



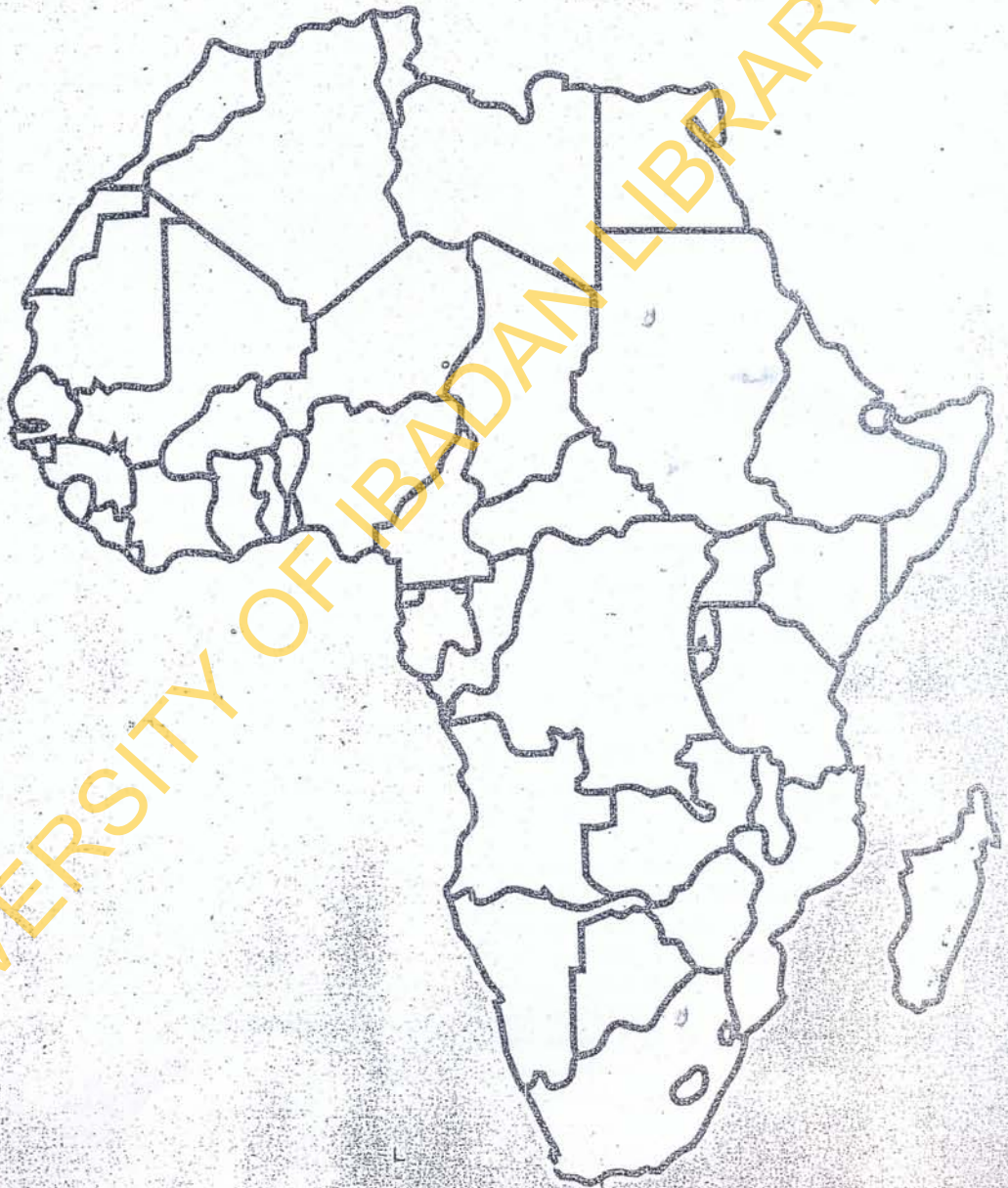
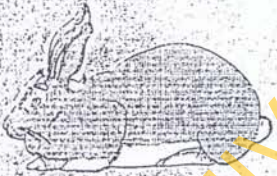
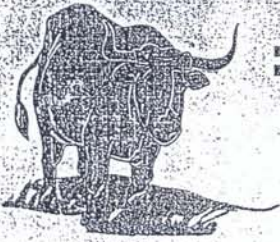
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## EVALUATION OF THE EFFECTS OF VARIATION IN INGREDIENT COMPOSITION ON THE EATING QUALITIES OF SUYA.

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## ABSTRACT

The semimembranous muscle from singed beef carcass was trimmed of all visible bones and connective tissue. The meat was sliced into thin sheet of 0.15 – 0.3cm thick and between 5.0 – 9.0 cm long.

The experiment comprised of five treatments. Treatment one ( $T_1$ ) In served as the control, with all ingredients present while ginger, red pepper, curry and white pepper were absent in  $T_2$ ,  $T_3$ ,  $T_4$  and  $T_5$  respectively. A total of 30 sticks of suya with an average weight of  $34.92 \pm 5.03$ gram of meat per stick were prepared for each treatment. The stick meat was properly coated with each respective ingredient mixture. The coated stick meat was roasted on a glowing, smokeless fire for 30 minutes with regular turning of the product.

The result of the study showed that the least product yield was recorded where the percent loss was highest ( $P < 0.05$ ) in treatment four ( $T_4$ ). The taste panel score revealed that apart from hotness (pungency) which was dependent ( $P < 0.05$ ) on the presence of red pepper (*Capsicum frutescens*) all other eating qualities such as flavour, tenderness, juiciness and overall acceptability were not affected ( $P > 0.05$ ) by the absence of any of the four spices under investigation.

**Key Words:** Suya, Spice, Semimembranous

## INTRODUCTION

Meat is nutritive and an excellent source of high quality protein, vit. B – complex and some minerals, especially, iron (Elizabeth, 1994). Because of the high nutritive value of meat, dressed carcass or fresh meat can only remain fresh for a short time before spoilage sets in and in order to avoid this, meats are processed into products. Processed meat products include those in which the properties of fresh meat are modified by the use of one or more procedure like grinding, chopping, addition of seasoning, heat treatment, drying and other processing or preservative processes (Ikeme 1990, FAO, 1995).

Meat processing enables the processor to convert low priced meat cut into high priced processed products (FAO, 1995). The process involved facilitates the tailoring of the product to meet consumer's need in specific market. Processing of meat to products renders meat product easier to package, handle, distribute and market.

Suya is one of such products that is easy to prepare and highly relished. There are three types of suya namely, *tsire*, *kilishi* and *balangu* of the three types, *tsire* which is boneless meat pieces that are staked on slender wooden sticks and cooked by roasting using a glowing fire, is certainly the most popular with consumers (Igene and Muhammed, 1983). Unfortunately, as popular as suya is, its production is still in its technological infancy because the production

methods that have been in use for the past generations are yet to be upgraded or modernized to cope with the increasing consumer demand (Igene and Ekanem, 1985).

Historically, suya production has been considered as an art rather than science hence there has not been any standardized ingredient formulation in the processing of suya. Suya producers combine various additives in any manner resulting in suya of various inconsistent organoleptic properties.

Ingredient formulation that will provide optimum eating quality and product consistency in suya production is therefore the objective of this study.

## MATERIALS AND METHODS

**Meat Preparation:** The meat used in this study was the semi-membranous muscle from singed beef carcass. The meat was trimmed of all visible bones and connective tissues. The meat was initially cut into chunks of 10cm long and 8cm wide. The chunks were further sliced into thin sheets of 0.15 – 0.30mm thick and between 5 – 9cm long using a long thin knife with a very sharp blade.

An individual suya stick, which was about 30cm long, was weighed and the thin sheets of meat were inserted into the suya stick. A total of 30 sticks of suya were prepared from each ingredient mixture. The average weight of meat per stick was  $34.92 \pm 5.03$ gram.



**Preparation of Ingredient:** The spices used were purchased individually from specialized spice market. These spices/additives includes, curry, ginger, white pepper, red pepper, common salt, magi seasoning, monosodium glutamate, groundnut powder and groundnut oil. All the spices were mixed together in a specific proportion (Table 1). Five different ingredient formulations were used.

#### Preparation of suya

Each ingredient combination was spread on a neat flat tray and each stick meat was properly coated with the ingredient combination. Sticks of suya made from each treatment were labeled for easy identification. A total of 30 sticks of meat were made for each treatment. The average weight of ingredient per stick meat was  $4.41 \pm 1.53$  gram.

After proper coating, the stick meats were re-weighed and spread back on the tray. About 5-10mls of groundnut oil was sprinkled on each stick meat prior to roasting.

**Roasting:** The labelled stick meats were arranged round a glowing, smokeless fire made from charcoal. The distance of the sticks from the fire point was  $21.96 \pm 2.31$  cm. The stick meats were allowed to stay on the fire for 30 minutes with regular turning of the product. Intermittently, additional groundnut oil was sprinkled on the meat while roasting continued.

The weight of each suya was determined after roasting and this was used in calculating the percentage loss and the product yield.

#### Taste panel evaluation

A total of twenty trained individuals were used to evaluate the suya prepared from the various ingredient mixtures. The panelists were made to evaluate each of the 4 replicates of the meat product. The panelists rated the samples on a nine-point hedonic scale with maximum score of 9 to extremely high condition while the lowest score of 1 was assigned to the poorest condition (Mahendraker *et al.*, 1988). The parameters evaluated for included, flavour, tenderness, juiciness, hotness and overall acceptability.

Equal bite size (2 x 2cm) from the five treatments were coded and served hot on a plate to each of the 20 panelists. Each sample was evaluated independent of the other.

#### STATISTICAL ANALYSIS

Data from parameters investigated were analyzed in a completely randomized design using the procedure of statistical analysis system SAS. (SAS 1988).

#### RESULTS AND DISCUSSION

No variation ( $p > 0.05$ ) was found in the weight of meat and stick used in the preparation of suya in this study. The weight of meat per stick varied from  $32.84 \pm 1.85$  to  $37.32 \pm 1.62$  gram while those of stick varied from  $3.31 \pm 0.34$  to  $4.34 \pm 0.23$  gram.

The weight of the ingredient mixture used in coating the prepared stick meat was highest ( $P < 0.05$ ) in the treatment without white pepper (treatment 5) with a value of  $5.87 \pm 0.82$  gram however, the amount of ingredients used in treatments 1, 2, 3 and 4 were not different ( $P > 0.05$ ) from each other. The optimum combination of meat and ingredients was found to be in ratio of 10.78:1 i.e. 90.72% beef and 9.28% composite ingredient. The optimum combination of meat and ingredient in this study was close to the 11.41:1 i.e. 91.94% beef and 8.06% ingredient reported by Igene and Ekanem, (1985).

The absence of any of the spices in the ingredient mixture did not affect the yield of the final product except in treatment 4 (absence of curry) where the yield was significantly lower ( $P < 0.05$ ) than others. Treatment 4 that gave the lowest product yield also had the highest numerical weight loss of 32.97%. Generally, it was reported that the weight loss will increase with time of processing (Igene and Ekanem 1985). The internal temperature to which meats are cooked rather than the cooking method is an important factor in determining cooking losses (Harrison, 1975). The percentage loss obtained in this study were similar ( $P > 0.05$ ) however, where the loss was highest, the reason above could be adduced.

Igene and Abudu (1984) reported product yield varying from 72.0 to 87.0% for commercially fire roasted product with a mean of 85.7% while the result obtained in this study ranged from  $63.35 \pm 1.12$  to  $74.95 \pm 3.75$ % which was lower than the average of 85.7% reported by Igene and Abudu (1984). The yield of suya is most probably influenced by the length of time of roasting (Igene and Ekanem, 1985), and also by the amount of ingredient used in suya preparation rather than the ingredient composition.

#### Taste panel evaluation

Overall acceptability and rating of the suya by the panelists are measures of overall eating quality of the product as affected by various ingredient compositions.

**Tenderness:** This is the degree of toughness of meat. It could be described as the ease with which the teeth sink into the meat when chewed. The most important contributing



sensory attribute to eating quality was tenderness with flavour and juiciness contributing significantly, although, to a lesser extent. (Safari *et al.*, 2001). Consumer surveys have also shown that tenderness is considered the most important component of meat quality (Ashton-Jones, 1986; Hopkins *et al.*, 1995). The result obtained in this study showed that there was no significant difference ( $P>0.05$ ) in tenderness of the suya prepared using different ingredient mixtures. Although, ginger was supposed to have tenderizing effect on the meat product because of the proteolytic enzyme, zingibain (Lee *et al.* 1986 and Ohtsuki *et al.*, 1978), the result obtained showed that the treatment without ginger compared well with the others in tenderness score.

**Flavour:** The sensory evaluation result indicated that the flavour of suya prepared, irrespective of the ingredient composition, were not significantly different ( $P>0.05$ ) from each other. This showed that any of the five ingredient compositions could be used to achieve a final product of acceptable flavour score. Spices are generally used for flavouring and imparting aroma to food (Donald, 1966). The acceptability and value of meat and meat products can therefore be improved by the use of spices while cheaper cuts of meat can be made more expensive if well processed and flavoured (FAO,1990).

**Juiciness:** Irrespective of any of the five ingredient compositions used in this study, the juiciness of the suya was not affected significantly. The panelists rated the product equal ( $P>0.05$ ) in terms of juiciness. This is an indication that any of the spices used could be omitted without any adverse effect on the juiciness of the product.

**Hotness:** Consumers of suya prefer the product with moderate hotness in terms of pungency and this was reflected in the panelist assessment of the product prepared using

varied ingredient composition. The panelists rated the suya without red pepper lowest, ( $P<0.05$ ) in terms of hotness while others that contained red pepper (*Capsicum frutescens*) were rated the same ( $P>0.05$ ). Red pepper and chilies are widely used throughout the tropics as a pungent spice for domestic purposes. This spice is prized for its pungency and the pungency of the spice increased as the plant matured Lee *et al.* (1986). The use of red pepper has to be standardized because over use of it might render the product extremely too hot to taste.

In this present study a maximum level of 11.11% inclusion of red pepper was used without adverse effect on the pungency of the product as evaluated by the taste panelists.

**Overall acceptability:** The mean panel ratings for overall acceptability are shown in table 3. Numerically, the panelists rated the product prepared from the ingredient composition in which white pepper was absent higher than those in which the ingredient was present. However, there was no noticeable difference ( $P>0.05$ ) between the ratings of the product irrespective of the ingredient composition most probably because suya is a delicacy cherished by many but afforded by few people. As a result, the sensory perception was overridden by the eagerness to consume the product.

## CONCLUSION

The result of this study showed that any of the five ingredient mixtures could be used in suya preparation without any effect on the product yield. The use of curry and red pepper in suya preparation is of great influence on the percent loss and pungency of the product respectively. However, any of the four test ingredients could be omitted without any deleterious effect on the eating quality of the final product. There is however, the need to educate the traditional suya processors on the importance of using standard mix powder to ensure product consistency



Table 1: Composition of the Ingredient Mixtures (%)

Names of spices and condiments	Treatments				
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>
Groundnut powder ( <i>Arachis hypogea</i> )	52.00	57.73	57.73	54.73	54.73
Ginger ( <i>Zinfiber officinale</i> )	10.00	-	11.11	10.53	10.53
Dried pepper ( <i>Capsicum annum</i> )	10.00	11.11	-	10.53	10.53
Curry	5.00	5.56	5.56	-	5.26
White pepper ( <i>Piper nigrum</i> )	5.00	5.56	5.56	5.26	-
Salt (sodium chloride)	8.50	9.44	9.44	9.95	8.95
Maggi seasoning (Monosodium glutamate)	7.50	8.33	8.33	7.90	7.90
Groundnut oil*	2.00	2.22	2.22	2.11	2.11

\*5-10mls of groundnut oil was added to each stick of meat during roasting.

T<sub>1</sub>: All spices present

T<sub>2</sub>: Ginger absent

T<sub>3</sub>: Red pepper absent

T<sub>4</sub>: Curry absent

T<sub>5</sub>: White pepper absent

Table 2: Effect of variations in the ingredient composition on physical changes in the final product (suya).

	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>
Weight of stick (g)	3.7160.49	3.3160.34	4.3060.18	4.3460.23	3.9660.31
Weight of meat (g)	35.2061.49	32.8461.85	36.1062.99	37.3261.62	34.7862.53
Weight of ingredient (g)	4.5260.36 <sup>ab</sup>	4.7060.36 <sup>ab</sup>	3.3560.36 <sup>b</sup>	3.6060.65 <sup>d</sup>	5.8760.82 <sup>a</sup>
Meat: ingredient ratio	7.79:1	6.99:1	10.78:1	10.37:1	5.93:1
Weight before roasting (g)	43.4361.71	40.8562.18	43.7562.83	45.2661.49	44.6163.06
Weight after roasting (g)	33.4861.25	30.3761.80	32.3261.91	30.3461.20	33.8663.06
Percentage loss	22.9165.90	25.6661.88	26.1360.63	37.9760.34	24.1060.20
Product yield (%)	74.9563.75 <sup>a</sup>	72.0862.16 <sup>a</sup>	71.0861.65 <sup>a</sup>	63.3561.12 <sup>b</sup>	73.5662.12

<sup>ab</sup> Means in the same row with similar superscripts are not significantly different.

Table 3: \*Mean taste panel evaluating of suya as affected by variations in the ingredient composition

	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>
Flavour	3.6360.53	3.8860.69	4.0060.60	3.3860.68	4.6360.84
Tenderness	4.8860.55	4.3860.65	5.2560.70	4.3860.82	5.8860.74
Juiciness	5.6360.60	5.2560.75	5.5060.63	3.3860.75	5.5060.94
Hotness	6.7560.45 <sup>a</sup>	6.3860.60 <sup>ab</sup>	4.8860.48 <sup>b</sup>	6.2560.49 <sup>ab</sup>	6.6360.65 <sup>a</sup>
Overall acceptability	3.060.46	6.5060.50	6.1360.55	5.5060.53	6.7560.59

<sup>ab</sup> Means in the same row with similar superscripts are not significantly ( $p > 0.05$ ).

\*Rated on a nine-point hedonic scale. Higher values indicate higher preference.

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