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Comparative Evaluation of the Effects of Three Local Spices on Nutrient and Organoleptic Qualities of Rabbit Meat

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Abstract
A study was conducted to evaluate the effects of three different spices: *Monodora myristica* (African Nutmeg), *Zingiber officinale* (Ginger), and *Piper guineense* (African Black Pepper) on chemical composition and organoleptic characteristics of dried rabbit meats. The three spices collected as seeds were processed into meals before applied on the fresh meat cut (loin) obtained from ten (10) rabbit bucks slaughtered. The treatments were arranged as follows: T_1 (200g meat without spice) which served as control, T_2 (200g meat +5% Nutmeg) T_3 (200g meat + 10% Nutmeg), T_4 (200g meat +5% Ginger) T_5 (200g meat +10% Ginger), T_6 (200g meat + 5% African Black Pepper) T_7 (200g meat +10% African Black Pepper).Each treatment was oven dried before presented to taste panel that adjudged the test for colour, flavour, tenderness, juiciness and overall acceptability. Samples of each treatment were analysed for chemical composition. Results obtained indicated that there were significant ($p<0.05$) differences in flavour, tenderness and overall acceptability. Meat spiced with *Zingiber officinale* was rated significantly ($p<0.05$) higher in tenderness, flavour and overall acceptability both at 5% and 10% level, followed by *Monodora myristica*, which was not different ($p>0.05$) from the control (meat without spice), while meats spiced with *Piper guineense* scored least. Laboratory analysis also showed that rabbit meats spiced with Ginger recorded lowest fat at 5% while meats spiced with *Piper guineense* recorded highest protein content at 10%.

Keywords: Ginger, black pepper, nutmeg, rabbit meat, organoleptic

Introduction

Meat is the most important source of protein and includes the flesh or entire musculature and organs of any animal used for food. It is composed essentially of nutrients vis-à-vis water, fat, minerals and vitamins apart from protein. However, meat is often processed before consumption and spices are commonly used during meat processing to enhance organoleptic composition of meat in Nigeria. This implies that when meat is spiced, its palatability, flavour, juiciness, colour and tenderness may be altered, thereby enhancing or decreasing the overall acceptability of the meat by a consumer. Sensory evaluation plays an important role in the examination of meat products. Not only does scientific sensory evaluation with skilled panelists using special test programs and point systems give reliable results, but results can also be obtained in a simple way at the consumer level. For the average consumer, sensory evaluation is the only way to decide whether or not he or she should buy or eat a certain product. Rabbit meat as reported by Cheek *et al.,* (1987) is fine grained, nutritious and appetizing. It is ranked best in quality as it is low in fat (10-12%), compared to other meats like poultry (11-13%), pork (42-48%), and beef (27-29%) but high in protein (20-22) compared to chicken (19-21%),pork (10-12%)and beef,15-17% (Fielding, 1991).Even though rabbit meat is rated the most nutritious meat, it's consumption level by the Nigerian populace is still very low. One of the ways to boost the rabbit meat consumption therefore is to apply spices and oven dried or smokes dried (Bamgbose, 2006). Basically, three (3) local spices namely: *Zingiber officinale* (Ginger), *Monodara myristica* (Nutmeg), and *Piper guineense* (African Black Pepper) are available which potentials can be tested on the chemical composition as well as sensory qualities of rabbit meat.

This study is, therefore, an attempt to evaluate the potentials of some local spices and their effects on the proximate composition as well as organoleptic attributes of oven dried rabbit meat. These local spices include: *Zingiber officinale* (Ginger), *Monodara myristica* (Nutmeg), and *Piper guineense* (African Black Pepper).

Materials and method

The study was carried out at the Teaching and Research Farm of the Department of Animal Science, Obio Akpa Campus, Akwa Ibom State University. The Local spices (Ginger rhizomes, Nutmeg seeds, and African black pepper seeds) were bought from Uyo Urban market, Akwa Ibom State, Nigeria. The meats were obtained from 10 slaughtered rabbit bucks in the Rabbitry unit of the farm .*Zingiber officinal* (Ginger), *Monodora myristica* (Nutmeg seeds) as well as *Piper guineense* (African black pepper seeds) were bought fresh from local market. They were washed, chopped into tiny pieces and sundried for one day before ground into meal using the electric grinder (AS3101 model) as described by Akinloye *et al.* (2000).

Each of the processed spices was applied thoroughly on 200g fresh rabbit meat at 5% and 10% level (meat weight basis) before subjected to oven drying at a temperature of 80^{o}C for 1 hour and 30 minutes using compact oven (PR305225M model). Sensory evaluation was conducted using the 9-point hedonic scale as described by Ihekoronye *et al*. (1985). A 7-

member pre-trained taste panel was set up to carry out the sensory evaluation. Meats were rated for colour, flavor, tenderness, juiciness, and overall acceptability. Samples of each of the spiced meat from each treatment were also subjected to proximate analysis according to AOAC (1990).

Data obtained from the organoleptic evaluation were subjected to analysis of variance using Completely Randomized Design, and treatment means where differences manifested were separated by Fisher LSD using SAS (1999-2000).

Results and discussion

From table 1, it is shown that highest Crude protein was obtained in T_6 followed by T_5 and T_1. Highest value of ash was recorded in T_1 followed by T_5, T_4, T_6 and T_3. The least was obtained in T_7. Highest value for fat was obtained in T_1 followed by T_7, T_5 while the lowest was obtained in T_2 and T_4. Highest value for fiber was rather recorded in T_1 while the lowest was recorded in T_7. This implies that the proximate composition of all the treatments did not follow any particular trend. Result as presented in table 2 indicates significant ($P<0.05$) differences among the treatments. T_4 was rated significantly ($p<0.05$) higher than all other treatments. This was followed by T_1, T_2, T_3 and T_5, which were statistically similar ($p>0.05$). T_6 recorded significantly ($p<0.05$) lower mean value while T_7 scored least. This implies that, meats spiced with *Zingiber officinale* at 5% was most preferred in colour while *Piper guineense* especially at 10% was least considered by the consumers. Similarly, significant ($p<0.05$) difference existed among the treatments in terms of flavor. The highest significant mean value was obtained in T_5 and T_4. This was followed by T_2. However, T_1, T_3, and T_7 which were not significantly ($p>0.05$) different were scored low and T_6 scored least. This suggests that the flavor from *Piper guineense* was not accepted by the consumers.

Table 1: Proximate composition of spiced meat samples

Parameters (%)	Treatments							
	T_1	T_2	T_3	T_4	T_5	T_6	T_7	SEM
Moisture	10.05	35.10	18.10	20.00	15.25	27.10	19.15	19.15
Ash	11.60	4.85	6.55	7.30	7.40	6.75	4.40	4.40
Fat	8.45	1.45	5.00	0.90	5.80	1.25	8.15	8.15
Protein	52.54	47.28	25.38	38.52	55.16	63.92	30.64	30.64
Fiber	7.73	3.23	4.37	4.45	4.65	4.25	2.93	2.93
NFE	19.68	43.19	58.70	48.83	26.99	23.83	53.88	53.88

T_1 = control; T_2 = 5% Nutmeg + meat; T_3 = 10% Nutmeg + meat; T_4 = 5% Ginger + meat
T_5 = 10% Ginger + meat; T_6 = 5% African Black Pepper + meat; T_7 = 10% African Black Pepper + meat

Table 2: Sensory Evaluation of Treatment Samples

Parameters	Treatments							SEM
	T_1	T_2	T_3	T_4	T_5	T_6	T_7	
Colour	7.00^{b}	7.29^{b}	7.14^{b}	7.86^{a}	7.14^{b}	6.57^{c}	5.57^{d}	0.58
Flavor	5.14^{c}	6.71^{b}	4.86^{c}	7.29^{ab}	8.14^{a}	3.86^{d}	4.86^{c}	0.74
Tenderness	3.57^{cd}	5.57^{b}	5.29^{b}	7.00^{a}	5.14^{bc}	3.14^{d}	4.14^{c}	0.80
Juiciness	3.83^{d}	5.71^{bc}	5.14^{bc}	7.00^{a}	6.00^{b}	4.43^{cd}	3.86^{d}	0.81
Overall Acceptability	5.86^{bc}	6.57^{b}	5.57^{bc}	8.00^{a}	7.14^{a}	3.86^{d}	3.29^{d}	0.53

^{abcd} Means with different superscripts along the same row differed significantly ($P<0.0$)

Result of tenderness as presented also showed that there were significant ($p<0.05$) difference among treatments. Highest mean value was recorded in T_4 followed by T_2, T_3, and T_5 which were not significantly different ($p>0.05$). Mean values for T_7, T_1, and T_6 were low and statistically similar ($p>0.05$). This implies that rabbit meats spiced with *Zingiber officinale* were most tender while the meats spiced with *Piper guineense* and the control was the least tender. The highest tenderness obtained in T_4 may be related to the high calcium content of *Zingiber officinale* which is known to enhance tenderization of meat. This result also corroborates earlier report (Mendiratta *et al*., 2000), that *Zingiber officinale* enhances tenderization in mutton, and chicken meat respectively. The result of juiciness as presented in table 2 shows that there was significant ($p<0.05$) difference among the treatments. T4 recorded the highest mean value followed by T_5, T_2 and T_3 which were not significantly different ($p>0.05$). Result however showed that T_1, T_6, and T_7 which were not significantly different ($p>0.05$), recorded lower values. This implies that the control and *Piper guineense* had least influence on juiciness of the rabbit meat. Result indicated that there was significant difference ($p<0.05$) among the treatments for overall acceptability. T_4 and T_5 which indicated no significant difference ($p>0.05$) scored the highest mean value compared to all other treatments. This was followed by T_2, T_1, and T_3. Least acceptability was

however recorded in T_6 and T_7. This result reveals that, meats spiced with *Zingiber officinale* were most preferred by the consumers considering all the parameters earlier scored. This was followed by *Monodora myristica* while the least preferred was *Piper guineense*. This also suggests that spices generally influence meats' organoleptic characteristics.

Conclusion and Recommendation

The results of this study has shown that consumers preferred spiced rabbit meats especially *Zingiber officinale* spice. However, *Piper guineense* increased rabbit meat protein while *Zingiber officinale* reduced the meat fat content at 5% levels. It is therefore recommended that to enhance organoleptic and the nutritive quality of rabbit meat, ginger spice at both 5% and 10% are recommended while African black pepper is recommended only at 5% for improved protein content. However, Combination of both spices at various levels is recommended for further studies.

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