

Design and Fabrication of Different Packaging Materials for Smoked Fish Products

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Abstract: - The packaging materials for smoked fish product were produced from three different materials namely; Laminating films, Glossy card and polyamide polyethylene. The normal traditional basket was used as control. These materials were chosen after a preliminary study was carried out, the size and shape of the packages were also put into consideration for convenience handling. The polyamide polyethylene package is rectangular in shape, 38cm x 23.50cm by size and 0.06mm thickness. While the glossy card is square shape, 25cm x 23.20cm by size and 0.24mm thickness. Fish samples were smoked and allowed to cooled. Sample of the smoked fish were taken for proximate and sensory analysis before and after storage. The smoked fish samples were stored in the two different packages for eight weeks and same for the control (local basket). There was no significant difference before and after storage for sensory analysis from the result obtained. The proximate analysis also revealed little difference before and after eight weeks storage. In general, the result shows that properly packaged smoked fish can prevent post harvest losses also prolong the shelf life of smoked fish for duration and more hygienic for end users. These packages protect the product against spoilage and breakage, easy distribution or transportation.

Keywords: packaging materials, *Clarias gariepinus* (catfish), quality, shelf life and smoking kiln

I. INTRODUCTION

The perishable nature of fish necessitates its proper handling and preservation to increase its shelf-life and retain its desirable quality and nutritional value. The quality of freshwater fish which is delivered to the consumer greatly depends on correct handling when processed and suitable packaging.

Packaging technology refers to the process of designing, producing and evaluating products packages (Coles, 2003). Packaging is a coordinated system of preparing goods for transport, warehouse, logistics, sales and end use (Soroka, 2002). Traditional packaging materials include plastic,

II. MATERIALS AND METHOD

i. Selection of materials for packaging

From a preliminary study carried out and the information obtained revealed that most smoked fish are not properly stored. This is because most of these smoked fish were kept in

aluminium, glass, paper, cartons, mats, baskets, wood etc. The primary function of packaging is to contain, protect and preserve the product, while the primary function of packaging design is to specify the package characteristics. Therefore the package is a brand ambassador which should sell itself (Domenick, 2017). Hence, a strong brand that identifies and communicates information about the product clearly to the target audience is needed.

Great packages begin with the right material on that can deliver performance, quality and reliability for the product it houses. Packaging has become indispensable in today's society, likewise in fish industry. The movement towards the use of a well-designed packaging concept has become an essential tool to contain, protect and preserve fish products in an economic manner. Appropriate packaging is necessary to maintain the quality of smoked fish product and customer satisfaction. An effective fish packaging material should be able to reduce oxidation and rehydration, provides less bacterial and chemical spoilage, prevent odour permeation and protect the product from physical damage. (Olayemi *et al.*, 2015).

According to a study sponsored by the Food and Agriculture Organisation (FAO) of the United Nations, the quantity of dried and smoked catfish, tilapia and other types of fish exported from West African to the United Kingdom was estimated at over 500 tonnes per year (John-Paul Iwuoha , 2013). An appropriate packaging of smoked fish can be a very good profitable business for producers, creates more jobs and also serves as another additional source of revenue for the entire country.

The objective of this study was therefore to design and fabrication of different packaging material for smoked fish products from affordable materials such as laminating films, polyamide polyethylene and glossy card.

an opened materials such as sacks, cartons, baskets, mats, plastic bowls, metal pans etc. Which exposes these smoked fish to so much contamination and environmental pollution that might endangers the health of the consumers of such smoked fish. Hence affordable materials such as laminating films, polyamide polyethylene and glossy card were chosen for the fabrication of the packaging materials. To maintain

purity and freshness of smoked fish, it prevents rehydration, water activity and also serves as a barrier against dirt and other contaminants. These put together prolongs shelf-life, retain its quality and nutritional values enhances flavour and increase utilization of the smoked fish in food.

ii. Design of the packaging materials

The size and shape of the packaging materials were put into consideration for easy handling and distribution. The polyamide polyethylene package which is rectangular in shape is 38cm x 23.5cm by size and 0.06mm thickness. While the glossy card is square shape with 25cm x 23.20cm by size and 0.24mm thickness. The polyamide polyethylene package was designed in a way that the smoked fish is neatly packaged and also transparent. While the glossy card was designed with an additional protective water-resistant on the external surface using laminating film, Both packages were designed to reduce the smell and no drip to enable the product to be tucked into shopping basket with other purchases. Moreover these packages were also designed to ensure attractive presentation among food products without contaminating them. It also provide protection to the smoked fish packaged and convenience in handling, distribution, marketing and transportation.



Fig.1. Smoked fish package in glossy card



Fig. 2. Smoked fish sample in glossy card and polyamide polyethylene



Fig. 3. Smoked fish sample in polyamide polyethylene

iii. Smoking and packaging of fish samples

A 25kg of *Clarias gariepinus* (cat fish) were purchased and conveyed to fisheries and product engineering laboratory where they were degutted washed thoroughly and skewered. The skewered fish were placed in salt and ginger solution to brine for 40 minutes. The fish were later placed on racks to strain the water before loading into the smoking kiln. An improved WAAPP-NIFFR smoking kiln was used for smoking the fish samples. The fish were properly smoked and well monitored during smoking, this is to ensure that the smoked fish samples did not contained any considerable amount of moisture that might likely attract insects and moulds which significantly reduce the quality of the products after smoking. The smoked fish samples were removed from the smoking kiln allowed to cooled and were packed in each of the two packaging materials. The samples were stored under ambient temperature for eight weeks.

iv. Sensory Analysis

Organoleptic evaluation of the smoked fish samples were carried out before and after storage. Using 8 man untrained panel to determine the following parameters, Taste, Aroma, Colour, Texture and general acceptance on a 5 point hedonic scale of preference. Precautions were taken to ensured that the panellists rinsed their mouth with water provided after

evaluation of the smoked fish samples from the first package before moving on to next package

v. Proximate Analysis

The proximate analysis of the smoked fish samples were also carried out before and after storage to determined the followings; moisture content %, Ash content %, crude fibre content %, crude protein content %, crude fat content %, and nitrogen free extract %(NFE). Using Association of Analytical chemist method (AOAC)

III. RESULT AND DISCUSSION

S/N	PARAMETERS	GLOSSY CARD	GLOSSY CARD	POLYAMIDE POLYETHYLENE	POLYAMIDE POLYETHYLENE
		Before storage	After storage	Before Storage	After Storage
1	Taste	5	4	5	5
2	Aroma	4	3	4	3
3	Colour	4	4	4	4
4	Texture	5	4	5	4
5	General acceptance	5	4	5	4

Table I. Result of sensory Analysis

The scales of preference were ranked 5-1 which translates to;

5-very good

4-good

3-Acceptable

4-poor

1-very poor

Table II Result of proximate analysis

S/no	Packaging material	Moisture content %	Ash content %	Crude fibre %	Crude protein %	Crude fat %	NFE %
1	"O" stage	6.52	6.23	0.30	54.32	5.86	24.03
2	Polyamide Polyethylene	10.81	4.42	0.40	58.09	8.38	179.0
3	Glossy card	7.07	5.92	0.51	56.53	6.9	23
4	Control	6.76	5.09	0.35	54.27	9.3	26

Figure i above, shows smoked fish packaged in glossy card, Figure ii also shows smoked fish samples in both glossy card and polyamide polyethylene packages before storage. While figure iii shows some smoked fish samples in polyamide polyethylene after storage.

Table 1 indicates the result of sensory analysis of smoked fish samples in the different packaging materials before and after storage with their respective parameters. From the result obtained in the table, there were no significant differences before and after storage of the fish samples. These revealed that the packaging materials were acceptable to an extent. Table 2, shows the result of proximate analysis of smoked fish samples of the different packaging materials including the zero stage (before storage) and the control (local basket).

From the result table above, the smoked fish samples in the different packaging materials were better than those stored in the local basket (control). These shows that proper packaging materials can prolong the shelf life of smoked fish

IV. CONCLUSION

This study revealed that proper designed package for preserving fish can reduce post harvest losses. It's also maintains the quality and nutritional attributes of the smoked fish and more hygienic to the consumers. Packaging of smoked fish also help to ensure safe delivery to the ultimate consumer in sound condition at optimum cost. Fish been a source of essential nutrients for human consumption, could provide a relative nutritional stability for higher percentage of protein.

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