ASSESSMENT OF CONSUMER ACCEPTANCE OF *KILISHI* OF AFRICAN CARP (*Labeo coubie*, Rueppell) AND ELEPHANT SNOUT (*Hyperopisus bebe occidentalis*, Guenther)

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ABSTRACT

This study was carried out to assess consumers' acceptance of kilishi prepared from Labeo coubie and Hyperopisus bebe occidentalis in Sokoto. The organoleptic properties (texture, odour, taste and flavour) of kilishi in its fresh form and under storage for 16 weeks were determined. The mean scores for the organoleptic assessment (6.90 and 7.19 for kilishi of Labeo and Hyperopisus, respectively) showed that fish kilishi was highly acceptable. Hyperopisus kilishi recorded slightly higher mean scores for the tested organoleptic properties. The declining pattern of the sensory assessment scores with length of storage indicated that the optimum storage period under the room temperature for kilishi made from the experimental fish species in the study area was 6-8 weeks. Further research on appropriate storage methods is desirable. However, preparation of fish kilishi could be explored as alternative preservation technique to reduce fish spoilage especially during the glut in supply and to diversify fish products.

INTRODUCTION

The inadequate fish supply in Nigeria is worsened by the massive spoilage of what is produced due to poor post-harvest technology comprising handling, processing and preservation. The waste due to fish post-harvest losses accounts for substantial proportion the total supply and this widens the gap that exists between the quantity that is produced and that available to consumers. Post harvest losses could be minimized by the application of proper preservation and processing methods. It is in view of this, that, this study investigated the feasibility of adapting a traditional meat processing technology in Northern parts of Nigeria to fish processing.

Kilishi is a Hausa word, which refers to beef, sheep or goat meat that is processed by slicing, dressing, sun-drying application of slurry of spices and roasting in a glowing fire. *Kilishi* production is traditionally practised in the northern parts of Nigeria, but its origin is lost in antiquity (Igene *et al.*, 1989). It appears to have developed among the early Fulani and Hausa herdsmen as a means of preserving meat in the absence of modern facilities, in order to enhance long storage. Ketiku (1975) reported that, addition of spices to *kilishi* ingredients is also of health importance as this could be a check to stomach disorders, rheumatics and act as relaxers of the alimentary system.

Magawata and Oyelese (1998) carried out a preliminary assessment of smoked and *kilishi* processed samples of mud catfish and silver catfish. Fish *kilishi* was tested not only as a good protein source, but also as a much acceptable means of preservation. The question of what does it take to get fresh fish into this fine, ready to eat stage and how acceptable is fish *kilishi* advised this study. The overall objective of the study therefore was to determine the consumer acceptability of *kilishi* of *Labeo coubie* and *Hyperopisus bebe occidentalis*. Specifically, the study determined the organoleptic properties and shelf life of fish *kilishi* made from the two fish species.

MATERIALS AND METHODS

Ingredients for *Kilishi* Preparation

Six meat *kilishi* processors in Sokoto were interviewed on the types and levels of ingredients used for *kilishi* preparation. The quantity of each ingredient used by each processor was weighed, and the average obtained. Thus, the levels of the ingredients employed in this study were averages of those used by the meat *kilishi* processors (Table 1). The defatted groundnut cake was bought from Hausa women who process it mainly for extraction of groundnut oil at Rijiya Dorowa in Sokoto. Small dried red pepper, ginger, onion and curry powder were bought at Sokoto Central Market for the study. The pepper was cleaned and ground into fine powder and added to the other ingredients. Ginger was also cleaned and ground finely before added to other ingredients. The onion bulbs were washed in water, sliced into appreciable pieces and chopped for easy mixing with other ingredients. Curry powder was added to other ingredients in order to add a spicy medium to the fish. The proximate composition of each ingredient was determined (AOAC, 1990).

Table 1: Types and levels of ingredients used for the fish *kilishi* production

Ingredient	Hausa Name	Weight (g)	Proportion %)
Curry powder	Curry	30	1.0
Defatted groundnut cake	*Labu*	1980	66.0
Dried (hot) pepper	*Barkonu*	90	3.0
Eugenia caryophyllata	*Kanunfiri*	60	2.0
Fagarasanthox loids	*Fasakwauri*	60	2.0
Ginger	*Chitta*	180	6.0
Knor cube	*Knor*	60	2.0
Onion	*Albasa*	420	14.0
Piper guinensis	*Masoro*	90	3.0
Salt	*Gisiri*	30	1.0

Dressing of Fish Samples

The two fish species - African carp (*Labeo coubie*, Family Cyprinadae) and Mormyrid (*Hyperopisus bebe occidentalis*, Family Mormyridae) - used for this study were bought from Sokoto Central Market. The samples were taken to the Chemical Laboratory of Faculty of Agriculture, Usmanu Danfodiyo University, Sokoto, where they were instantly washed with cleaned water in a big bowl. A total of 26 fish samples, 13 of each species were used. The scales, tails, heads, intestines and bones were removed with a sharp sterilized knife. The samples were subjected to block filleting while still in the fresh state.

Preparation of Fish *Kilishi*

The preparation of the fish *kilishi* was carried out to follow closely the method of the preparation of meat *kilishi* (Hassan and Sani, 2000). This involved two stages. The first stage involved sun drying of freshly-dressed fish on millet stalk mat (*zana*) for about four hours. The second stage involved the infusion of the (slurry) ingredients. The ingredients were ground and mixed together thoroughly with water. The filleted samples (which were sun-dried for four hours) were infused into the slurry one after the other. The infused fish samples were mounted again on the straw mats for sun drying for about 4 - 5 hours to ensure proper blending and handling. The dried infused fillets were then roasted on fire for about 30-40 min to ensure the blend of ingredients and obtain the finished product. The finished products were wrapped in paper envelopes and stored at room temperature.

Organoleptic Assessment of the Fish *Kilishi*

Organoleptic assessment of the fresh *kilishi* was carried out, and subsequently at two weekly intervals over a period of 16 weeks. The two types of fish *kilishi* were sampled for organoleptic assessment by groups of non-trained tasters, using a designed questionnaire. The parameters scored were texture, odour, flavour and taste. The ratings of the assessors were ranked using an 8-point scale according to Bossey and Talabi (1981), where extremely acceptable = 8, highly acceptable = 7, acceptable = 6, slightly acceptable = 5, neither acceptable nor unacceptable = 4, slightly unacceptable = 3, highly unacceptable = 2, and extremely unacceptable = 1.

Statistical Analysis of Data

Descriptive statistics and F-test (ANOVA) of the Statistical Package for the Social Sciences (SPSS, 1999) were used in analyzing the data collected. Graphs were also drawn for illustration.

RESULTS AND DISCUSSION

Proximate Composition of Ingredients

Table 2 shows that the moisture content of the analysed ingredients ranged between 0 % (trace) in salt and 92.67 % in onion. The ash content varied from less than 0 % (trace) in onion to 98 47 % in salt. The mean ash content of the ingredients was 25 %.

Table 2: Proximate composition of ingredients / spices

Ingredient	Composition (%)				
	Moisture	Ash	Protein	Ether extract	Fibre
Curry powder	19.80	15.20	1.08	5.00	Trace
Defatted groundnut cake	25.60	5.20	28.90	20.20	5.33
Fasakwari	15.40	48.33	0.16	5.13	20.20
Ginger	19.93	5 03	0.55	5.17	24.67
Kanunfuri	20.00	5.53	1.13	Trace	5.07
Maggi	4.97	60.33	0.27	Trace	Trace
Masoro	10.00	5.13	1.39	Trace	5.07
Onion	92.67	Trace	0.83	Trace	Trace
Red pepper	15.47	5.33	0.73	Trace	Trace
Salt	Trace	98.47	0.02	Trace	Trace

The protein content ranged from 0.02 % in salt to 28.9 % for defatted groundnut cake. The ether content was in trace quantity for *masoro*, *maggi*, onion, salt. *kanunfari* and dry pepper. *Fasakwari*, ginger and curry powder contained about 5 % each, while defatted groundnut cake contained 20.2 %. The fibre content was in trace quantities in maggi, onion, curry powder, salt and dry pepper. Defatted groundnut cake. *masoro* and *kanunfari* contained about 5 % fibre. The highest fibre content was obtained in ginger (24.67 %) followed by *fasakwari* with 20.2 %.

Organoleptic Properties of Fresh and Stored Fish *kilishi*

With a mean score of 6.81 ± 0.83, the *kilishi* made from *L. coubie* recorded a significantly higher score ($P < 0.001$) for texture in the fresh form than at any stage during storage (Figure 1). Subsequently. the product maintained an almost uniform rating till the end of the 16-week storage. The taste panel's rating of the texture of *Hyperopisus kilishi* followed a slightly different

pattern. Though the fresh product also had the highest score

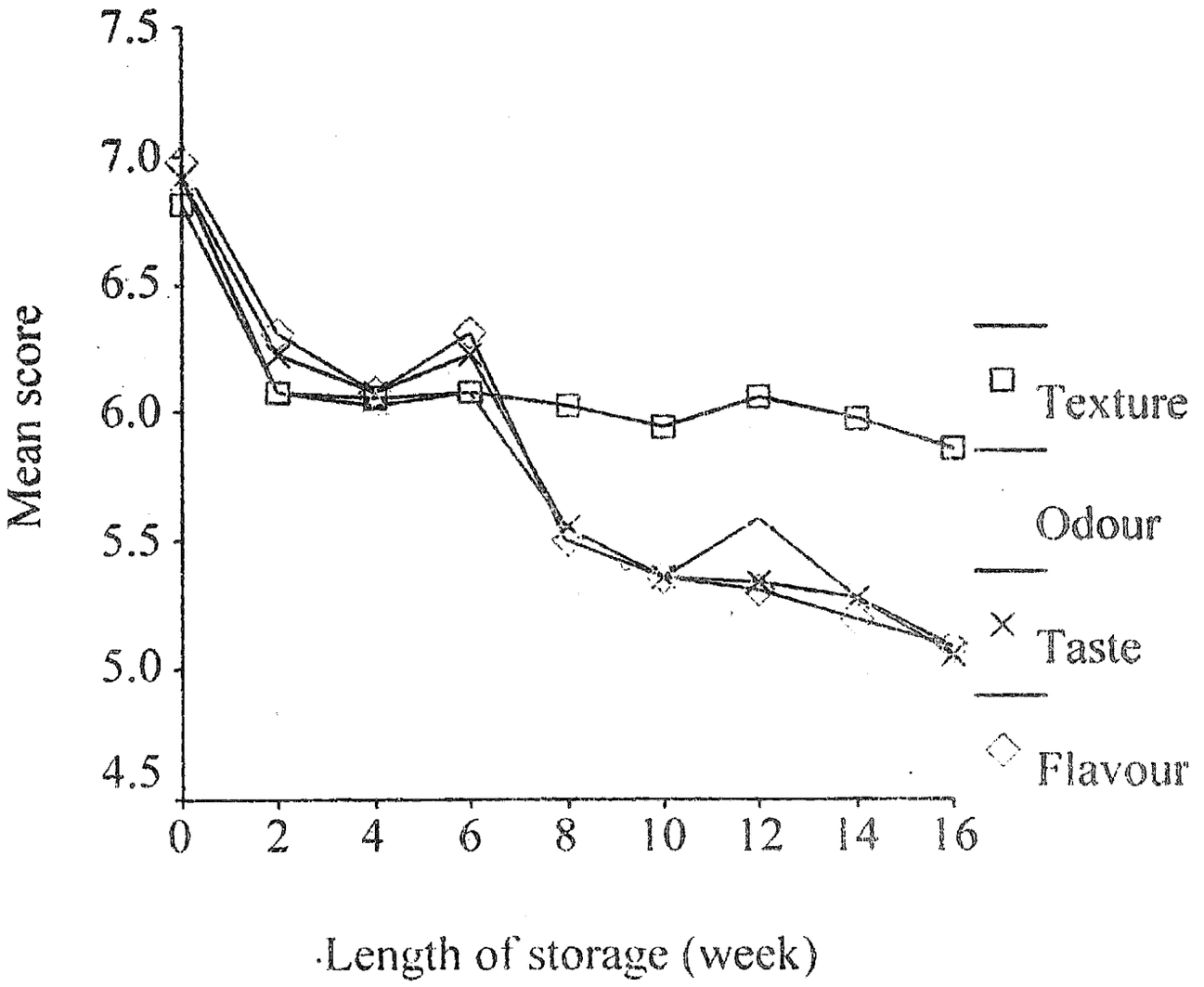

Figure 1: Changes in organoleptic properties of fresh and stored *Labeo kilishi*

(7.36 ± 0.4), a distinct decline was noticeable during storage up till the 10th week. Thereafter, the mean scores remained essentially the same (Figure 2).

In its fresh form, *Labeo kilishi* recorded a significantly higher ($P < 0.001$) mean score of 6.92 ± 0.65 for odour. *Hyperopisus kilishi* showed a similar trend, recording a mean score of 7.08 ± 0.47. The highest mean score of 6.92 ± 0.78 was recorded for taste by the fresh *Labeo kilishi*. The corresponding value for *Hyperopisus kilishi* stood at 7.02 ± 0.50. Apart from the fact that *Labeo kilishi* was scored the highest mean value of 6.97 ± 0.59 ($P < 0.001$) for flavour, the observed decline in the scores of the panelists for this organoleptic property followed exactly the same pattern as for the scores for taste. This suggests a close relationship between flavour and taste in quality determination of the product. In line with the established trend, the fresh *Hyperopisus kilishi* was rated highest for flavour with a mean score of 7.28 ± 0.53.

The sensory evaluation carried out using the taste panelists showed the *kilishi* made from the two fish species to be organoleptically acceptable. In terms of texture, odour, taste and flavour, the average scores of samples in the fresh form were 6.81, 6.92, 6.92 and 6.97 respectively for *Labeo kilishi*, an average of 6.90, which signifies an acceptable to highly

acceptable product based on the evaluation key. For the *Hyperopisus kilishi*, the corresponding mean scores were 7.36, 7.08, 7.03 and 7.28 (mean = 7.19). These values indicated that the product was rated as highly acceptable. Magawata and Oyelese (2000) got very close ratings for *kilishi* made from *Bagrus* and *Clarias* (6.78 and 7.03).

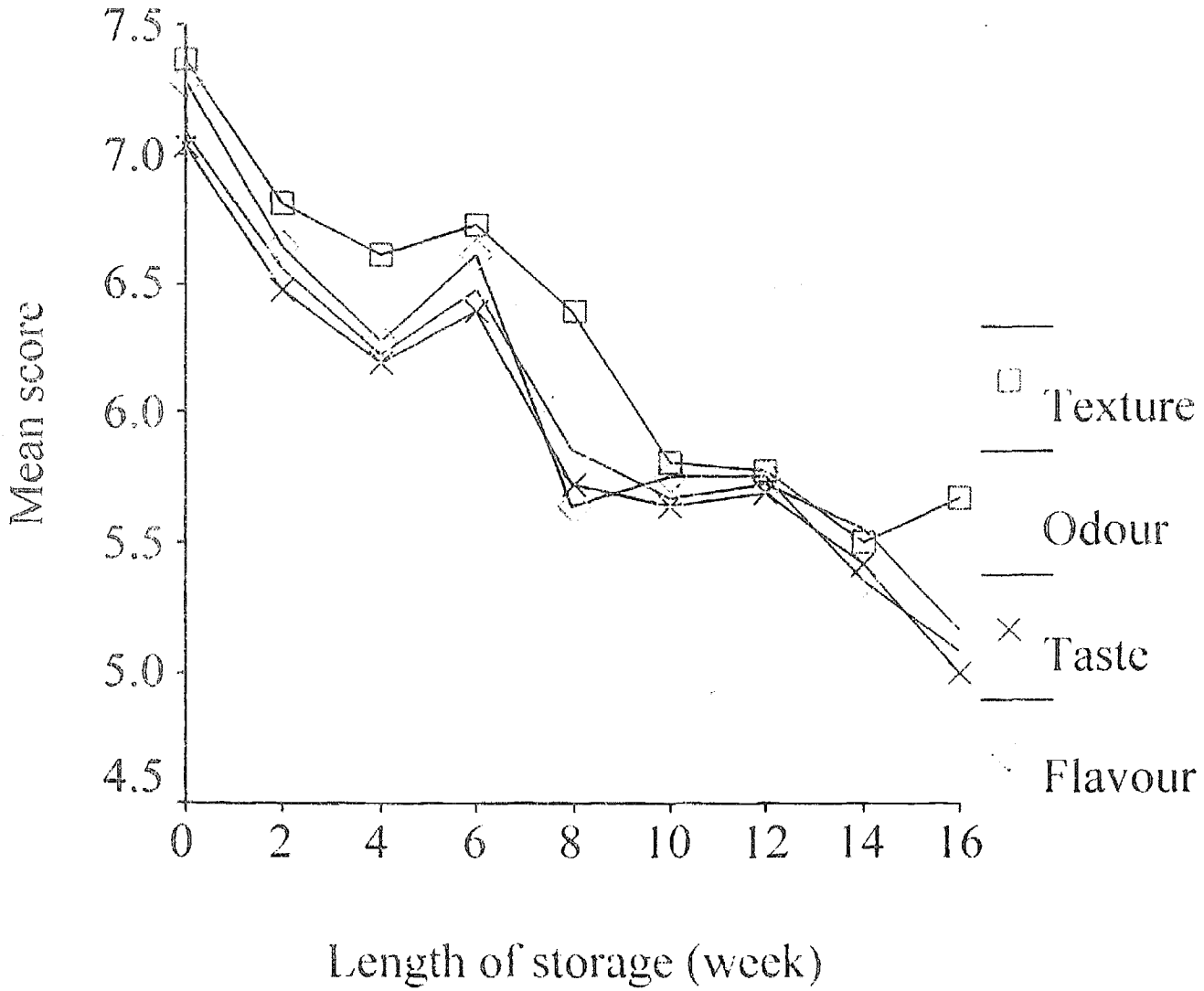

Figure 2: Changes in organoleptic properties of fresh and stored *Hyperopisus kilishi*

Effect of Fish Species on Organoleptic Properties of *Kilishi*

The *kilishi* made from *Hyperopisus bebe occidentalis* was rated significantly finer in texture than the one produced from *Labeo* coubie (7.36 ± 0.41 versus 6.81 ± 0.83 (Table 3). There was no significant species effect on the taste panelists' assessment of odour of *kilishi* made from the two fish species, though *Hyperopisus kilishi* was rated higher. *Hyperopisus kilishi* was rated slightly but not significantly higher for tastiness than *Labeo kilishi*. Differences in the flavour of *kilishi* followed a similar pattern to that observed for taste in favour of *Hyperopisus kilishi*.

Of all the assessed organoleptic properties, only the texture of the *kilishi* was significantly influenced by difference in fish species, in favour of *H. bebe occidentalis* both at the fresh stage and under storage. The level of slurry absorption during infusion, which was more appreciable in the latter and the decline in its level of ash could be partly responsible for this finding.

Table 3: Taste panel scores (means ± standard deviations) for texture and odour of *kilishi* of experimental fish species

Organoleptic Property	Fish species	
	Labeo coubeo	*H. bebe occidentalis*
Texture	6.81 ± 0.83^{a}	7.36 ± 0.41^{b}
Odour	6.92 ± 0.65	7.08 ± 0.47
Taste	6.92 ± 0.78	7.02 ± 0.50
Flavour	6.97 ± 0.59	7.28 ± 0.53

Means with same letter in row are not significantly different ($P > 0.05$).

CONCLUSION

Fish *kilishi* was highly acceptable to consumers both in its fresh and stored forms. However, *Hyperopisus kilishi* recorded slightly higher mean scores for the tested organoleptic properties. The declining trend in the quality assessment scores with the duration of storage indicated that the optimum storage period under room temperature was 6-8 weeks. It is suggested that preparation of fish *kilishi* should be explored as a means of preserving fish catches to arrest spoilage especially during glut in supply and to diversify fish products.

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