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Evaluation of the Effects of Various Additives on the Acceptability of Kilishi

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Target Audience: Meat Scientists, Nutritionists, Health workers, Meat Processors.

Abstract

The semitendinosus muscle of hot de-boned beef was trimmed of all visible fats, bones and connective tissue. The cleaned muscle was weighed and sliced into thin sheet of 0.17-0.20cm thick and between 60-80cm long. The sliced meat was infused with locally available spice, condiments and other materials such as salt, sugar, maggi seasoning, peanut paste and water. The local spices and condiments used include; onion, alligator pepper, cloves, chillies, ginger, 'gyadar miya' (Hausa name), black pepper and spice mixture containing locust bean, groundnut powder and other seasoning.

The experiment comprised of six(6) treatments. Treatment one (T1), served as the control with all ingredients present while ginger, alligator pepper, cloves, gyadamia and black pepper were absent in T₂, T₃, T₄, T₅, and T₆, respectively. The result of the taste panelist showed that in terms of flavour, the Kilishi where alligator pepper was absent was most preferred. The result also showed that one or two of the spices could replace each other without any marked difference in flavour, juiciness, pungency, tenderness and overall acceptability.

Key words: Kilishi, Spice mixture, Condiments.

Description of Problem

There is a high demand for animal products due to the ever - increasing population size. The production, as well as preservation of meat in the warm climate regions are associated with some specific problems, which differ greatly from those encountered in the temperate zones.

The processing of meat originated from the desire to preserve meat for consumption at a later date. Different methods exist for preserving meat, however, the selection of an economic and effective method requires a careful weighing of the many technical factors involved as well as local needs and conditions.

In Nigeria, recent development involved a greater use of refrigerator in extending the shelf life of meat. This however, requires high capacity outlay. The erratic power supply also compounds the problem.

The use of seasoning such as salt, spices, herbs, fermented sauces and others can be employed to enhance the acceptability of traditionally processed meat product like Kilishi. Kilishi is a sun dried traditional meat product made principally from beef. It is an intermediate moisture or semidry meat product. The product appears to have developed as a means of preserving meat in the absence of refrigeration facilities by the early Fulani and Hausa herdsmen of Northern Nigeria and the Sahelian Africa. As a ready - to - eat convenience meat product, Kilishi possess an excellent shelf life. According to (2) Kilishi has a shelf life of 12 months at room temperature. This makes the handling and marketing of the product very convenient for consumers and retailers.

This study was therefore designed to evaluate the effect of various spice mixtures

commonly used in processing of Kilishi on the consumer acceptance of the product in order to have a scientific approach to develop and modify the product.

Materials and Methods

The meat used was the semitendinosus muscle obtained from hot de-boned beef.

The infusion ingredients used comprised of the locally available spices, condiments and other ingredients such as salt, sugar, maggi, seasoning, peanut paste and water. The local spices and condiments used include onions, alligator pepper, cloves, chillies, ginger, 'gyadar miya' (Hausa name), black pepper and spice mixture containing; locust bean, groundnut powder and other seasoning.

Experimental Design: The design was a completely randomized design.

Meat preparation: The semitendinosus

muscle of beef was trimmed of all visible fat, bone and connective tissues and then weighed. The weighed meat was sliced into thin sheets of 0.17-0.20 cm thick and between 60-80cm long using the local butcher's knife with a very sharp thin blade. The thin sheets of meat were dried in the sun for about seven hours.

Preparation of infusing ingredients: Each of the spices were ground into powder with an electric grinder. The onions were sliced into small thin cubes. The fresh peanut paste was prepared from grains of dry uncooked groundnut after extraction of oil by pressing.

The various ingredients were mixed together with water according to the method of (1) with some modifications (Table 1).

Preparation of Kilishi: The dried thin sheets of meat were soaked into the infusion slurry for about 30 minutes, after, which it was taken out

Table 1: Presence of and proportions of various spices and condiments in the infusion mixture (%).

Spices or condiments	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Ginger						
<i>Zingiber officinale</i>	3.36	-	3.36	3.36	3.36	3.36
Alligator pepper						
<i>Aframangun meleguata</i>	1.23	1.23	-	1.23	1.23	1.23
Cloves						
<i>Eugenia caryophyllata</i>	0.81	0.81	0.81	-	0.81	0.81
Gyada miya	0.81	0.81	0.81	0.81	-	0.81
Black pepper						
<i>Piper guineense</i>	1.67	1.67	1.67	1.67	1.67	-
Dried pepper						
<i>Capsicum annum</i>	2.00	2.00	2.00	2.00	2.00	2.00
Onion						
<i>Allium cepa</i>	12.00	12.00	12.00	12.00	12.00	12.00
Chillies						
<i>Capsicum frutescens</i>	0.85	0.85	0.85	0.85	0.85	0.85
Spice mixture	3.29	3.29	3.29	3.29	3.29	3.29
Peanut paste	31.00	31.00	31.00	31.00	31.00	31.00
Maggi seasoning	0.29	0.29	0.29	0.29	0.29	0.29
Salt (Sodium chloride)	4.29	4.29	4.29	4.29	4.29	4.29
Cane sugar	3.15	3.15	3.15	3.15	3.15	3.15
Water	35.25	35.25	35.25	35.25	35.25	35.25

Key T₁: All spices present

T₂: Ginger absent

T₃: Alligator pepper absent

T₄: Cloves absent

T₅: Gyada miya absent

T₆: Black pepper absent

and spread in the sun to dry. After drying; the infused meat was roasted in an oven at a temperature of 100°C for 10-15 minutes. The finished products were cooled at room temperature, packed and heat sealed in cellophane bags and allowed to age for two weeks before the sensory evaluations was carried out.

Taste panel evaluation: A total of 40-screened individuals were used. These panelists were randomly allocated to the six treatments of the Kilishi. The panelists were made to rate each of the 4 replicates of the meat product. Equal bite size sample from the six treatments were coded and served on a plate to each of the 40 panelists. Each sample was evaluated independent of the other.

The panelist rated the samples on a 9-point hedonic scale for flavour, tenderness, juiciness, pungency and overall acceptability.

Statistical Analysis:

An analysis of variance (ANOVA) of the data was carried out using the ANOVA procedure from (7). The least significant difference test was applied to compare the means.

Results and Discussion

Flavour: The result showed a significant ($P < 0.05$) difference in the flavour of the different Kilishi prepared with various spice mixture. The result indicated that the absence of alligator pepper, black pepper, cloves and gyadar miya in the spice mixture gave products with comparable flavour characteristics. The flavour score was however better than those obtained when ginger was absent and when no spice was absent from the spice mixture. This result showed that the presence of ginger in the spice mixture contributed greatly to the flavour of the finished

product especially at the level of incorporation.

The flavour of Kilishi when cloves, gyadar miya and black pepper were absent respectively from the spice mixture was similar ($P > 0.05$) and was comparable to the control. This indicated that any of these spices could be omitted from the spice mixture without much difference in flavour compared to the control. In doing this, the cost of production of the Kilishi could be reduced.

The sensory evaluation result indicated that the flavour of the Kilishi with spice mixture in which alligator pepper was absent was best preferred by the taste panelists. This revealed that the presence of alligator pepper in the spice mixture was not desired as adjudged by the taste panel. The alligator pepper could be omitted from the spice mixture to give a product, which is significantly better than the control in terms of flavour rating.

Furthermore, the absence of black pepper and gyadar miya from the spice mixture gave Kilishi with similar flavour ($P > 0.05$). This indicated that any of these two spices could be substituted for each other in the spices mixture depending on, which is readily available and cheaper.

Pungency: As shown in table 2, there was no significant ($P > 0.05$) difference in the pungency of kilishi when the mixture of all spices were used and when their compositions were varied. This showed that the result of the pungency was not due to the inclusion of any of the various spices that were tested. It might probably be due to the effect of other spices such as dried red pepper and chillies (6). Chillies are widely used throughout the tropics as a pungent spice for domestic

Table 2: Sensory Evaluation of the Different 'Kilishi' Products.

Sensory traits	Sensory scores*					
	1	2	3	4	5	6
Flavour	5.30 ± 0.3 ^{bc}	5.03 ± 0.6 ^c	6.38 ± 0.5 ^a	6.18 ± 0.6 ^{ab}	5.40 ± 0.9 ^{abc}	6.05 ± 0.9 ^{ac}
Pungency	4.53 ± 0.6	4.20 ± 0.5	4.63 ± 0.3	5.08 ± 0.4	3.95 ± 0.5	4.65 ± 0.5
Juiciness	4.75 ± 0.6 ^{ab}	4.43 ± 0.4 ^b	5.25 ± 0.7 ^a	4.68 ± 0.6 ^{ab}	4.53 ± 0.7 ^b	5.25 ± 0.8 ^a
Tenderness	4.48 ± 0.5 ^b	3.80 ± 0.4 ^c	5.53 ± 0.6 ^a	4.75 ± 0.4 ^b	4.35 ± 0.2 ^{bc}	4.95 ± 0.7 ^{ab}
Overall acceptability	5.17 ± 0.4	4.55 ± 0.3	5.85 ± 0.8	5.33 ± 0.7	5.13 ± 0.8	5.40 ± 0.9

Means in the same row with different superscripts are significantly different ($P < 0.05$)

Rated on a nine- point hedonic scale.

Higher value indicates higher preference.

purposes. This spice is prized for its pungency and the pungency of the spice increase as the plant matured (3).

Juiciness: Juiciness is made up of two effects viz; the impression of moisture released during chewing and also the salivation produced by flavour factor.

The absence of alligator pepper, black pepper and cloves gave final kilishi product with similar juiciness to the control ($P>0.05$). Also, the absence of ginger and gyadar miya in the spice mixture gave kilishi with similar juiciness ($P>0.05$).

The result showed that the effects of both alligator and black pepper on juiciness of Kilishi were similar and therefore both spices could be substituted on for another. The same applied to Ginger and Gyadar miya. Furthermore, the absence of cloves from the spice mixture gave Kilishi, that had a comparable ($P>0.05$) result with the control. This indicated that cloves could be successfully omitted from the spice moisture without noticeable effect on the juiciness of the final product.

Tenderness: Tenderness is the degree of toughness of meat. It could be described as the ease with which the teeth sinks into the meat when chewed. The variation in tenderness of meat depends on factors such as the age of the animal, sex, post mortem changes in the carcass, the part of the meat used and the processing methods to which the meat is subjected. Although tenderness varies within muscles, it is almost uniform in biceps femoris and semitendinosus (5). The variation in tenderness of the Kilishi was therefore dependent to a large extent on the variations in the ingredients used since processing method was the same throughout the experiment.

It was observed that there was no significant ($P>0.05$) difference in the tenderness of the final kilishi product when alligator pepper and black pepper were absent in the spice.

Also, the absence of black pepper, cloves and Gyadar miya from the spice mixture gave similar results which were comparable to that obtained

when no spice was absent (control). The result showed that any of the three spices could be omitted from the spice mixture without much effect on the tenderness of the final product. Alligator pepper tends to have the least tenderizing effect while Ginger and Gyadar miya had the highest tenderizing effect on the meat product. This might be due to the fact that these spices are of vegetable origin with plant proteolysis enzyme-zingibain (3 and 4). The activity of the enzyme on collagen and actinomyosin myosin results in significantly ($P<0.05$) more tender meat. Levels of ginger extract that was added to the meat appear to be sufficient to enhance the tenderization of the meat (3 and 8).

Overall Acceptability: The mean panel ratings for overall acceptability are shown in table 2. The result revealed no significant ($P>0.05$) difference in the overall acceptability of the Kilishi when the spice composition was varied. The result obtained was similar in numerical value to those of flavour, juiciness and tenderness attribute of the kilishi. The inability of the taste panelist to detect any noticeable ($P>0.05$) difference might probably be due to the fact that Kilishi is a delicacy cherished by many but afforded by few people, as a result, people are eager to consume the product. Therefore, regardless of the difference in flavour, tenderness and juiciness, it was acceptable to consumers. The product is now a commodity exported from Nigeria to Saudi Arabia, particularly during the annual pilgrimage to Mecca and Medina(1).

Conclusion

Kilishi is a product highly acceptable to consumers. Kilishi without alligator pepper was most preferred by consumers while ginger contributed greatly to the flavour of the final product. From the result of this work, it was noted that the cost of production could be reduced as one or two of the spices under investigation could replace each other without marked difference in the organoleptic and overall acceptability of the final product.

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