

Cowpea (*Vigna unguiculata*) as a Filler in Coarse Smoked Pork Sausage

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Resumé

Teye, G. A., Osei-Frempong, G. & Dei, H. K. *Le niébe (Vigna unguiculata) comme remplissage dans la saucisse de porc, grosse et fumée.* L'entier ou la farine du niébé décortiqué était utilisé comme remplissage dans la saucisse de porc grosse et fumée pour déterminer son approbation par les consommateurs. La variété "Bengpla" qui est blanche et erecte de la famille *vigna unguiculata* était utilisée. Tous les niébé étaient traités par la vapeur, séchés dans le soleil et puis pilés. On a aussi préparé la farine du niébé décortiqué après le décorticage des niébes traités par la vapeur. Le produit du contrôle comprend de 75% du porc mince, 25% du porc gros et puis des condiments. Dans les produits expérimentaux, le porc gros était remplacé par les farines de niébé à 5% et 7%. Les produits étaient empaillés dans un revêtement naturel (l'intestin du porc), fumés à peu près 4 heures, rafraîchis et conservés à 2°C. Chaque produit était grillé à 25°C pour 30 minutes et coupé pour l'évaluation du goût par 14 experts - l'essai triangulaire. Les résultats ont montré beaucoup de différences ($P < 0.01$) entre les produits contrôlés et la totalité des produits niébes. Les produits niébes décortiqués étaient modérément différents à 5% et 7% ($P < 0.01$). Les experts étaient convaincus que les 5% produit de la farine du niébé décortiqué était plus acceptable ($P < 0.05$) que le produit contrôlé mais n'ont réalisé aucune différence (< 0.05) en accord du produit contrôlé et les 7% produit de la farine du niébé décortiqué. Le coût par kilogramme du produit contrôlé (¢20,000.00) était légèrement élevé que celui des produits des farines de niébes. A partir de cette expérimentation nous recommandons 5% de farine de niébé décortiqué comme remplissage non-conventionnel dans la saucisse grosse et fumée.

Mots clés: La farine du niébe, la saucisse, le coût, l'approbation.

Abstract

Whole or dehulled cowpea flour was used as filler in coarse smoked pork sausage to determine its acceptability by consumers. The white, erect black-eye variety (Bengpla) of *Vigna unguiculata* was used. The whole beans were steam treated, sun-dried and ground. Also, dehulled cowpea flour was prepared after the steam treated beans were dehulled. The control product comprised 75% lean pork, 25% pork fat and seasonings. In the experimental products the pork fat was replaced with cowpea flours at 5% and 7%. The products were stuffed into a natural casing (pig intestine), smoked for 4 h, cooled and stored at 2°C. Each product was grilled at 25°C for 30 min and sliced for taste assessment by 14 panelists, the

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Triangle Test. The results showed much difference ($P < 0.01$) between the control products and the whole cowpea flour products. The dehulled cowpea products were moderately different at 5% and 7% ($P < 0.01$). Panelists found the 5% dehulled cowpea flour product to be more acceptable ($P < 0.05$) than the control product but did not find any differences ($P > 0.05$) in acceptability of the control product and the 7% dehulled cowpea flour products. The cost per kilogramme of the control product (¢20,000.00) was slightly higher than that of the cowpea flour products (¢19,000.00). Based on this experiment, 5% dehulled cowpea flour is recommended as non-conventional filler in coarse smoked sausage.

Keywords: Cowpea flour, sausage, cost, acceptability.

Introduction

In Ghana, animal production contributes only 25% of the national meat requirements (Annor-Frempong *et al.*, 1996). The daily availability of protein from meat in developing countries is smaller than that in developed countries (FAO, 1992). Of late, there has been growth in demand for processed meat products due to a rapid population growth and high rate of urbanization. The high costs of processed meat products, including sausages however, restrict their patronage to only middle or high-income earners. As such meat extenders (non-meat additives), usually protein extracts are being used to reduce the actual quantity of meat in a unit sausage. This reduces the cost of production and consequently the price of some of these products (FAO, 1991). Besides, extenders are used to improve yield and protein content (Annor-Frempong *et al.*, 1996; Anang, 1993) of these products as well as reduce fat levels that make consumption of sausage less risky for health conscious consumers (Keeton, 1993). Common extenders or fillers used so far in Ghana

include cassava flour, Anchovy and yam flour (Anang, 1993; Annor-Frempong *et al.*, 1996; Anang *et al.*, 1999). There is, also the possibility of using cowpea, a legume, as a meat extender because of its desirable characteristics such as high protein content, water binding ability, free from objectionable flavour and taste, appropriately coloured and readily available at competitive prices as noted for extenders (Schmidt, 1988). This study was, therefore, undertaken to determine the optimum inclusion levels of whole or dehulled cowpea flour in coarse smoked sausage.

Materials and methods

Whole cowpea flour (WCF) and dehulled cowpea flour (DCF) were used as extenders in coarse smoked sausage. The WCF was prepared after the beans had been steamed at 100°C to remove the beany flavour that may affect the aroma and flavour of the meat products. It was sun-dried and ground. In the case of the DCF, the treated beans were sun-dried and sifted to remove the testa before grinding (milling). Four test products were formulated in which pork

was partially replaced by the cowpea flours at 5% and 7% and labeled 5% WCF, 7% WCF, 5% DCF and 7% DCF. The control product consisted of 75% minced lean pork, 25% pork fat and seasonings. Addition of the cowpea flour thickened the sausage mass and necessitated the addition of some amount of water to relax it before stuffing. Each product was stuffed into a natural casing (small pig intestine), hand linked at about 10cm long, smoked for 4 h, cooled and stored at 2°C for taste assessment. Each product was grilled at 25°C for 30 min, sliced into small sizes (2cm thickness) and served to 14 taste panelists sampled from consumers familiar with sausages. The products were evaluated using the Triangle Test (Ihekoronye and Ngoddy, 1985). The data obtained was analysed statistically as described by Ihekoronye and Ngoddy (1985).

Results and Discussion

Assessment of cowpea flour products

Results of the panel assessment of the difference between coarse pork sausage (control) and the cowpea flour products are in Table 1 and their acceptability by consumers in Table 2. There was detectable difference between the control product and all the cowpea products. There was much difference ($P<0.01$) between the control product and the whole cowpea products (5% and 7%), but moderate difference was detected when dehulled cowpea was used at 5% ($P<0.001$) and 7% ($P<0.01$).

Detectable differences observed between the control and cowpea flour products include internal colour, texture and taste. The 5% DCF sausages had dark brown internal colour and nice flavour, were tenderer, juicier, and on the whole highly acceptable (Table 2). Annor-Frempong *et al.* (1996), who evaluated cassava flour as filler in pork sausage, stated that darker internal colour, good taste, tenderness and juiciness are good attributes of comminuted sausages. The change in colour of the cowpea flour products occurred when water was added to these products. This colour observation agrees with the work of Vassiler *et al.* (1983) who found out that sunflower flour product became dark brown. The addition of water might have promoted the oxidation of the haem pigments from the purple to the brown colour. The products with cowpea flour filler have shown better consistency and texture probably due to the good gel forming and pasting properties as compared with the control products. These properties were also better with soybean flour product as Annor-Frempong *et al.* (1996) indicated. From the data collected, about 70% of the panelists accepted the tender and juicy cowpea products. However, majority of the panelists preferred 5% DCF sausage to the rest (Table 2). Filler-based sausage products with these attributes are rated acceptable (Annor-Frempong *et al.*, 1996; Vassiler *et al.*, 1983).

Table 1. Detectable difference between control and cowpea flour products.

| <i>Products</i> | <i>Average difference</i> | <i>Degree of difference</i> | <i>Level of probability</i> |
|-----------------|---------------------------|-----------------------------|-----------------------------|
| 5% WCFS | 2.6 | Much | P<0.01 |
| 5% WCFS | 1.8 | Moderate | P<0.001 |
| 7% WCFS | 3.3 | Much | P<0.01 |
| 7% WCFS | 1.7 | Moderate | P<0.01 |

Table 2. Acceptability of control and cowpea products.

| <i>Products</i> | <i>Number of judges</i> | <i>Number who found cowpea flour products more acceptable</i> | <i>Level of probability</i> |
|-----------------|-------------------------|---|-----------------------------|
| 5% WCFS | 11 | 5 | NS |
| 5% WCFS | 14 | 12 | P<0.05 |
| 7% WCFS | 11 | 4 | NS |
| 7% WCFS | 13 | 9 | NS |

NS: Not significant.

The whole cowpea flour sausages including 7% DCF sausage seemed quite acceptable to the taste panel as there was no significant difference ($P > 0.05$) between them and the control products as shown in Table 2. However, the 5% dehulled cowpea flour product was found to be more ($p < 0.05$) acceptable compared with the control. The dehulling of the cowpea beans and its low inclusion level (5%) in the coarse pork sausage could account for the high acceptability as a result of favourable functional properties in the product (Schmidt, 1988).

Economic implications of using cowpea flour as filler

Cowpea has been an adequate substitute for meat in many parts of the world (McCracken *et al.*, 1988), so its acceptance as filler in pork sausages may have some economic benefits. The costs per kilogramme of the control product and the 5% DCF sausage were ₵20,000.00 and ₵19,000.00 respectively. Thus cowpea as filler has made a moderate reduction in the formulation cost of sausage. This could be ascribed to the lower price of cowpea (₵4,000.00 kg⁻¹) than that of meat (₵14,000.00 kg⁻¹). This finding corroborates that of Annor-Frempong *et*

al. (1996), who reported lower cost for filler-based products. This result suggests that a processor using cowpea as filler can save one million cedis (¢1,000,000.00) on every tonne of sausage produced. Therefore, on a large-scale production, cowpea based products will be relatively affordable, with consequent increase in protein intake. Acceptance of cowpea as filler could provide additional market channel for cowpea farmers thereby increase their outputs.

The results of this study indicate that inclusion of dehulled cowpea flour up to 7% in coarse pork sausage is quite acceptable to consumers, but the 5% dehulled cowpea sausage is more acceptable compared with the all pork sausage. Also, cowpea as filler reduced formulation cost of sausages with a saving of one million cedis per tonne. It is recommended that further studies be carried out to assess yield loss and shelf life of cowpea-based products.

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