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CARCASS CHARACTERISTICS AND SENSORY EVALUATION OF MEAT FROM RABBITS FED CASHEW-NUT RESIDUE BASED DIETS

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ABSTRACT

A study was conducted for a 42-day period to evaluate the carcass characteristics and sensory quality of meat from 18 weaner rabbits (mixed breeds) fed cashew nut residue (CNR) based diets. The three diets used contained: 0, 10 and 20% CNR as a partial replacement for maize. The CNR based diets significantly ($P<0.05$) decreased the shrunk body weight, empty body weight, hot carcass weight, gastrointestinal tract, rack, loin, shoulder and legs. The inclusion of CNR in the diets did not significantly ($P>0.05$) influence the appearance, taste, juiciness, chewness, texture, aroma and overall acceptability. It can be concluded that cashew nut residue could be incorporated up to 20% in rabbit diet without deleterious effect on the meat quality.

Keywords: Carcass characteristics, sensory quality, weaner rabbits.

INTRODUCTION

The high cost of animal protein and rapid increasing population in developing countries are the major constraints militating against the availability of the much needed high quality protein food to low income people. An increase in the standard of living almost inevitably calls for an increase in availability of animal protein sources. This situation calls for the production of fast maturing livestock like rabbits which can utilize cheap and locally available feedstuffs (Balogun *et al.*, 2003).

The unprecedented increase in the cost of conventional ingredients used in compounding livestock feeds has necessitated intensive investigations into the use of agricultural and agro-based industrial by-products, which are regarded as non-conventional feed resources (Oluokun and Olaloku, 1999).

Cashew (*Anarcadium occidentale* L.) nut residue is one of the by-products of the cashew processing industries. Cashew nut residue (full-fat cashew nut) is particularly useful in feeding monogastric animals, being a moderate source of protein and an excellent energy source because of its high fat content (Onifade *et al.*, 1999). Full-fat cashew nut reject had been utilized in broiler diets without deleterious effects on the performance and carcass characteristics (Sogunle *et al.*, 2005). Sogunle *et al.* (2005) observed that full-fat cashew nut (FFCN) reject has the following proximate composition viz: protein, 20.36%, ether

extract, 45.49%, crude fibre, 2.10%, ash, 3.65% and nitrogen free extract, 28.40%. Mateos and Sell (1981), however suggested that specific effects of fat in improving energy utilization were due to retardation of the rate of intestinal feed passage. This then resulted in a marked effect of the source of dietary energy supplement on lipogenesis. The authors then concluded that fat supplementation stimulated it. Hence, the inclusion of cashew nut residue in the diets of rabbits as an energy supplement. The present study was conducted to examine the effect of cashew nut residue on the carcass characteristics and sensory qualities of rabbit meat.

MATERIALS AND METHODS

Research station and diets

The study was carried out in the Rabbit Unit of the Agricultural Science Department, Federal College of Education, Abeokuta, Nigeria. The cashew nut residue (broken, slightly burnt and scorched kernels) used for the study was obtained from the cashew nut processing factory, University of Agriculture, Abeokuta (UNAAB), Nigeria. During processing, roasting of the nuts was done to cut down the amount of cashew nut shell liquid thereby making the shell more brittle for cracking. The cashew nut residue (CNR) was ground using hammer mill followed by inclusion in the diets at 0, 10 and 20% levels to formulate weaner rabbit diets (Table 1).

Animals

Eighteen weaner rabbits (6 weeks old) of both sexes were obtained from the Rabbit Unit of the UNAAB teaching and Research farm. They were allotted on weight equalization basis to three dietary treatments of six rabbits per treatment. Each treatment was replicated three times with two rabbits per replicate. Feed and water were supplied *ad libitum* throughout the experimental period of 42 days.

Carcass composition

At the end of the feeding trial, feed was withheld overnight. Three rabbits from each treatment group were randomly selected, weighed and slaughtered to evaluate the carcass composition. The rabbits were slaughtered by severing their heads at the occipitoatlas articulation. Dressing was done by flaying, the tails and feet (trotters) were cut off and weighed, carcasses were cut open and the gastrointestinal tracts, kidneys, livers, lungs and hearts were removed and weighed individually. The weights of the carcasses devoid of internal organs were recorded. The carcasses were dissected into shoulders, racks, loins and legs and later weighed.

Carcass sensory evaluation

Lean meat from the lumber region and hind limb from each treatment group was used for sensory evaluation. It was boiled in water without salt seasoning for 10 minutes and allowed to cool. The boiled meat was cut into bite size and served in plates to 15 member taste panel selected from the College community. They were instructed to evaluate the meat using a 5-point Hedonic scale for appearance, taste, juiciness, chewness, texture, aroma and overall acceptability. The scale for juiciness, taste and chewness are 5=very juicy/intense/tender, 4=moderately juicy/intense/tender, 3=slightly dry/bland/tough, 2=moderately dry/bland/tough, 1=very dry/bland/tough. The scale for appearance and aroma are 5= very good, 4=good, 3=fair,2=poor and

1=very poor.

Statistical Analysis

The experimental design used was completely randomized design (CRD). All data generated were subjected to one way analysis of variance (ANOVA) and the significant means were separated by Duncan Multiple Range Test (Steel and Torrie, 1980).

RESULTS

The results of carcass characteristics of rabbits fed cashew nut residue based diets are shown in Table 2. There were significant ($P<0.05$) differences among the treatment means in liveweight, shrunk body weight (SBW), empty carcass weight (ECW), hot carcass weight (HCW), GIT and retail cuts (rack, loin, shoulder and leg). The rabbits fed the control diet had higher values ($P<0.05$) for SBW, EBW, HCW, GIT, rack, loin and legs than rabbits fed other diets, which had similar values.

There was no significant ($P>0.05$) difference for dressing percentage among the dietary treatments, although there was numerical increase in the values as the levels of CNR increased in the diets. Moreover, rabbits fed diet 2 (10% CNR) had the highest values for head, liver, kidney, lungs, heart, spleen and shoulders than their counterparts fed other diets.

The results of sensory evaluation of rabbit meat are presented in Table 3. The appearance, taste, juiciness, chewness, texture, aroma and overall acceptability were not significantly ($P>0.05$) influenced by the dietary treatments. Numerically, the values obtained for the sensory quality of the meat were greater than the threshold level of 3 except for overall acceptability which was lower than the threshold value.

DISCUSSION

Carcass classification in rabbits may be predicted using only carcass weight or slaughter weight as the criterion (Blasco *et al.,* 1984). Deltoro and Lopez (1985) reported that the body parts located in the hindquarters of rabbits have high growth rate according to their characteristic pattern of locomotion. This may be probably attributed to fat depots around these regions as supported by Fernandez and Fraga (1996). The lumber circumference was the only trait that increased with the increase in dietary fat. However, these fat depots are similar to those of rabbits fed conventional diets (Garcia *et al.,* 1993).

There was no significant influence of dietary treatments on dressing percentage, as supported by Gondret *et al.* (1986), that dressing proportion at 11 or 15 weeks of age was not significantly affected by fat diets. Fernandez and Fraga (1996) reported that the main productive and economic traits such as dressing proportion and slaughter weight were not affected by the dietary fat source.

Earlier reports on liver weight variations with respect to diet were non-conclusive (Onhayoun *et al.,* 1987) probably because in those experiments, the slaughter of rabbits was in a range of weights in which, according to Cantier *et al.* (1969), the allometric change of the organ took place. Deltoro and Lopez (1985) also reported negative allometric growth of these organs from 8 to 10 weeks. The increased weight of the relative organs could be attributed

to fat depots as observed during carcass analysis.

The increased organ weights of rabbits fed 10% CNR meal further supported the adequacy of CNR based diet as a moderate source of protein (plant source) and an excellent energy source. Thus eliciting higher weight of the various organs, as growth of organs can be inhibited when insufficient protein and amino acids are available (Green *et al.,* 1986). The increased heart weight of rabbits fed 10% CNR based diet was an indirect effect due to the increased metabolic activities of the liver (Oluokun and Olaloku, 1999).

The lower values of the cut parts (rack, loin shoulder and leg) of the rabbits fed CNR based diets means that the feed was poorly utilized leading to higher wastage of energy that would have been used for fattening despite the high energy content of the diet (Oluokun and Olaloku, 1999).

The mean score (4.40) for appearance of meat from the dietary treatments was considered acceptable since the human eye has a remarkably fine qualitative discrimination for colour though it is not a quantitative instrument (Amerine *et al.*, 1965). Colour and other aspects of appearance influence food appreciation and quality especially by the consumers (Egege, 1994). Colour is an important indicator of the quality of fresh or cooked meat, as such, the appearance of the meat influences the consumers' acceptance of the meat(Van Oeckel *et al.,* 1999).

The scores showed an overall acceptability of rabbit meat in accordance with the findings of Briedenstein and Carpenter (1983) who reported that colour, flavour, juiciness and tenderness are the primary determinants of eating, with the tenderness being the most important.

CONCLUSION

The results of this study showed that cashew nut residue is a good feed resource for rabbits and can be included in such diets up to 20% without a significant adverse effect on the carcass characteristics and sensory attributes.

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Table 1: Percentage composition of the experimental diets

Traits	Levels of inclusion of CNR		
Ingredients	0%	10%	20%
Maize	45.00	35.00	25.00
Cashew nut residue	0.00	10.0	20.00
Groundnut cake	12.00	12.00	12.00
Soyabean cake	6.00	6.00	6.00
Fish meal	1.00	1.00	1.00
Palm kernel cake	10.00	10.00	10.00
Wheat offal	21.50	21.50	21.50
Bone meal	2.50	2.50	2.50
Oyster shell	1.50	1.50	1.50
Vit./Min. premix	0.25	0.25	0.25
Salt	0.25	0.25	0.25
Total	100.00	100.00	100.00
Calculated analysis (DM basis)			
Metabolizable energy(MJ/kg)**	10.72	11.33	12.18
Crude protein	18.50	19.54	20.57
Crude fibre (%)	7.40	8.55	7.28

**Metabolizable energy was calculated using Pauzenga (1985) formula.
*Premix (Univit 15 Roche) contained: 1500 I.U., Vit. A. 1500 I.U., Vit. D; 3000 I.U., Vit. E. 3.0g Vit. K, 2.5g Vit. B_2, 0.3g Vit. B_6, 8.0g Vit. B_{12}, 8.0g, Nicotinic acid, 3.0g Ca-Panthothenate, 5.0mg Fe, 10.0g Al, 0.2g Cu, 3.5mg zn,).15mg I, 0.02g Co, 0.01g Se.

Table 2: Carcass characteristics of rabbit fed cashew nut reject based diets

Parameters	Levels of inclusion of CNR			
	0%	10%	20%	SEM
Liveweight (g/rabbit)	1153.30[a]	1000.00[b]	950.00[b]	7.30
Shrunk body weight (g)	1003.30[a]	850.00[b]	900.00$_{ab}$	3.67
Empty carcass weight (g)	750.83[a]	722.47[b]	666.12[b]	3.54
Hot carcass weight (g)	602.02[a]	588.05[b]	560.48[b]	3.00
Dressing weight (g)	52.20	58.81	59.00	1.63
Head*	9.70	10.47	8.88	0.82
Trotter*	3.20	3.01	2.24	0.82
GIT*	21.89	12.75[b]	14.09[b]	0.82
Liver*	2.60	3.03	2.81	0.51
Kidney*	0.61	0.71	0.65	0.08
Heart*	0.31	0.43	0.19	0.06
Spleen*	0.11	0.12	0.11	0.01
Rack*	12.06[a]	9.60[b]	9.97[b]	0.07
Loin*	13.54[a]	10.44[b]	11.00[b]	0.33
Shoulder*	10.05[a]	10.79[a]	7.44[b]	0.20
Legs*	21.21[a]	18.90[b]	17.14$_{c}$	0.25
Lungs	0.62	1.10	0.80	0.08

[a,b,c]Means in the same row having different superscripts differed significantly (P<0.05).
*Percentage computed as a ratio of liveweight.
SEM: Standard error of the means

Table 3: Sensory evaluation of meat from rabbits fed cashew nut reject based diets

Parameters	Levels of inclusion of CNR			
	T1 (0%)	T 2(10%)	T3(20%)	SEM
Appearance	4.60	4.60	4.20	0.82
Taste	3.70	4.40	4.50	0.58
Juiciness	4.40	3.90	4.50	0.82
Chewness	3.80	3.70	3.80	0.82
Texture	3.40	4.10	3.10	0.82
Aroma	4.30	4.10	3.60	0.82
Overall acceptability	2.42	2.48	2.36	0.48