SENSORY CHARACTERISTCS OF MEAT FROM RED SOKOTO GOATS FED DIFFERENT FORMS OF NEEM (Azardirachta indica) LEAVES AND A CONCENTRATE DIET

¹Ocheja, J.O, ¹Yahaya, B, ¹Umar, M.M, ²Adeyemi, A.M ¹Abdullahi, M.H, ¹Magaji, A., ³Mohammed, A., and ⁴Adunfe, T.A

¹Department of Animal Science, Federal University, Kashere, Nigeria ²Department of Pasture and Range Management, Federal University of Agriculture, Abeokuta, Nigeria ³Department of Animal Science, Federal University, Gashua, Nigeria

⁴Department of Animal Science, University of Abuja, Nigeria

(Ocheja, J.O: josiahocheja@yahoo.co.uk)

ABSTRACT

. The experiment was carried out at the Small Ruminants Unit of the Teaching and Research Farm, Federal University of Kashere. Gombe State, Nigeria. Sixteen red sokoto goats (bucks) with initial weight range of 6.80 - 7.20 kg, were allotted into four (4) treatments of four goats each. The goats were fed fresh neem leaves, neem leaf hay, neem leaf meal and neem leaf silage at 300g/goat/day for treatments 1, 2, 3 and 4 respectively; and concentrate diet at 125g/goat/day for a duration of sixty three (63) days. Water was served 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 (LSD) contained in SAS 9.4, 2018 edition statistical package. The concentrate and the neem leaves were analyzed for their proximate composition and fibre fractions using the methods of AOAC 2000At the end of the feeding period3 goats from each treatment were slaughtered , bled and dressed and thereafter the meat used for the evaluation of their sensory properties. all the sensory parameters values were not significantly (P < 0.05) different, values for juiciness , palatability and overall meat quality ranged from 3.65-3.75, 3.70-3.80 and 17.55-17.70 respectively. It was concluded that .treatment/processing of neem leaves had no significant effect on the sensory properties of the meat of red Sokoto goats, further research using other breeds of goats as well as other species of ruminants was recommended

Key words : Sensory , Concentrate , Neem Leaves, Nutrition, , Red Sokoto Goats

INTRODUCTION

1.0

Meat plays a major role in human diets because it supplies required nutrients for growth development and maintenance of health. (Anjaneyelu*et. al.*,2007) Goat meat(Chevon) serves as a major source of meat in developing countries, especially ,Nigeria , (Qcheja, 2016) however it is less popular in the Western world. However this trend in goat meat consumption is changing due to the health benefits of the consumption of lean meat with reduced fat and low cholesterol content(Webb ,2014). Carcass fat content is generally low in goat meat; fat accretion is less in the growth process of goats than other ruminants. Goat meat protein also has a high biological value of almost 64% and digestibility coefficient of 97% based on trial with rats fed 10% protein from goat meat(Casey

et.al.,2003)

According to Oguche *et.al.*(2018), the nutrition of an animal reflects in the sensory characteristics and hence meat quality and meat quality depends largely on the nutritive value, proximate and mineral composition of the feeding materials. The value of a goat carcass depends on the quality of edible parts available for sale and the nutrition of goats have been reported to reflect in the meat quality (Steele, 1996). The ideal carcass can be described as one that has a minimum quantity of bones, a maximum quantity of muscle and an optimum quantity of fat.

The production of meat from goats is suitable because their feeding does not compete for feed ingredients with humans (Ocheja*et al.*, 2016; Ocheja *et.al* 2020; Gboshe and Ukorebi,2020).)According to Ayoade *et al;* (2007), exploitation of cheap feed resources for animal production would lower the market price of animals and their products in Nigeria. The use of leaves from trees that retain their leaves during the long dry season ,to feed ruminants during the long dry season is very important, due to scarcity of forages and high cost of feed materials, .one of such leaves that can be used is leaves from Neem (*Azadirachta indica*) tree

Neem leaves as supplement to basal diets of crop residues have been shown to improve feed utilisation and animal performance in ruminants (Raghuvansi *et al.*, 2017). Neem leaves are high in crude protein. There are, however, wide variations in the reported values. Crude protein contents of between 17.5% and 18.7% have been reported by Bhowmik *et al.*, (2010). Neem leaves are reported to be deficient in copper, manganese (Niranjan *et al.*, 2008), zinc and phosphorus (Rao *et al.*, 2011). Levels of minerals, especially trace minerals, are expected to vary widely due to differences in the mineral content of the soil in which the trees grow.

Research works on the the effects of neem leaves on animal performance and blood profile abound , however research works on carcass characteristics especially the sensory properties may be very scanty, thus justifying this research work.

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 9°54'46N and longitude 9°46°,'27E and 10°57°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°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 Carcass Evaluation

At the end of the sixty three days, 3 bucks per treatment were starved for about 12 hours prior to slaughter but were given water, they were slaughtered, bled, eviscerated and dressed.

Four (4) pieces of meat each weighing 20 g were cut from the same thigh of three (3) goats slaughtered from each treatments (i.e Twelve (12) pieces of meat for each treatment [twelve replicates]. The pieces of meat were cut in different shapes for ease of identification as follows:

T1 - Round

T2 - Triangular

T3 - Square

T4-Rectangle

Cooking was done at the same time in the same pot. Assessment by a trained taste panel was done simultaneously. Each questionnaire was labelled as (T1, T2, T3 and T4); there were eight trained panelists. Each panelist tasted the cooked meat from each of the 4 treatments, (four assessments/panelist) and completed the questionnaire provided. There were a total of 48assessments (1x4x12). The questionnaires were rated on a scale of 1-5 for each parameter according to the method of Ocheja *et al.* (2016):

(i) Very good-5

(ii) Good-4

(iii)Moderate-3

(iv)Fair-2

(v) Poor - 1

Thereafter the scores for each replicate were added together and divided by 12 to get the mean score for each parameter/treatment. The total mean score for the five (5) parameters were added together to determine the overall meat quality.

Experimental Design and Statistical Analysis

The experimental design was a Completely Randomized Design (CRD). Data collected were subjected to a one way analysis of variance (ANOVA); means with significant differences were separated using Least Significant Differences (LSD) with the aidof SAS 9.04 (2018) Statistical Package.

Chemical Analysis

Samples of the concentrate, diet and the different forms of neem leaves were analyzed for their proximate compositiongh

using standard procedure as outlined by AOAC (2000). The fibre fraction analysis was

Table 1 Composition of Experimental Diets	
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

Table 1 Composition of Experimental Diets

RESULTS AND DISCUSSION

3.0

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

The proximate composition of the different forms of neem leaves and the concentrate diet is presented in Table 2. The protein content of 6.44-9.19% for the neem leaves were lower than theNRC (1996) recommended values of 12-18% for growing ruminants in the tropics. However, the supplement is expected to take care of this deficiency, with a protein content of 16.80% which 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% and if exceeded may impede appetite and fibre digestion (Maithison *et al.*, 1997). Table 2:Proximate Composition and Fibre Fractions of Experimental Diets

Nutrient	Treatments					
	T1	T2	Т3	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	
Neutral Detergent Fibre	54.00	55.00	54.55	52.35	60.00	
Acid Detergent Fibre	37.40	36.30	37.00	40.15	34.50	
Acid Detergent Lignin	8.60	8.70	8.45	7.50	5.50	
Ceellulose	28.80	27.60	28.55	32.65	29.00	
Hemicellulose	16.60	18.70	16.45	12.20	25.50	

Conc.=Concentrate, NFE=Nitrogen Free Extract

International Journal of Global Affairs, Research and Development (IJGARD), Vol. 1. No. 1, 2023, 110-116, ISSN-2992-2488 3.2 Sensory Characteristics of the Meat from Red Sokoto Goats fed Different Forms of Neem Leaves

The sensory properties of the meat from the experimental Goats can be seen in Table 3. All the values for the sensory properties evaluated were not significantly (P<0.05) different. Ocheja *et al.*(2016) reported significant (P>0.05) values for juiciness, tenderness, leanness, palatability and overall meat quality, and non-significance (P<0.05) for flavor, with West African dwarf goats fed diets containing graded levels of steam-treated cashew nutshell. Oguche *et al.*(2017),reported significant (P>0.05)differences in values for tenderness, flavor, and palatability , while the values for juiciness, leanness and overall meat quality were not significant(P<0.05) for West African dwarf goats fed some browse species, these differences may be due to differences in the composition of the concentrate diets as well as the browse. The values of 17.55 - 17.75 obtained for overall meat quality was lower than 19.63 - 20.38 reported by Oguche *et al.*(2017), and Ocheja *et al.*(2016), differences in the breeds of goats used for the experiments may also be responsible for these variations.

	T_1	T ₂	T ₃	T_4	SEM	
Juiciness	3.70	3.70	3.75	3.65	0.03	
Tenderness	3.80	3.90	3.90	3.85	0.04	
Flavour	3.60	350^{a}	3.50	3.50	0.02	
Leanness	3.75	3.85	3.88	3.75	0.05	
Palatability	3.80	3.70	3.75	3.78	0.02	
Overall meat quality	17.65	17.70	17.55	17.55	0.08	

 Table 3: Sensory properties of the Meat of Red Sokoto Goats Fed Different forms of Neem

 Leaves

SEM=Standard Error of Means

T1 (Fresh neem leaves and Concentrate)

T2 (Neem Leaf hay and Concentrate)

T3 (Neem leaf Meal and Concentrate)

T4 (Neem leaf Silage and Concentrate)

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

Thetreatment /processing of Neem leaves into various forms had no significant effects on the sensory properties of the meat of red sokoto goats fed various forms of Neem leaves supplemented with a concentrate diet.

4.2Recommendations Further research using other breeds of goats such as sahel and West African dwarf as well as other species of ruminants is recommended..

REFERENCES

Anjaneyelu A.S.R, Thomas R and Kondaiah N (2007). Technology for Value added Buffalo Meat Products: A Review. American Journal of Food Technology. 2(3):104-114

- AOAC (2000) Association of Official Analytical Chemists, *Official Method of Analysis* (17thEdition) Vol.1 Arlington, Virginia, USA
- Ayoade J.A Carew S.N and Ameh A.E. (2007). The feed value of sugarcane scrapping meal for Weaner Rabbits; Growth, Meat Yield and cost of Production., *Proceedings of the 3rd annual Conference at the Nigeria Society of Animal Production*, University of Calabar March 18-21, 2007, Pp 544-546.Azadirachta and its medicinal application. Journal of Chemical and *Pharmaceutical Research*, 2(1): 62-72.
- Bhowmik D, Chiranjib, Yadav J, Tripathi K K and Kumar K P S (2010):Herbal remedies of browse sand concentrate ingredients for goats. Livestock Research for Rural Development, 23(8). Article #166. Retr January 12, 2016, from http://www.lrrd.org/lrrd23/8/rao23166.htm
- Casey, N.H., Van Neikerk, W.A, and Webb, E.C. (2003) Goat Meat. In: Caballera B. Trago, L, Finglass, P (Editors). *Encyclopedia of Food Science and nutrition*. A c a d e m i c P r e s s L o n d o n . P p . 2937 - 2944. common tree Indian Veterinary Journal, 85: 1067-1069
- **Gboshe, P.N and Ukorebi, B.A** (2020). Performance and carcass characteristics of West African Dwarf Goats fed cassava peel meal partially replaced withsSugar cane peel meal. *Animal and Veterinary Science (Special Issue: Promoting Animal and Veterinary Science Research)* 8(1):36-40
- Lakpini, C.A.M., Adamu, A.M., Ehoche, O.W. and Gefu, J.O. (2002). Manual for small ruminant production. National animal production research institute. viix.
- Maithison, G. W., McAlhster, T. A., Cheng, K. J., Dong, Y., Galbraith, J. and Dmytruk, O. Niranjan PS, Udeybir, Singh J and Verma D N 2008: Mineral and anti-nutritional factors of
- NRC, National Research Council, (1996). Nutrient requirements of beef cattle 7th Rev. Ed. National Academy Press Washington, DC. P. 27.
- Ocheja, J.O, Abalaka, E.O, Akinleye,S.B, Usman,G.O., Netala,J, Oyibo,A, Lamido, M and Dauda, A.N.(2020). Quality attributes of meat of West African dwarf goats fed cashew nutshell based diets. *Nigerian Journal of Animal Science and Technology* 3(3):1-10
 - Ocheja, J.O., Ayoade. J.A., Attah, S, Netala, J. Ocheni J. and Oyibo A. (2016) Carcass characteristics of growing West African dwarf goats fed diets containing graded level of steam- treated cashew nut shell. *Animal and Veterinary Science* 4(3-1): 18-22
- **Oguche G.H.E, Ocheja J.O, Omonzokpia O.F, and Jibrin R** (2018) WholeSale cuts amd organoleptic properties ofmeat from West African dwarf goats fed diets containinggraded levels of cashew nut shell. *International Journal of Agriculture. and Veterinary Science* 4 (4);47-52.
- Oguche, G.H.E, Ocheja, J.O, Ode, C.O, Oyibo, A, Musa, A.O, and Alpha, E.O(2017). Wholesale cuts and sensory evaluation of meat of West African dwarf goats fed some browse species. *Internationasl Journal of Research in Agriculture and Forestry*. 4(4):19–22.
- Raghuvansi S K S, Prasad R, Mishra A S, Chaturvedi O H, Tripathi M K, Misra A K, Saraswat B L and Jakhmola RC(2007):Effect of inclusion of tree leaves in feed on nutrient utilization and rumen fermentationsheep. Bioresource

- International Journal of Global Affairs, Research and Development (IJGARD), Vol. 1. No. 1, 2023, 110-116, ISSN-2992-2488 Technology 98 (2007) 511–517.
- Rao, S B N, Radhika V, Singh N and Dutta T K(2011): Evaluation of mineral adequacy of natural Research in Agriculture, Saint Foy March 12 14, Pp.(45) 40–45. 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. (27):55–62.
- SAS(2018), Statistical Analysis System, 9.4, SAS Institute, Cary, North Carolina
- Steele, M(`1996). Goats, The Tropical Agriculturalist Series. CTA/Macmillan. Wageningen, Netherland, Pp.110-114
- Van Soest, P. J., Robertson, J. B. and Lewis, B. A. (1991). Methods of Analysis for Dietary Neutral Detergent Fibre and Non Starch Polysaccharides in Relation to Animal Nutrition. *Journal of Dairy Science*, 74:3583-3597.

Webb, E.C (2014) Goat meat production, composition and quality. *Animal* Frontiers. 4(4):33-37(1997)

h