	34.00	15.00	40.50	10.00	5.05
Dry matter	64.00	85.00	59.50	90.00	94.95
NFE	23.20	41.65	22.76	41.02	60.65

Conc.=Concentrate, NFE=Nitrogen Free Extract

3.1 Whole Sale Cuts of Red Sokoto Goats Fed Different Forms of Neem Leaves and a Concentrate Diet

The wholesale cuts of the experimental Goat meat is presented in Table 3. Values for loin and belly were significantly (P>0.05) different, while the values for rib cage , neck, shoulders thigh and head were not significantly (P> 0.05) Gboshe and Ukorebi *(*2020) reported no significant (P<0.05) differences in the values for whole sale cuts for West African dwarf goats fed cassava peels and sugar cane peels based diets. Oguche *et.al.(*2018) obtained significant (P>0.05) differences in the values for thigh, shoulder, ribs ,back and belly and non significance (P<0.05) for head and neck for West African dwarf goats fed cashew nutshell based diets. Similarly Oguche *et.al*.(2017) reported significant (P>0.05) differences in the values for head, neck, thigh, ribs and back and no significant (P<0.05) difference in the values for shoulder and belly for West African Dwarf goats fed some browse plants. The values for neck in the present study ranged from 3.99 – 4.31% and were similar to 3.86 – 4.05?% reported by Alih *et al.,(*2021), for West African Dwarf Goats fed Panicum maximum supplemented with bambara nut

offals and cereal spent grains based supplement diets. The values for shoulder and thigh ranged from 3.83 – 4.51% and 3.97 – 4.94% and were both lower than 7.66 to – 8.10 and 8.55 – 9.00% These discrepancies can be attributed to differences in the ages/sizes of the goats as well as concentrates and forages fed to the goats.

Table 3: Whole Sale Cuts of Carcass of Experimental Goats. (% of Slaughter weights)

	T_1	T_2	T_3	T_4	SEM
Rib Cage	10.14	11.11	9.10	9.36	0.52
Loin	6.35^{a}	5.69^{ab}	4.66^{b}	4.87^{ab}	0.28
Belly	2.77^{ab}	3.71^{a}	2.39^{b}	3.30^{ab}	0.23
Shoulder	4.50	4.23	4.51	3.83	0.19
Neck	4.13	4.31	4.20	3.99	0.24
Thigh	4.23	4.94	3.97	4.05	0.20
Head	9.03	7.81	7.92	8.62	0.43

a, b, c=Treatment means on the same row with different superscripts differ significantly (p>0.05).
SEM=Standard Error of Means.

3.4 Weights of By-Products (% of Slaughter Weight) of Red Sokoto Goats Fed Different forms of Neem Leaves and a supplement Diet

Values for all the by-products parts evaluated were not significantly (P< 0.05) different, the values did not follow any particular trend. The result tallies with that obtainrd by Abalaka et al, (2021) who reported nun significance (P,0.05) in the values of all the by-products determined, the result was almost at par with that of Ocheja, *et al*, 2019) who recorded non significance (P< 0.05) for all the by-product parts evaluated except for abdominal fat which however was not determined in this study. The full gut and blood weight proportions of 29.69– 30.82 % and 3.71 - 4.10% were higher than 28.90- 29.75 % and 3.70 – 4.00 % reported by Abalaka *et al* 2021

However, Odoemedan *et al* (2014) reported significant (P>0.05) differences in the weights of the internal organs and by-products of West African dwarf goats fed Panicum maximum supplemented with bambaranut meal based concentrate diets , similarly , Ozung and Anya, (2018) obtained significant (P>0.05) differences in the weights of some internal organ and by-products in the carcasses of West African dwarf goats fed with cassava peels meal and African yam beans based concentrate diets . These discrepancies could be due to differences in the concentrate diets and forages fed to the goats

Table 4: Weights of By-Products (% of Slaughter Weight) of Red Sokoto Goats Fed Different forms of Neem Leaves and a supplement Diet

	Treatments				
By-Products	**T_1**	**T_2**	**T_3**	**T_4**	**SEM**
Empty Gut	7.66	9.81	8.48	10.17	1.70
Full Gut	30.82	30.00	30.46	29.69	2.11
Blood	4.10	4.10	3.79	3.71	0.22
Horns	0.05	0.06	0.05	0.05	0.01
Hooves	0.37	0.35	0.39	0.36	0.02

SEM=Standard Error of Means.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The different forms of the neem leaves had no significant effects on the determined by products of red Sokoto goats.

The different forms of neem leaves had only a negligible effect on the examined by products of red Sokoto goats

4.2 Recommendations

Further study should be carried out using other classes and breeds of goats as well as other species of ruminants.

Treatment/processing of neem leaves may not be necessary if whole sale cuts and by- products are the focus

REFERENCES

Abalaka,E,O, Yahaya, B, Effienokwu, J.N, Adegbe, J.Y, Odiba, J, and Ali, P.A (2021) Weights of By-products of Carcass of West African Dwarf Goats fed *Panicum maximum* and Bambara Nut Offal and Cereal Spent Grains Based Supplement diet .*International. Journal of Agriculture. and Rural Deveiopment.* 24 (1): 5617 – 5621

AOAC 2000 Association of Official Analytical Chemists, *Official Method of Analysis* (17th Edition)

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 andEnvironment* **10**(4):18.24 .

Oguche G.H.E, Ocheja J.O., Omonzokpia O.F and Jibrin, R. (2018) Whole Sale cuts and Organo-Leptic properties of Meat from West African Dwarf Goats fed Diets Containing Graded levels of Cashew Nut Shell. Int. J of Agric. Vet. Sci. 4(4):47-52.

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

Maithison, G. W., McAlhster, T. A., Cheng, K. J., Dong, Y., Galbraith, J. and Dmytruk, O. (1997). Methane emissions from farm animals. Abstract of workshop on green house Gas Research in Agriculture, Saint Foy March 12 – 14, Pp**.(45)** 40–45.

NRC, National Research Council, (1996). Nutrient requirements of beef cattle 7th Rev. Ed. National Academy Press Washington, DC. P. 27.(National Geospatial Intelligence Agency, 2012).

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.

SAS (2018), Statistical Analysis System ,9.4 , SAS Institute, Cary , North Carolina

Steele, M. (1996). Goats. The Tropical Agricultural Series. CTA/Macmillan Pp. 1