SHORT COMMUNICATION

THE EFFECT OF GUINEA FOWL SKIN ON THE YIELD AND QUALITY OF COMMINUTED GUINEA FOWL SAUSAGES

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ABSTRACT

This study examined the effect of guinea fowl (Numida maleagris) skin on the yield and quality of comminuted sausages. Forty carcasses of average dressed weight of 0.7 kg were divided into two groups and deboned. Group1 was deboned with the skin-on while Group 2 was deboned without the skin. Equal quantities of boneless meat (5.8kg) were used for the sausages. Each group was minced, mixed with spices, comminuted and stuffed into natural casings, and later smoked for 45minutes, scalded, cooled and stored for sensory evaluation. The first sensory assessment was carried out two days after production, and thereafter, at 7, 14 and 21 days. The products were thawed and heated to a core temperature of 70°C, sliced into pieces of 2cm in length and served to trained taste panelists in coded aluminum foil for sensory evaluation. The parameters evaluated were texture, flavour, flavour likening, taste, juiciness and overall likening of the sausages. The results showed that the products made with the skin on the muscle, yielded 15% more than the products made with the skinless muscles. Processing with the skin on the muscle significantly improved the taste (P<0.05) and juiciness (P<0.001) at 14 days and 21 days respectively. Formulating guinea fowl sausages with the skin on the muscle has the potential for creating good quality products, reducing cost of production and giving higher profit margins.

Keywords: *Guinea fowl, sausage, skin-on, comminuted, yield, sensory evaluation*

INTRODUCTION

Processing of meat also adds value to meat product thereby increasing the profit margin and shelf life of meat (FAO, 1991). Meat processing in Ghana provides livestock farmers with a ready market thereby providing the necessary encouragement for improved and increased production (Teye, 1994). Sausages are defined as comminuted seasoned meats stuffed into casings; they may be smoked, cured, fermented and heated. Sausages are made from any edible part of the animal, and a series of non-meat ingredients (FAO, 1985). The degree of comminution differs among various processed products and is often a unique characteristic of a particular product ranging from very coarsely comminuted, to finely comminuted to form an emulsion (FAO, 1991).

Guinea fowl processing is generally on a small scale as majority of the processors handle between one and five birds whilst a few handle between 15 and 20 per day (Mogre, 2006; Teye and Abubakari, 2007). The high cost of the live birds and the seasonal variation in the supply of birds make it difficult for the processors to purchase birds in large quantities (Mogre, 2006).There are many methods of processing guinea fowls for consumption in Ghana; these include; grilling, cooking/ boiling, roasting/smoking and frying (Karikari, 2005, Teye and Abubakari, 2007). Approximately, about 68% of processed guinea fowl is fried, 26% grilled and 3% boiled (Teye and Abubakari, 2007). Using guinea fowl meat for sausage production is not as common as the other types of meat because the live bird is very expensive (Mogre, 2006; Teye and Abubakari, 2007). Also, the yield of the meat available after deboning the local guinea fowl is very small (Teye *et al.*, 2001) and this can be a disincentive for commercial sausage production. However, there is the need to diversify the products from guinea fowl meat in order to expand the market base for production. This study sought to determine the effect of guinea fowl skin addition on the yield and quality of comminuted sausages.

MATERIALS AND METHODS

A total of forty birds (40) were bled, immersed in hot water and the feathers plucked manually. The carcasses were washed to remove the surface blood, dust and any visible soiling. Each carcass was then split open to remove the viscera. The eviscerated carcasses were divided into two groups of twenty (20) birds with similar dressed weights (0.7kg). Group one was deboned with the skin-on while the group two was deboned without the skin.

Formulation of guinea fowl sausages

The two groups of boneless meat were separately minced through a 5-mm sieve into coarse forms, using a table top mincer (Talleras Rommon, Spain). Equal quantities of the minced meat (5.8kg) and spices (75g curing salt, 3g red pepper, 4g adobo, 2g black pepper, 2g white pepper, 12g vitamin C, and 2g of phosphate) and 3kg ice crystals were comminuted separately to obtain a fine mixture in a 3-knife bowl chopper (Talleras Rommon, Spain).The comminuted meat was immediately stuffed into natural casings using a hydraulic stuffing machine (Talleras Rommon, Spain) and manually linked into the same sizes. The sausages were hanged on smoking racks and smoked for 45minutes after which they were scalded to a core temperature of about 70°C. The sausages were cooled in cold water and hanged later again on the rack for the excess water to drain off. The cold sausages were then packed, labeled and stored for sensory evaluation.

Preparation of products for sensory evaluation

Sensory evaluation was carried out after 2, 7, 14 and 21days of freezer storage. The sausages were thawed and grilled to a core temperature of about 70°C using an oven (Turbofan, Blue Seal, UK). The products were then sliced into pieces of about 2cm each and wrapped with coded aluminum foil, and served to the panelists. Each panelist was served two coded products with a slice of bread to serve as a neutralizer between the two products.

Sensory evaluation

A total of fifteen students were selected and trained according to the British method of sensory evaluation (BSI, 1993) to evaluate the products. A five-point category scale was used for the evaluation of the products. The panelists were further asked to indicate the product that was more acceptable and to rank them in the order of preference as first (1), and second (2). The evaluation of the product was based on the following parameters:

Texture: very smooth (1), smooth (2), intermediate (3), coarse (4), very coarse (5)

Flavour: very strong (1), strong (2), moderate (3), weak (4), very weak (5)

Taste: very gummy (1), gummy (2), intermediate (3), crisp (4), very crispy (5)

Flavour liking: like very much (1), like (2), intermediate (3), dislike (4), dislike very much (5)

Juiciness: very juicy (1), juicy (2), intermediate (3), dry (4), very dry (5)

External colour: very light (1), light (2), intermediate (3), dark (4), very dark (5)

Internal colour: brown (1), pale brown (2), indeterminate (3), dark brown (4), white (5)

Overall liking: like very much (1), like (2), indeterminate (3), dislike (4), dislike very much (5)

Statistical Analysis

The general linear model of analysis of variance of Minitab, version 15.0 (MINITAB, PA USA) was used to analyze the sensory data.

RESULTS AND DISCUSSION

Although both products (with and without skin) were made with the same amount of minced meat (5.8kg), the addition of the skin yielded 15% more product. This indicates that when the skin is added to the muscle the producer could obtain higher yields, make extra revenue and make more profit. Okai *et al.* (2007) reported that when pigskin was incorporated in smoked pork sausages, it reduced the cost of production since less boneless pork was used. Similarly, when the guinea fowl skin is added to the muscle there could be a reduction in the price of the product thereby making it available and affordable to consumers and thus increase the possibility for commercial production of guinea fowl sausages. Generally the guinea fowl meat available after deboning is so scanty and for that reason its sausage could be very expensive. Thus addition of skin as a filler could reduce formulation cost. Schmidt (1998) indicated that the use of fillers (e.g. whole cowpea flour) in beef sausages was able to reduce formulation cost, maintain nutritional quality and make the product relatively cheap and in abundance. Also, Teye *et al.* (2006) and Dei *et al.* (2008) reported that the use of both dehulled and whole cowpea flour had the potential to reduce formulation cost and the price of sausages.

Table 1: Effect of guinea fowl skin the texture, flavour, taste and juiciness of guinea fowl sausages

Storage periods (days)	Types of sausages	Texture	Flavour	Taste	Juiciness
2	Skinless	2.13	2.27	2.40	nd
	With skin	2.07	2.13	2.00	nd
	Sed	0.14^{ns}	0.13^{ns}	0.15^{ns}	-
7	Skinless	2.80	2.47	2.67	3.07
	With skin	2.73	2.73	2.87	2.40
	Sed	0.12^{ns}	0.19^{ns}	0.19^{ns}	0.29^{ns}
14	Skinless	2.53	2.67	2.47	2.87
	With skin	2.53	2.80	3.19	2.33
	Sed	0.22^{ns}	0.18^{ns}	0.19^{*}	0.27^{ns}
21	Skinless	2.73	2.60	2.60	3.27
	With skin	2.40	2.60	2.93	1.67
	Sed	0.25^{ns}	0.18^{ns}	0.18^{ns}	0.26^{***}

*Sed-standard error of difference; nd-not determined; ns-not significant; (P>0.05), *P<0.05, ***P<0.001*

liking and overall liking of guinea fowl sausages.

Storage Periods (days)	Types of sausages	Flavour likening	External colour	Internal colour	Overall likening
2	Skinless	nd	2.13	2.00	nd
	With skin	nd	2.20	2.13	nd
	Sed	-	0.15^{ns}	0.15^{ns}	-
7	Skinless	2.00	2.27	2.00	2.67
	With skin	1.93	2.47	2.13	2.07
	Sed	0.16^{ns}	0.19^{ns}	0.12^{ns}	0.24^{ns}
14	Skinless	2.40	2.47	2.00	2.13
	With skin	2.27	2.67	2.13	2.13
	Sed	0.16^{ns}	0.24^{ns}	0.12^{ns}	0.24^{ns}
21	Skinless	2.27	2.20	2.00	2.33
	With skin	2.13	2.20	2.47	1.93
	Sed	$0,19^{ns}$	0.19^{ns}	0.19^{ns}	0.22^{ns}

nd-not determined

The results of the sensory evaluation of the products at various intervals of freezer storage are presented in Tables 1 and 2.There was a significant difference ($P<0.05$) in the taste of the products after 14 days of storage with the products containing the skin tasting better than those without the skin.

A highly significant difference ($P<0.001$) was obtained in juiciness between the products when stored for 21 days with the products containing the skin being more juicy. However, there were no significant differences ($P>0.05$) between the products for the texture, flavour, flavour likening, external and internal colours and the overall likening over the storage periods. This implied that the formulation of the products did not have any effect on them within the first week of production. However, the products made with only the muscle could not be stored for a long time because the taste was affected when stored for 14 days. Panelists generally described it as gummy. The products made with the skin on the muscle were more juicy when stored for 21 days. This means that when the products were stored for this period juiciness improved which could be due to the presence of the skin which helps to bind water thereby preventing

Table 3: Percentage acceptability of guinea fowl sausages

Periods of storage (days)	Without skin (%)	With skin (%)
2	26.7	73.0
7	33.3	66.7
14	40.0	60.0
21	40.0	60.0
Mean acceptability	35.0	65.0

it from drying. Also the skin may contain some fat which contributed to improving juiciness. This finding suggested that the addition of skin to the muscle had favourable effect on the eating quality of the guinea fowl sausage and the product could be stored for up to 21 days.

The results also indicated that the product made with the skin on the muscle was highly preferred by the panelists throughout the storage period (Table 3). However, there was slight decline in the acceptability of product with skin in storage; this may be due to rancidity since the skin might contain more fat than the lean meat alone. The acceptability of both products was not influenced by storage after the 14th day indicating that guinea fowl suasages either with or without skin can be stored up to 21 days.

CONCLUSION AND RECOMMENDATIONS

The addition of the skin had improved the yield and eating qualities of guinea fowl sausage. Also, the acceptance of the product made with the skin on the muscle could provide an additional marketing channel for guinea fowl processors to increase their income. Guinea fowl sausages should be manufactured with the skin on the muscle in order to expand the market base for guinea fowl production

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