National Animal Production Research Institute
Ahmadu Bello University
P.M.B 1096, Shika-Zaria,
Kaduna State, Nigeria.
Email: japr@napri-ng.org Website: www.naprijapr.org

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SENSORY EVALUATION OF MEAT FROM RED SOKOTO GOATS FED GRADED LEVELS OF CORNCOB DIETS SUPPLEMENTED WITH COWPEA HUSK

***[1]Ishiaku, Y.M., [2]Tsado, D.N. and [2]Oyibo, S.U.**

[1]National Animal Production Research Institute, P.M.B. 1096, Ahmadu Bello University, Shika, Zaria, Nigeria.

[2]Department of Animal Production, Federal University of Technology, Minna, P.M.B. 65, Niger State, Nigeria

**Corresponding Author: ishiaku.ym2014@gmail.com Tel: +2348101055090*

ABSTRACT

An experiment was conducted on Sensory evaluationof meat from Red Sokoto goats in feedlot trial. The goats were fed graded levels of corn cob diets at 0%, 10%, 20%, and 30% respectively, supplemented with cowpea husk. Meat from the experimental animals were subjected to cooking and frying. 18 untrained panelists are requested to record their responses for meat quality based on colour, tenderness, juiciness, flavour and overall acceptability for cooked and fried meat samples using the nine point scoring scale. The result of this study showed that both cooking and frying of the meat samples were significantly (P< 0.05) different in terms of individual preferences for meat quality. The preferences observed for the cooked meat in all the treatment diets ranges from 7.27 to 8.94 and for the fried meat it ranges from 6.15 to 8.72 respectively. However, cooked meat samples in terms of colour preference in Diet 3 (8.78) was significantly (P<0.05) better than the meat samples from other treatment diets. Meat samples obtained from Diet 2 was significantly (P<0.05) better in tenderness (8.56), juiciness (8.94) and flavour (8.78). The fried goat meat preferences for colour (8.50), juiciness (8.72) and flavour (8.11) respectively were significantly (P<0.005) better in diet 4 while meat samples from goats fed diet 2 were significantly (P<0.05) better in tenderness (8.67). The overall acceptability of goat meat samples for the cooked and the fried meats preferences were not significantly (P>0.05) different when compared to all the other treatment diets on colour, tenderness and flavour. It was concluded from this trial that despite variations in the levels of inclusion of corncob in the diets of Red Sokoto goats, the overall acceptability of either cooked or fried goat meat was not significant. Therefore, corncob can be included in the diets of Red Sokoto goats up to 30% for better meat quality and acceptability without any detrimental effect.

Key words: Red Sokoto goats, Meat, Sensory evaluation, Corncob and Cowpea husk.

INTRODUCTION

In recent times, the quality as well as quantity of animal products has become very important in developing countries like Nigeria, where especially goat meat known for its low fat content has been more preferred. Goat meat is characteristically lean, thus rich in nutrient that could be acceptable by health conscious consumers (Okeudo and Moss, 2004). According to Banskalieva *et al* (2000), goat meat contains higher amounts of poly-unsaturated fatty acids compared with sheep meat. Most consumers' preferences for a product have determined the process of meat quality improvement. The sensory properties like colour or tenderness may have a significant impact on meat quality acceptability. These qualities of meat is one of the primary factors influencing consumers' satisfaction. Sensory analysis performed by untrained panelists is the most appropriate tool to explain differences between the treatments as perceived by humans (Rodrigues and Teixeira, 2009). Preferences and consumption patterns for goat meat are dictated by cultural, traditional and religious background and the socio-economic status of the community members. Tenderness and juiciness are part of the

measures of overall meat eating quality (Chulayo and Muchenje, 2013) for cooked or fried meat.

Corncob is one of the relatively available and abundant agricultural wastes; a major limiting factor in the utilization of this agricultural waste is its low digestibility and relatively poor nutrient composition (Kategile, 1981). One possible way to alleviate this challenge and maintain production in the tropics is to feed crop residues which cannot be consumed by man, but can be converted by ruminants into desirable human food. This will reduce the cost of animal production without a decrease in productivity (Odeyinka, 2001). Corn cob and cowpea husks can substantially reduce the cost of feed as this will give hope for feeding millions of Nigerian and safe guard their food security (Makkar, 2002). The cowpea husk is also a very important by-product of beans milling. This is obtained after the removal of seed from the pods by crushing in a hammer mill or locally women using manual threshing method with mortar and pestle (Bawa *et al*., 2008). Despite high demand for these crop residues for the ruminants, the crop residue still remain the cheapest and most available in the dry season. Reports on the use of groundnut haulms and cowpea shells in ruminants feeding have recorded a great succession by most researchers (Abubakar *et al*., 2005)

MATERIALS AND METHODS

Experimental site and location

The experiment was conducted at Feedlot Unit of the Teaching and Research Farm, Animal Production Department, School of Agriculture and Agricultural Technology, Federal University of Technology, Minna, Niger State, Nigeria which is characterized by two seasons which include the wet (March to October) and the dry season (November to March). Minna has an altitude of 75m above sea level with a land area of 6784km^2 and lies between latitude $9^0$37'N and longitude $6^0$33'E. The mean annual rainfall is about 1200-1300mm, while the mean annual temperature of Minna is between 38^{o}C to 42^{o}C and is located in the Guinea Savannah Zone of Nigeria (NSADP, 2005).

Experimental animals, their management and experimental design

Sixteen (16) Red Sokoto goats with an average body weight of 10.19$\pm$ 0.19kg were used for the experiment. The animals were randomly allotted to 4 dietary treatments with each treatment having 2 replicates with 2 animals per replicate. Animals in Diet 1 (control) were fed 0 % corn cob, Diet 2 (10 %) corn cob, Diet 3 (20 %) corn cob and Diet 4 (30 %) corn cob. The animals were fed 500 g each in a day and water was offered daily *ad-libitum*. Feed intake was measured daily by subtracting the feed left over from feed offered. A randomized complete block design (RCBD) was used according to Steel and Torrie, (2000).

Sensory evaluation and Statistical analysis

At the end of experimental period which lasted for 12 weeks, two goats were randomly selected from each of the treatments. The animals were fasted overnight and slaughtered by cutting their jugular veins and allowed to bleed for 5 minutes. They were flayed and eviscerated. An average of 40 g meat samples from the right hind leg of each treatment animals were collected after removing the flesh from the bone and labelled for identification as described by Isah, *et al* (2009) while the remaining carcass were also weighed as described by Ahamefule and Udo, (2010). Samples meat from each animal was divided into two parts, the first part was cooked by adding 1gram of salt and water at a temperature of 65^{o}C for 30 minutes in a cooking pot using a Kerosene stove as described by (Fasae *et al.*, 2010), while the other part was also cooked for 30 minutes and then fried at 150^{0}C for 5 minutes in a frying pan using vegetable oil. Eighteen (18) untrained panelists were used in the assessment

procedure. They were instructed to chew on a sample from each treatment and score it for colour, flavour, juiciness and tenderness. Bottled water was served to the panelists to rinse their mouths after scoring each sample to reduce flavour carryovers. The panelists scored each sample on a nine – point hedonic scale: 9= like extremely, 8= like very much, 7= like moderately, 6= like slightly, 5= neither like nor dislike, 4= dislike slightly, 3= dislike moderately, 2= dislike very much and 1= dislike extremely. (AMSA, 1978). Overall acceptability was scored on a three- point scale: 1= least acceptable, 2= more acceptable and 3= most acceptable. (Iwe, 2002). Data collected were subjected to analysis of variance (ANOVA) with General linear model of SAS, (2008) and significant means were compared by Duncan Multiple Range of the same SAS package.

Table 1: Composition of experimental diets

Ingredients	Diet1 (0%)	Diet 2 (10%)	Diet 3 (20%)	Diet 4 (30%)
Corn cob	0.0	10	20	30
Maize offal	67	57	47	37
Maize	24	24	24	24
Groundnut cake	8	8	8	8
Vitamin premix	0.5	0.5	0.5	0.5
Salt	0.5	0.5	0.5	0.5
Total	100	100	100	100
Calculated				
% CP	13.37	12.92	12.47	12.03
ME(kcal/kg)	2710.40	2490.60	2270.90	2051.10

RESULTS AND DISCUSSION

The Proximate composition and energy levels of feed experiment was shown in (Table 2), the dry matter content of corncob (97.0 %) was higher than that of cowpea husk (95.49 %). The crude protein was higher in cowpea husk (12.97 %) compared to corncob (6.52 %). The dry matter and crude protein content reported in this study were higher than 90 % DM and 3 % CP reported by Ososanya *et al.* (2013) when corncob was used in the diet to feed West African Dwarf Sheep. Similar report was made by. The values of dry matter and crude protein were similar to the report of (Hammad *et al.,* 2010 and Tsado *et al.,* 2011). The dry matter of the experimental diets as shown in (Table 3) was higher in Diet 2 and lowest in Diet 1 ranges from (86.25 % to 87.40 %). This was in line with the reports of (Ososanya, *et al.,* 2013 and Tsado, *et al.,* 2011). The percentage crude protein decreases as the level of corncob increases probably because of increase in fibre content. The values obtained for dry matter and crude protein contents of experimental diets were similar to the report of Asar *et al.* (2010).

Table 2: Proximate composition of corn cob and cowpea husk

Parameters (%)	Corn cob	Cowpea husk
Dry matter	97.0	95.49
Crude protein	6.52	12.97
Crude fibre	20.0	33.40
Ether extract	0.21	7.0
Ash	1.67	10.70
Nitrogen free extract	68.59	41.63
ME (kcal/kg)	3023.7	2812.8

Table 3: Proximate composition of experimental diets

Parameters	Diet 1 (0%)	Diet 2 (10%)	Diet 3 (20%)	Diet 4 (30%)
Dry matter	86.25	87.40	87.15	87.10
Crude protein	16.35	15.09	14.80	14.60
Crude fibre	6.25	13.20	15.76	15.98
Ether extract	19.08	13.53	15.11	13.71
Ash	4.64	4.50	3.94	4.08
Nitrogen free extract	39.91	41.09	37.54	38.73
ME (kcal/kg)	3967.6	3464.0	3453.5	3367.10

Sensory evaluation of cooked meat samples of Red Sokoto goats in (Table 4) showed that values obtained in the study for juiciness, flavour, tenderness and colour showed significant ($P<0.05$) differences between the treatment groups. Diet 2 and 3 were significantly better than Diet 1 and Diet 4 in terms of colour. Animals fed Diet 2 are observed to be significantly ($P<0.05$) more preferred in terms of tenderness, juiciness and flavour. The significant values obtained in this study were higher than those report of (Bello and Tsado, 2013; Ronaldo, 2009). Colour of meat was found to be is considered as an important parameter that attracts customers in buying meat in the markets. Adam *et al.* (2010).The overall acceptability showed no significant ($P>0.05$) different.

Sensory evaluation of fried meat samples of Red Sokoto goats in (Table 5) showed that colour, juiciness and flavour of meat from animals fed Diet 4 was significantly ($P<0.05$) highest compared to other treatment groups. The preference for fried or cooked meat samples from goats are based on consumers choice. The study was in agreement with the report of

Bello and Tsado, (2013) for colour of meat and flavour preferences was 6.2 and 7.9 respectively when Yankasa Rams were fed on sorghum stover**.** The overall acceptability showed no significantly (P>0.05) different with all the treatment groups. Whether meat of goat was cooked or fried, the consumers' preference still remain the same. Therefore, despite the variations in levels of corncob in the diet fed to Red Sokoto goats the overall acceptability for cooked and fried meat still remain not significant.

Table 4: Sensory evaluation of cooked meat sample from Red Sokoto goats.

	Parameters	
Treatment	Colour	Overall acceptability
Diet 1	7.61^{b} ± 0.31	3.44±0.20
Diet 2	8.44^{a}±0.28	2.78±0.36
Diet 3	8.78^{a}±0.24	3.28±0.38
Diet 4	7.67^{b}±0.35	3.61±0.44
LS	*	NS

ab - Means in the same Column with different superscripts are significantly different (P<0.05)
LS - Level of Significance * - significantly (p<0.05) different. ± Standard Error of Mean.

Table 5: Sensory evaluation of fried meat sample from Red Sokoto goats.

Treatments	**Parameters**				
	Colour	**Tenderness**	**Juiciness**	**Flavour**	**Overall acceptability**
Diet 1	7.28^{b}±0.35	6.15^{c}±0.37	6.17^{c}±0.45	7.22^{b}±0.29	3.22±0.33
Diet 2	8.39^{a}±0.27	8.67^{a}±0.21	8.67^{a}±0.26	7.17^{b}±0.35	2.61±0.24
Diet 3	8.33^{a}±0.18	7.78^{ab}±0.32	7.22^{b}±0.29	7.11^{b}±0.33	3.11±0.29
Diet 4	8.50^{a}±1.29	7.33^{b}±0.41	8.72^{a}±0.34	8.11^{a}±0.22	2.67±0.34
LS	*	*	*	*	NS

ab - Means in the same row with different superscripts are significantly different (P<0.05)
LS - Level of Significance * - significantly (p<0.05) different. ± Standard Error of Mean.

CONCLUSION

Meat samples from Red Sokoto goats fed corncob diet enhances meat quality and overall acceptability whether cooked or fried. The quality of goat meat depends on consumer's preference. Therefore, corncob can be incorporated in the diet of Red Sokoto goats up to 30% for better meat quality preference without any detrimental effect.

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