



The Effect of 'Prekese' (*Tetrapleura tetraptera*) Pod Extract Processed at Different Time Intervals on the Sensory Qualities of Pork Sausage

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Abstract

This study was conducted to determine the effect of 'prekese' (Tetrapleura tetraptera) pod extract (PPE) processed at different time intervals on the sensory qualities of pork sausage. Four (4) kg of minced pork was used. The pork was divided into four batches of one (1) kg each and placed in a metal pan and labeled treatment 1 to 4. Each product contained the following: Treatment 1 (T1) contained 0ml of the PPE to serve as the control product, Treatment 2 (T2) contained 10ml of PPE soaked for 12 hours, Treatment 3 (T3) contained 10ml of PPE soaked for 24 hours and Treatment 4 (T4) contained 10ml of PPE soaked for 36 hours. The products were evaluated for sensory and nutritional qualities. The study indicated that, the use of 'prekese' pod extract at different processing time intervals had no adverse effect ($P > 0.05$) on the sensory characteristics of the smoked pork sausage at an inclusion level of 10ml/kg of meat. The study also revealed that, the use of 'prekese' pod extract had no significant effect ($P > 0.05$) on the nutritional qualities in terms of moisture and crude protein. However, there were significant effects ($P < 0.05$) on pH and crude fat content. pH of the test product T2, T3 and T4 were significantly higher ($P < 0.05$) than T1 (control).

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

INTRODUCTION

Meat is animal flesh that is eaten as food (Lawrie and Ledward, 2006). Meat consumption varies worldwide, depending on cultural or religious preferences, as well as economic conditions. Meat can also be processed into a variety of products. Processing of meat involves the addition of ingredients and/or mechanical action that convert meat into specific products such as bacon, fresh or raw sausages, liver sausage, scalded sausages and cook sausages (Teye, 2007). Sausages consist of ground meat, animal fat, herbs and spices with sometimes other ingredients usually packed in casing and preserved in a way by curing or smoking (Rajesh,

2007). Spices are pungent or aromatic seasonings obtained from the bark, buds, fruits, roots, seeds or stems of various plants and trees (Anonymous, 2014). In West Africa, the plant *Tetrapleura tetraptera* (locally known as 'Prekese') is used as a spice, a medicine and as a dietary supplement rich in vitamins (Herbert and Ross, 1977). Okwu (2003) reported on the chemical evaluation, nutritional and flavouring properties of 'Prekese' which contain varying amount of protein, crude lipids, carbohydrate, crude fat and energy.

A variety of local spices and/or ingredients have been used to prepare different meat

products such as sausages and hamburgers (Boateng, 2013; Teye *et al.*, 2014; Teye *et al.*, 2015). Recent work by Lartey (2012) involving the use of 'Prekese' pod powder as a spice in sausage and burger showed a promising result in the sensory characteristics and nutritional qualities of the products. There were increases in the protein and fat content of the product (sausage) but the colour of the product became darker as inclusion levels of the 'Prekese' pod powder increased in the sausages (Lartey, 2012). There is the need to find out whether pod extract of 'Prekese' processed at different time interval will have positive or negative effect on pork sausage. The objective of this work is to determine the effect of 'prekese' (*Tetrapleura tetraptera*) pod extract processed at different time intervals on the sensory qualities and nutritional qualities of pork sausage.

MATERIALS AND METHODS

Study area

This study was conducted at the Meat Processing Unit and Spanish Laboratory of the University for Development Studies (UDS), Nyankpala Campus.

Preparation of 'prekese' pod extracts (PPE) About 100g of 'Prekese' pod was soaked in 0.5litre of water to get the extract. The time of soaking/processing the pods varied as follows, 12 hours, 24 hours and 36 hours, respectively.

Sausage preparation

The meat (pork) was thawed overnight at a temperature of 1°C, cut into smaller sizes and minced using a 5mm sieve table top mincer (Talleras Rammon, Spain). The four (4) kg meat was divided into four batches of one (1) kg each and placed in a metal pan and labeled treatment 1 (T1), treatment 2 (T2), treatment 3 (T3) and treatment 4 (T4). The spices together with the prekese extract at defined interval were added and mixed manually until the meat was thoroughly mixed with the extract. T1 contained 0ml of the PPE to serve as the control product, T 2 contained 10ml of PPE soaked for 12 hours, T 3 contained 10ml of PPE soaked for 24 hours and T 4 contained 10ml of PPE soaked for 36 hours. The thoroughly minced meat and spices were stuffed into natural casing using hydraulic stuffer (Talleres Rammon, Spain) and manually linked

into smaller sizes of about 10cm. The sausage were hanged on labeled smoking rack and smoked for an hour after which they were allowed to cool under room temperature. The sausages were bagged in transparent polythene bags, and sealed using an electronic vacuum sealer (Busch, RAMON, Spain), labeled and stored in a chest freezer for sensory and chemical analysis.

Product preparation for sensory evaluation

The products were removed from the refrigerator, allowed to thaw and grilled in an electric oven (Turbofan, Blue seal, UK) at a temperature of 105°C for 45 minutes, sliced into uniform sizes of about 2cm² and were wrapped in coded aluminum foil. A total of 15 panelists were selected and trained according to the British Standard Institution (BSI, 1993) guidelines for panel selection and training, to form the sensory panel for evaluating the products. Each panelist was provided with water and piece of bread to serve as neutralizers between the products. A five-point category scale as described by Adu-Adjei *et al.* (2014) was used to evaluate the products.

Laboratory and data analysis of the products

The sausages were analyzed for moisture, crude protein, pH and fat (ether extract) content according to the method of International Association of Official Analytical Chemist (AOAC, 1999). Analyses were conducted in triplicates. All reagents were of analytical grade. The data obtained from the study were analysed by ANOVA using GenStat statistical package (GenStat Discovery Edition 4, 2011).

RESULTS AND DISCUSSION

Sensory characteristics of smoked pork sausages

The results obtained from the sensory evaluation of the pork sausages are presented in Table 1. The results showed no significant differences ($P > 0.05$) in taste, colour, 'prekese' flavour, aroma and overall liking of the product. This means that pork sausages prepared using 'Prekese' pod extract processed at different time interval will equally be accepted as the control (pork sausages without 'Prekese').

Table 1: Sensory characteristics of smoked pork sausages

Parameters	T1	T2	T3	T4	S.e.d	P- value
Taste	2.00	2.20	2.20	2.20	0.289	0.869
Colour	1.87	1.93	1.80	1.67	0.2309	0.693
‘Prekese’ Flavour	3.40	3.33	3.73	3.53	0.395	0.755
Aroma	2.20	2.33	2.33	2.67	0.332	0.543
Overall Liking	2.27	2.47	2.47	2.53	0.352	0.886

S.e.d= Standard Error of Difference.

The result agrees with the findings of Boateng (2013) and Adu-Adjei *et al.* (2014). Adu-Adjei *et al.* (2014) soak ground pod, chopped pod and full pod ‘Prekese’ in 10 ml of water for 12, 24 and 36 hours and found insignificant differences ($P > 0.05$) in colour, aroma, ‘Prekese’ flavor, and acceptability. Boateng (2013) used boiled ground, boiled cut and boiled whole ‘Prekese’ to prepare pork sausages and found no significant differences in the sensory attribute’s. The current result however, differed from that of Lartey (2012), who indicated that there were significant differences in colour and ‘Prekese’ flavor of pork sausage prepared using ‘Prekese’. Lartey (2012) used 2g and 4g of ‘Prekese’ pod powder to prepare the pork sausage. The sensory attributes of a product plays an important role in its acceptability and subsequent purchase. For instance taste is the sensory impression of food or other substances as perceived by the tongue and good tasty foods are liked by consumers. Van Oeckel *et al.* (1999) reported that colour is an essential indicator of the quality of fresh or cooked meat and the appearance of meat influences the acceptability by consumers.

Consumers usually like bright-red raw meats, brown-gray cooked meat and cured pork (Cornforth, 1994). Aroma gives an indication of the degree of attraction or repulsion of consumers to food substances and pleasant odour invites consumers, while a strong irritation discourages consumers (McWilliams, 1997). The aroma of food is enhanced through the addition of spices (Dziezak, 1989). However, in this study ‘Prekese’ which is a spice did not have any significant influence ($P > 0.05$) on the aroma of the pork sausages.

Proximate composition of smoked pork sausages

The proximate composition (crude fat and crude protein), moisture and pH of the smoked pork sausages prepared using ‘Prekese’ soaked at different time intervals is presented in Table 2. The result obtained showed no significant difference ($P > 0.05$) in terms of moisture and crude protein. However, there were significant differences ($P < 0.05$) in terms of pH and crude fat of the products.

Table 2: Proximate composition of smoked pork sausages

Parameters	T1	T2	T3	T4	S.e.d	P- value
Moisture	40.20	37.10	38.20	41.10	10.080	0.975
pH	5.97 ^b	6.02 ^a	6.05 ^a	6.04 ^a	0.0134	0.015
Crude fat	19.64 ^c	22.13 ^b	25.78 ^a	21.31 ^{bc}	1.025	0.016
Crude Protein	12.95	15.07	13.65	13.58	0.317	0.095

S.e.d= Standard Error of Difference, Mean in the same row with different superscript are significant.

Moisture refers to the amount of water contained in a product, which influence juiciness and storability of the products (Cross *et al.*, 1986; McEwen and Mandell, 2011). There was no

significant difference in the moisture of the product. ‘Prekese’ did not have any negative influence ($P > 0.05$) on the moisture content of the smoked pork sausages in this study. This

agrees with the findings of Lartey (2012), who also reported no significant difference in moisture content of pork sausages prepared using 'Prekese'. However, Adu-Adjei *et al.* (2014) recorded significant difference in moisture content of smoked pork sausages. They found smoked pork sausages prepared using ground pod of 'Prekese' soaked in 10 ml water for 24 hours to be significantly higher ($P < 0.05$) than the control (no 'Prekese') and other smoked pork sausages with 'Prekese' (chopped and whole soaked in water for 24 hours) in them. MAFRA (2011) reported that high pH in meat products causes 'shorter shelf life. Low pH on the other hand deters microbial activities and therefore storability is enhanced for a longer time. FAO (1985) also confirmed that the pH of meat products are important for their storage, the lower the pH, the lesser favorable condition for bacteria growth and the longer the product can be stored. pH of test products were significantly higher ($P < 0.05$) the control and thus the test products can spoil faster than the control. Boateng (2013) and Adu-Adjei *et al.* (2014) also found significant differences in the pH of smoked pork products prepared using 'Prekese'. Fat contributes to flavour, juiciness and texture. In addition, changes in fatty acid profile may be responsible for subjective firmness and sensory tenderness differences of pork loin chops (Leicket *et al.*, 2010; Teye *et al.*, 2007). Crude fat of the test products (T2 and T3) were significantly higher ($P < 0.05$) than the control (T1). Adu-Adjei *et al.* (2014) recorded higher crude fat contents of smoked pork sausage prepared using 'Prekese' than this study, although they also found significant differences in the crude fat content of their smoked pork sausages. Protein from meat and meat products are important to humans because they play a role in the growth and development of our bodies (Warriss, 2010; Adzitey, 2012).

Protein content of smoked pork sausages was insignificant ($P > 0.05$) in this study. The protein values obtained were similar to that of Boateng (2013) and Adu-Adjei *et al.* (2014). Similarly Boateng (2013) and Adu-Adjei *et al.* (2014) did not record significant differences ($P > 0.05$) in crude protein content of 'Prekese' pork sausages.

CONCLUSION AND RECOMMENDATION

The use of 'Prekese' pod extract processed by soaking at different time intervals had no adverse effect on the sensory characteristics of the smoked pork sausages at an inclusion level of 10ml/kg of meat. The study also revealed that, the use of 'prekese' pod extract had no effect on the nutritional qualities in terms of moisture and crude protein content. The pH and crude fat content of the pork sausages differed significantly ($P < 0.05$) from each other. It is recommended that further research should be conducted using different extraction methods with higher inclusion levels of the 'Prekese' pod extract and investigation should also be carried out to determine the shelf life of meat products prepared with 'Prekese' pod extract.

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