

SENSORY EVALUATION OF SMOKED AFRICAN CATFISH (*Clarias gariepinus* Burchell, 1822) USING DIFFERENT SMOKING KILNS.

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ABSTRACT

Fish and fish product are significant source of nourishment, revenue, and occupation for many people around the universe. Internationally, it serves as an important source of protein for both man and livestock. Thirty (30) live freshly harvested African catfish (*Clarias gariepinus*) with an average weight of (130 -180g) and length of (15-20cm) were purchased from Gamboru fish mongers at Gamboru fish market Maiduguri. Fish was smoked accordingly by stunning, coiling, sundrying, smoking, and storage using various smoking kiln (Rectangular modified smoking kiln, Improved Drum Smoking Kiln and Half drum smoking kiln). The smoked samples were later subjected to panelists for sensory evaluation. The result revealed that 16(53.33%) respondents indicated that the fish smoked with improved drum type smoking kiln tasted good (rank). Nevertheless, 9 of the respondents representing 30.0% had revealed that the colour quality of fish smoked with rectangular modified smoking kiln is good, while 13.30 % indicted good texture and none of the respondents qualify the colour as very poor. Quality outputs of the rectangular and improved drum smoking kiln were better compared with that of half drum smoking kiln. This research recommended that Proximate composition analysis should be carried out to reaffirms the inference of this study. Fish smoking using modified rectangular and improved drum smoking kiln was better than half drum smoking kiln, in terms of attributes such as taste, flavor, color, texture and general appearance.

Key words: African catfish, Hedonic scale, Fuel wood, Smoking Kiln, Quality

INTRODUCTION

Fish and its products is one of the cheap and major sources of protein, similarly, fish contain proportionate amount of calcium, lipids, minerals, vitamins and oils. The by-product of fish can be merged into the feedstuff of livestock and poultry. Among the most common fish obtainable in Nigerian water is the catfish species of *Clarias gariepinus* (Sadauki *et al.*, 2022). Fish and fish product is a significant source of nourishment, revenue, and occupation for many people around the universe. Internationally fish serves as an important source of protein for both man and livestock. As soon as a fish is trapped it becomes completely and professionally utilized to avoid deterioration/spoilage. For value addition, fish is being preserves or processed in many ways, which comprises; sun drying, solar drying, canning and smoking among others (Umar *et al.*, 2018).

Fish Smoking is predominant in most communities of Nigeria, despite modern fish preservative techniques such as drying, canning, use of additives, freezing, refrigeration, aseptic packaging and pasteurization, which are sometimes expensive. Fish is highly susceptible to deterioration when it is without any processing or preservative measures. (George *et al.*, 2014). During smoking, the smoke from the burning wood/charcoal containing a number of compounds inhibits bacterial growth, while the heat from the fire causes drying, however when the temperature is high enough, the flesh will be cooked, preventing bacteria, fungal growth and enzyme activity (Goulas and Kontominas, 2005). Fish spoilage in Nigeria is influenced to a large extent by high ambient temperatures, considerable distances of landing ports to points of utilization and poor as well as inadequate infrastructure for postharvest processing and landing (Saliu, 2008). The purpose of this study is assessing the difference in sensory quality of African catfish using different smoking kilns and compared the sensory and organoleptic assessment of the smoked African catfish.

MATERIALS AND METHODS

Collection and transportation of sample fish

The fresh fish samples of African catfish (*Clarias gariepinus*) with an average weight of (130 -180g) and length of (15-20cm) were collected from Gamboru fish mongers at gamboru fish market Maiduguri. Thirty (30) live freshly harvested African catfish (*Clarias gariepinus*) with an average weight of (130 -180g) and length of (15-20cm) was purchased from Gamboru fish mongers at Gamboru fish market Maiduguri. The fish were transported to the Department of Fisheries, post-harvest unit with a good handling. The fish was killed and gutted using sharp knife, thereafter, thoroughly washed with clean water.

Preparation of samples for processing

The three different types of Smoking kiln were set for this experiment. African catfish (*Clarias gariepinus*) which are include: 1-Rectangular Modified Smoking kiln, 2- Improved Drum Smoking kiln and 3-Half drum Smoking kiln in the post-harvest and fish processing units. The firewood was collected and smoking was conducted through the following steps; fish collection, stunning, coiling, sundrying, smoking and storage Omotesho *et al.* (2019). All Smoking kilns were cleaned before the setting the experiment.

Smoking Procedure

Samples were arranged on the experimental smoking kilns (direct heat) labeled sample A (hardwood) and sample B (softwood), then the wood were arranged at the bottom of the smoking kiln respectively Ezike and Ohen, (2018).

Assessment of smoke and smoked fish

The duration taken for each sample (A and B) was determined. Five point hedonic scales were used to for organoleptic assessment using standard sensory evaluation method. This was carried out to decide the taste, odor, texture and general appearance (color) of the Smoked Fish as described by Umar *et al.* (2018). Determinations of the shelf life were done by keeping the smoked fish for six weeks and concurrent weekly examination of physical quality was carried out.

Data Analysis

The data was subjected to Microsoft excel (version, 2010) for data were analysis using descriptive statistics (simple percentages)

RESULTS

Organoleptic assessment of *Clarias gariepinus* using different types of smoking kiln

▪ Rectangular modified smoking kiln

The results of sensory assessment of the respondents for modified smoking kiln are presented in the Table 1. The results revealed that 16 of the respondent representing 53.3 % had indicated that the fish smoked with rectangular modified smoking kilns taste is good (better) with 43.30% acceptability. Nevertheless, 9 of the respondents representing 30.0% had revealed that the color quality of fish smoked with rectangular modified smoking kiln is good, while 13.30 % indicted good texture and none of the respondents qualify the color as very poor.

Table 1: Treatment 1; Smoked Fish from Rectangular Modified Smoking Kiln

Score	Taste	Flavor	Texture	Color	Acceptable
Very good	36.7	26.7	13.3	26.7	23.3
Good	53.3	43.3	33.3	30.0	43.3
Neither good no poor	10.0	23.3	40.0	30.0	16.7
Poor	0.00	6.70	6.7	13.3	6.7
Total	100	100	100	100	100

▪ Improved Drum Smoking Kiln

The results of sensory evaluation of respondents for drum smoking kiln are presented in Table 2 below. The result revealed that 16(53.33%) respondents indicated that the fish smoked with improved drum type smoking kiln tasted good (rank). Similarly the results revealed that 11(36.70%) of the respondent indicated that the fish's flavor smoked with improved drum smoking kiln was good. Also, the 15(50.00%) has indicated that the color/appearance of fish smoked with improved drum smoking kiln color as good.

Table 2: Treatment 2; Smoked Fish from Improved Drum Smoking Kiln

Score	Taste	Flavour	Texture	Colour	Acceptable
Very good	33.30	26.70	20.00	10.00	20.00

Good	53.30	36.70	33.30	16.70	46.70
Neither good no poor	10.00	23.30	33.30	20.00	23.30
Poor	0.00	10.00	10.00	16.70	0.00
Total	100	100	100	100	100

▪ Half drum smoking kiln

The results of sensory evaluation of respondents for half-drum smoking kiln are presented in the Table 3 below. The results revealed that 15(50.00%) of the respondents had indicated that the fish smoked with half drum smoking kiln tasted good, while 12(40%) of the respondents had indicated that the fish texture smoked with half drum smoking kiln was neither good no poor. Hitherto, 11(36.70%) of the respondents had indicated poor general acceptability and only 6.70% of the respondents ranked the fish flavor very poor and 3.33% for both texture and color, while none of the respondents scored very poor for taste and acceptability.

Table 3: Treatment 3; Smoked Fish from Half Drum Smoking Kiln

Score	Taste	Flavor	Texture	Color	Acceptable
Very good	36.70	33.30	33.30	20.00	26.70
Good	50.00	33.30	20.00	26.70	6.70
Neither good no poor	10.00	16.700	40.00	46.70	30.00
Poor	3.30	10.00	3.30	3.30	36.70
Very poor	0.00	6.70	3.30	3.30	0.00
Total	100	100	100	100	100

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATION

Discussions

Sensory parameters such as taste, flavor, texture, color, and general acceptability were evaluated by the trained assessors after three weeks of storage of smoked fish using various smoking kilns. The results presented revealed no in trace of insect's infestation, no fragmentation. The results also show that there was no noticeable difference in all the sensory attribute. However in half drum smoking kiln the respondent found in general acceptable was poor. The overall performance in sensory attribute was found in rectangular modified smoking kiln (Table 1). The reason for general acceptable of the fish product from the smoking kiln might be attributed to a uniform quality product, short duration, and better fuel use efficiency and more control with the fire in rectangular modified smoking kiln and improved drum smoking kiln when compared half drum smoking kiln. This observation was in line with Adebawale *et al.*, (2008) who reported that one of the disadvantages of traditional smoking kiln are lack of control over the fire temperature and smoke productivity in efficient use of fuel. And it also observed that the capacity of the half drum is often very low, and modification to allow more fish to be smoked at one time have been suggested in this study. Similarly, color, taste, and texture of the all smoking kiln look the same promptly and to some times after smoking. This was no color change in the sample fish and insect infestation was observed. According to (Awosusi, *et al.*, (2015). Appearance of fish smoked in improved smoking kiln with the same after smoking and the shell-life was 4-5 weeks best in appearance and taste.

This means that fish smoked with rectangular modified or improved drum smoking kiln happen to be more efficient and better in operation compared this work reaffirmed the work of (Ikenweiwe, *et al.*, 2010) who reported 65% general acceptability. In the present study the best treatment was Treatment 2 (Improved drum smoking kiln).

CONCLUSIONS

Fish smoking using modified rectangular and improved drum smoking kiln was better than half drum smoking kiln, in terms of attributes such as taste, flavor, color, texture and general appearance. Also the processing of fish using of rectangular modified smoking kiln and drum type smoking kiln is more economical in fuel consumption and less havoc to the environment. Again, quality outputs of the rectangular and improved drum smoking kiln were better compared with that of half drum smoking kiln.

RECOMMENDATION

This research recommended that Proximate composition analysis should be carried out to reaffirms the inference of this study.

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