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The Effect of 'Prekese' (Tetrapleura Tetraptera) Pod Extract on the Sensory and Nutritional Qualities of Pork Sausage

Seth Adu-Adjei, Frederick Adzitey and Gabriel Ayum Teye*

Department of Animal Science, Faculty of Agriculture, University for Development studies, P.O. Box TL 1882, Tamale, Ghana

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Corresponding Author:

Ayum Teye
teyegabriel@yahoo.com

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ABSTRACT

This study was carried out to determine the effect of 'prekese' (Tetrapleura tetraptera) pod extract (PPE) on the sensory characteristics and nutritional qualities of smoked pork sausages. Four kilograms of minced pork was used. The pork was divided into four equal parts (1kg per treatment). Each product contains the following: (T1) control (without PPE), (T2) 10 ml of full pod PPE/1kg of pork, (T3) 10 ml of chopped pod PPE/1kg of pork, and (T4) 10 ml of ground pod PPE/1kg of pork. Sensory analysis was conducted to determine the effect of the 'prekese' pod extract on the sensory characteristics of the product. Crude fat, crude protein and moisture content were determined to find out the effect of the pod extract on the nutritional qualities of the products. There were no significant differences in the sensory characteristics. There were significant differences in the nutritional qualities of the products in terms of crude protein, crude fat, and pH and moisture contents. The inclusion of PPE in the sausage at 10ml/1kg of pork improved the protein content of the products.

Keywords: pork sausage, 'prekese', sensory characteristics, nutritional qualities.

INTRODUCTION

Lawrie and Ledward (2006) defined meat as the flesh of animals used as food. Meat is recognized as a 'functional food' that can beneficially affect physiological processes in the consumer and thereby potentially mitigate or prevent diseases (Jiminez-Colmenero *et al.*, 2001). Meat processing refers to procedures such as addition of ingredients and/ or mechanical action that convert intact meat into specific products such as bacon, minced meat, fresh or raw sausages, liver sausage, scalded sausages and cook sausages (Teye, 2007). Sausages consist of ground lean

meat, animal fat, herbs or spices with sometimes other ingredients and usually packed in casing and preserved in a way by curing or smoking (Kumar, 2007).

Spices are esoteric food adjuncts that are used as flavouring agents and as preservatives in meat products (Srinivisan, 2005). Platel and Srinivasan (2000;2001) reported on the beneficial effects of spices on human health, nonetheless there have been reported mixed feelings from consumers over health issues such as hypertension, cancer and obesity resulting from excessive use of artificial food additives and preservatives in meat products including pork sausages (Lawrie and Ledward, 2006). In order to replace artificial spices, some indigenous plants such as 'Akokobesa' (*Ocimum basilicum*), 'Dawadawa' (*Parkia biglobosa*) and 'Prekese' (*Tetrapleura tetraptera*) whose parts are used as spices in the preparation of local dishes can be used as replacement for seasoning meat products. *Tetrapleura tetraptera* plant has many medicinal uses ranging from it leaves, fruit, bark and pod (Steentoft, 1988). In Northern Nigeria for example, the fruits are used to prepare food for mothers from the first day of delivery to prevent postpartum contraction (Nwamu and Akah, 1986). Okwu (2003) reported on the chemical evaluation, nutritional and flavouring properties of 'Prekese' which contains varying amount of crude protein, crude lipids, crude fat, carbohydrate and energy.

A recent study involving the use of 'prekese' pod powder as a spice in sausage and hamburger, had shown a promising result in the sensory characteristics and nutritional qualities of the products (Lartey, 2012). For example, there were increases in the protein and fat contents of the products (sausages) but the colour of the products became darker as inclusion levels of the 'prekese' pod powder increased in the sausages (Lartey, 2012). The effect of prekese' pod extract (PPE) on sensory characteristics is not known; therefore this study seeks to determine:

- The effect of 'prekese' pod extract on the sensory characteristics of pork sausage.
- The crude protein, crude fat, pH and moisture contents of pork sausage.

MATERIALS AND METHODS

Study area

This study was conducted at the Meat Processing Unit of the University for Development Studies (UDS), Nyankpala Campus. Chemical analysis of the meat products were conducted at the Spanish laboratory of UDS, Nyankpala.

Preparation of pod extract

Tetrapleura tetraptera (prekese) pod extract was obtained by:

i) Weighing three pods of 'prekese', 50g each with a length of about 25cm each.
ii) The first pod was left fully intact.
iii) The second pod was chopped into five pieces with each piece measuring about 5cm long.
iv) The third pod was ground into powdery form and the weight retaken to ensure it is 50g.
v) 0.5 litres of water was used to soak the three different forms of the pod in plastic containers for 24 hours to get the extract. Figure 1 shows the various forms of the processed *Tetrapleura tetraptera* pod.

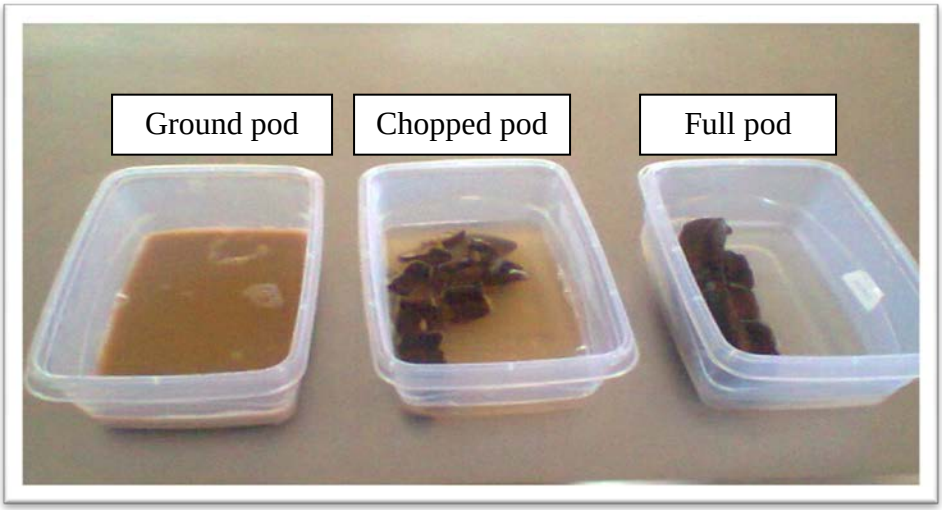

Figure 1: Pod extract in different forms of the pod after 24 hours

Sausage preparation

The meat used were thawed overnight at a temperature of 4^{o}C, cut into smaller pieces and minced using a 5mm sieve table top mincer (Talleras Rammon, Spain). The inclusion levels of test spice, (PPE) in millilitres per 1kg of meat, were as follows:

a. Treatment one (T1-Control): 2g/kg meat of Adobo and no PPE.
b. Treatment two (T2): 2g/kg meat of Adobo with 10 ml of PPE (full pod).
c. Treatment three (T3): 2g/kg meat of Adobo with 10 ml of PPE (chopped pod).
d. Treatment four (T4): 2g/kg meat of Adobo with 10 ml of PPE (ground pod).

The meat (4kg) was weighed and divided into four groups of 1kg each and placed in separate containers. The containers were labeled Treatments 1 to 4. The spices as indicated above were added to their respective treatments and manually mixed thoroughly. They were then stuffed into natural casings, using a hydraulic stuffer (Talleres Rammon, Spain) and manually linked into similar length of about 10cm. The sausages were hung on labeled smoking racks and smoked for an hour, after which the sausages were allowed to cool under room temperature.

Products preparation for sensory evaluation

For the sensory evaluation, the sausages were removed from the refrigerator and allowed to thaw for two hours. They were then grilled in an electric oven and sliced into uniform length (about 2cm). A total of 15 panelists were trained based on the British Standard Guide (BSI, 1993) to effectively carry out the sensory analysis. Each panelist was served with a piece of bread and water to serve as a neutralizer and was given a five-point category scale to evaluate the products for sensory characteristics.

Proximate analyses of the products

The sausages were analyzed for moisture, crude protein (Kjeldhal method) and fat contents (Soxtec apparatus**)** according to the methods of the International Association of Official Analytical Chemist (AOAC, 1999) and the pH of the products were determined (using the pH meter). All reagents were of analytical grade.

Statistical analysis

Data obtained was analyzed using Analysis of Variance (ANOVA) of the Minitab Statistical Package, Version 15.

RESULTS AND DISCUSSION

Sensory characteristics of the smoked pork sausages

The results obtained from the sensory evaluation of the pork sausages are presented in Table 1. There were no significant differences in colour, aroma, 'prekese' flavour, flavouring liking and acceptability of the products.

Table 1- Sensory characteristics of the smoked pork sausages

Parameters	T1	T2	T3	T4	Sed	Sig
Colour	2.60	2.60	2.50	2.40	0.4577	N.S
Aroma	3.60	3.60	3.60	3.40	0.5142	N.S
'Prekese' Flavour	2.50	2.90	3.40	3.00	0.4702	N.S
Flavour liking	1.90	2.00	2.10	1.60	0.3815	N.S
Acceptability	2.00	1.90	1.80	1.70	0.3543	N.S

N.S = not Significant, Sed = Standard error of difference, Sig = Significance.

The colour of meat and meat products is an important quality attribute that influences consumers' acceptance of the product and usually consumers like bright-red raw meats, brown-gray cooked meats and pink cured meats (Cornforth, 1994). It was expected that the dark brown colour of the pod extract would be imparted to the product, but that was not the case when the pod extract was used in this study. The results therefore differed from that of Lartey (2012), who indicated that there were significant differences between the colours of products prepared with pod powder (PPP). This is an indication that it will be better to use the PPE instead of PPP. The insignificant differences ($P > 0.05$) suggest that sausages prepared with 'prekese' pod extract at an inclusion level of 10ml per kilogram meat have similar colour as the control product and could be patronized equally by consumers.

There was no significant difference ($P > 0.05$) in the aroma of the sausages. Aroma gives an indication of the degree of attraction or repulsion of consumers to food substance. The panelists described the aroma as pleasant (Table 1) and this indicates that 'prekese' pod extract could be a good spice at an inclusion level of 10 ml per kilogram meat in meat products. The 'prekese' flavour of the sausages was not significantly affected. This result therefore indicates that 'prekese' flavour obtained from using the pod extract is not as stronger as the powder. Lartey (2012) reported significant differences between products prepared with PPP in terms of 'prekese' flavour. This could be possibly due to the fact that, soaking the pod for 24 hours may not be enough to release the pungent aroma of 'prekese' fully into the solution as described by Aladesanmi (2007). The insignificant difference in flavour liking and acceptability of the products indicate that sausages prepared with PPE at 10 ml per kilogram meat would be equally accepted just as the standard meat products on the market.

The results of the analysis of the pork sausages to determine the crude protein, crude fat, moisture content and pH level is shown in Table 2. There were significant differences in the crude protein content of the products (Table 2). T2 was significantly higher, than T3, T4 and T1. T3 and T4 protein content were similar. Okwu (2003) reported that, the composition of protein in *Tetrapleura tetraptera* ranges from 7.44-17.50%. This might have contributed to the significant

and marginal increases in the protein contents of the test products. This indicates that the inclusion level of 'prekese' pod extract in pork products may improve the nutritional qualities of the products.

Table 2- Proximate composition of smoked pork sausages

Parameters	T1	T2	T3	T4	Sed	Significance
Protein	12.02^{b}	16.08^{a}	13.58^{ab}	13.45^{ab}	0.030	***
Moisture	45.30^{b}	44.85^{b}	46.10^{b}	50.12^{a}	0.934	*
Fat	53.84^{b}	51.00^{c}	62.24^{a}	47.27^{d}	0.724	**
pH	6.15^{c}	6.11^{d}	6.24^{b}	6.29^{a}	0.008	***

Sed= Standard error of differences. Means on the same row with different superscripts are significant
*= P<0.05, **= P<0.01 and ***=P<0.001

The moisture content of the products increased significantly in T4 ($P < 0.05$). However the moisture content of T3 and T2 were similar to the control product. The moisture content in meat is a good indicator of its relative components of protein and lipids (Aberoumad and Pourshafi, 2010). It can be observed from table 2 that as T4 has the highest moisture content, the level of crude protein and fat in it were lower when compared to T3 and T2, respectively. There were significant differences in the fat content of the products, although there was no trend, with T3 having the highest fat content followed by T1, T2 and T4. The reasons for the differences in fat content are unknown but may be due to the fat content of the type of meat used. There were significant differences in the pH of the products (Table 2). There was no clear trend that PPE contributed to the increase in pH although T3 and T4 suggest a possibility. According to FAO (2007) a typical pH value for pork and its product ranges from 5.50 to 6.20. The importance of measuring the pH of meat and meats product is to evaluate the keeping quality (FAO, 2007). It can be suggested from the result that T3 and T4 may deteriorate faster than T1 and T2 due to their pH level creating a favourable environment for bacterial growth.

CONCLUSION

This study reveals that, the use of 'prekese' pod extract had no adverse effect on the sensory characteristics of the smoked pork sausages at an inclusion level of 10 ml/1kg of meat. However, there were effects on the moisture, fat and protein contents, and the pH of the products. There was also an improvement in the nutritional quality of the test products in terms of protein content. It is recommended that different extraction methods and higher inclusion levels of the 'prekese' pod extract be evaluated.

REFERENCE

Aberoumad, A., and K. Pourshafi. 2010. Chemical and Proximate composition properties of different fish species obtained from Iran. *World Journal of Fish and Marine Sciences.* 2:237-239.

Aladesanmi, J.A. 2007. *Tetrapleura Tetraptera:* Molluscicidal activity and chemical constituents. *African Journal of Traditional, Complementary and Alternative Medicines.* 4: 23-36.

AOAC. 1999. Official method of analysis. 17th edition, Association of Analytical Chemists. Washington DC. USA. pp: 56-132.

British Standard Institution. 1993. Assessors for Sensory Analysis. Guide to Selection. Training and Monitoring of Selected Assessors. BS. 17667. British Standard Institution London. United Kingdom.

Cornforth, D. 1994. Colour- its basis and importance: Quality attributes and their measurement in

meat, poultry and fish products. *Advance in Meat Research Series*. 9:34-78.

FAO. 2007. Meat processing technology for small to medium scale producers. pp: 9-149.

Jiminez-Colmenero, F., J. Carballo, and S. Cofrades. 2001. Healthier meat and meat products: their role as functional foods. *Meat Science*. 59:5-13.

Kumar, R. 2007. History of sausage. Available at: http://www.ifood.tv/blog/sausages. Accessed on 18/02/2013.

Lartey. 2012. The effect of prekese pod powder on the sensory characteristics and nutritional qualities of pork products. BSc. Dissertation, University for Development Studies. pp: 1-29.

Lawrie, R.A., and D.A. Ledward. 2006. Lawrie Meat Science, 7th Edition. Wood head Publication Press and CRC Press. UK.

Nwawu, J.I., and P.A. Akah. 1986. Anti-convulsant activity of the volatile oil from the fruit of *Tetrapleura tetraptera*. *Journal of Ethnopharmacology*. 18:103-107.

Okwu, D.E. 2003. The potentials of *Ocimum gratissimum, Penrgularia extensa* and *Tetrapleura tetraptera* as spice and flavouring agent. *Nigeria Agriculture Journal*. 35:143-148.

Platel, K., and K. Srinivisan, 2000. Influence of dietary spices and their active principles on pancreatic digestive enzymes in albino rats. *Nahrung*. 44:42- 46.

Platel, K., and K. Srinivisan, 2001. A study of the digestive stimulant action of selected spices in experimental rats. *Journal of Food Science Technology*. 38:358-361.

Steentoft, M. 1988. Flowering plants in West Africa. Cambridge University Press. ISBN 0-521-26192-9. pp: 1-364.

Teye, G.A. 2007. Manaul on small scale pork processing. Faculty of Agriculture. University for Development Studies, Tamale, Ghana. pp: 1-4.