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Original Research Article

Organoleptic Characteristics and Eating Quality Acceptability of Traditionally Smoke-Dried Freshwater Fishes in Toru-Orua, Bayelsa State

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Abstract

Organoleptic attributes and eating quality acceptance of traditionally smoke-dried *Clarias gariepinus*, *Heterobaranchus longifilis*, *Heterotis niloticus* and *Parachanna obscura* in Toru-Orua, bayelsa State, was studied. The fishes for organoleptic evaluation were prepared into separate but same type of pepper soups and tasted by untrained 28 member taste panel. Eating quality was evaluated with a chuck of the smoke-dried fishes. Organoleptic attributes results showed the panelist preference in a descending order of *Heterobranchus longifilis* > *Clarias gariepinus* > *Parachanna obscura* > *Heterotis niloticus*. Eating quality results in a descending order was *Heterotis niloticus* > *Parachanna obscura* > *Heterobranchus longifilis* > *Clarias gariepinus*. Results also suggest that eating quality acceptability is greatly influenced by organoleptic characteristics as fat and oil content of fish species.

Keywords: Sensory qualities, Flavour, Taste, Texture, Appearance.

INTRODUCTION

Smoke drying is a popular traditional and archaic method of processing and preserving fish in Nigeria (Adeyeye, 2019). This technology ensures sustainable supply of fish in both urban and rural communities all year round. Smoke drying, a curing process combined with drying, stimulates the deposition of natural chemicals derived from the thermal breakdown of the wood, on the body of the processed fish (Fawole *et al*., 2007). This value-addition process provides safe, wholesome, induces water loss and nutritious supply of desirable sensory quality fish in terms of flavour, odour, taste, texture and appearance (Kumolu-Johnson and Ndimele, 2011, Chakroborty and Chakroborty, 2017, and Tiwo *et al.*, 2019). Consumer acceptance of smoke dried fish products largely depend on the quality of flesh which include juicy taste, pleasant appearance, oily nature, chunkiness and toughness, due to the fact that fish come in different types, flavor, texture and aroma (HeathPartners, 2023). For good consumer acceptability, the organoleptic qualities/eating quality and synthesized judgments provide the overall quality of the product (Renitta *et al*., 2021). *Clarias gariepinus*, *Heterobaranchus longifilis*, *Heterotis niloticus* and *Parachanna obscura* are different species of fish, each with a distinctive and unique type of flesh, when smoke dried. The processing method applied to fish impact the fish quality differently (Kanyembo and Musuka, 2017). According to Sulieman and Sidahmed (2012), the quality of smoked, cured and dried fish can be assessed using physical, chemical, and organoleptic methods.

Toru-Orua, a developing town with an increasing students' population has an increasing market for different fish products, especially smoke dried fish. However, this traditional value-addition process often results to uneven cooking, scorching and burning due to the direct heating of the fish, resulting to bitterness, unattractive appearance, rancidity, limited shelf-life and insect's infestation (Bellahan *et al., 2007*). The acceptability of smoke dried fish greatly depend on the organoleptic characteristics and eating quality of the processed fish, hence the reason for this study.

This study is therefore carried out to assess the organoleptic characteristics and eating acceptability of four traditionally smoke-dried freshwater fishes in Toru-Orua, Sagbama Local Government Area in Bayelsa State. This

information is intended to be useful to fish mongers, consumers and policy makers and fisheries administrators in formulating fish preservation/processing policies and strategies.

MATERIALS AND METHOD

STUDY AREA

The study was carried out at the Faculty of Agriculture, the University of Africa, Toru-Orua (UAT), established in2017 by the Bayelsa State Government. Toru-Orua once a rustic rural community known for fishing and farming is fast emerging as a University community hence a city in the making in Bayelsa State. This change in status is as a result of the massive influx of students, staff and business operators with all the attendant socio-economic activities including agro-based processing, marketing, and value-addition outfits on foods and fisheries products. Toru-Orua is situated between Latitude 5° 06' 07" North and Longitude 6° 03' 59" East along the Forcados River in the Niger Delta. It's approximately seventy two (72) kilometers from Bayelsa State Capital, Yenagoa.

SAMPLE COLLECTION

Based on purposeful bird's eye view of the town for processing activities, the fishes for the study were selected and purchased from processors using the traditional metal drum smoking kiln. The fishes selected for the study were African walking catfish (*Clarias gariepinus*), African Snakehead (*Channa obscura*), African Tongue sole (*Heterotis niloticus*), and African mudcatfish (*Heterobranchus longifilis*). They were purchased and taken in air-tight containers to the laboratory for analysis.

DATA ANALYSIS

Organoleptic characteristics assessment was carried out by 28 members untrained taste panel randomly selected from the UAT student community. Each fish species was used to prepare traditional pepper soup for the panelists to assess. Ingredients used for the pepper soup were onions, red pepper, scent leaf and salt which were added in similar quantity to the various pepper soups. The panelists scored each pepper soup labelled A, B, C and D, for appearance, flavor, taste and texture of the smoke-dried fish used. The scoring was based on a six (6) point Hedonic scale as described by Afolabi *et al*. (1989), as shown below,

1. Dislike very much
2. Dislike moderately
3. Dislike slightly
4. Like slightly
5. Like moderately
6. Like very much

To ensure no bias being introduced, panelists were given water to wash their mouths before sampling the next experimental pepper soup dish. Panelist rating scores were tabulated and means calculated then subjected to One-Way-Analysis of Variance (ANOVA) at 5% significance level. Weighted mean values for the organoleptic characteristics was calculated using the means generated from the data. These were used to evaluate the perception and acceptability of the taste panel on the organoleptic characteristics of each smoke dried fish.

Eating quality evaluation was accomplished by cutting out chuck of muscle from the dorsal muscle with a clean knife and presented to panelist to taste without them seeing or knowing the fish species. They were asked to rank the eating quality acceptance in,

1. Like very much
2. Like moderately
3. Like slightly
4. Dislike slightly
5. Dislike moderately
6. Dislike very much

Acceptability = Ranking 1 – 3,
Mean ranking and percentage acceptance was calculated.

RESULTS

Summary of the organoleptic evaluation by the 28 member taste panel (Table 1) showed that the *Heterobranchus longifilis* was the most preferred in this study. In a descending order, the results obtained was *Heterobranchus longifilis* > *Clarias gariepinus* > *Parachanna obscura* > *Heterotis niloticus*. Further analysis showed that the mean scores for taste, texture, and appearance in these fishes studied were statistically significant at $P \leq 0.05$ (Table 1). However, *H. longifilis* and *C. gariepinus* were observed to be similar at $P \leq 5\%$. The weighted mean value for each organoleptic characteristic of the four smoke dried fishes together are 6.5, 7.07, 6.32, and 7.23, for appearance, flavor, texture, and taste, respectively. While the grand weighted mean is 6.7.

Result on eating quality acceptability of the four traditionally smoke-dried fishes in the study (Table 2), the panelists showed preferences in descending order as *H. niloticus* > *P. obscura* > *H. longifilis* > *C. gariepinus*. The panelists ranked *H. niloticus* highest in terms of percentage acceptance (96.43%) and *C. gariepinus* lowest (64.29%).

Table 1: Summary of Organoleptic characteristics evaluation of *Heterobranchus longifilis*, *Clarias gariepinus*, *Parachanna obscura* and *Heterotis niloticus* smoke-dried in Toru-Orua, Bayelsa State by 28 member Taste Panel.

FISH SPECIE	APPEARANCE	FLAVOUR	TEXTURE	TASTE	MEAN RATING	RANK
Heterobranchus longifilis	7.5	8.0	7.8	9.3	8.15[a]	1
Clarias gariepinus	7.0	8.0	6.5	7.0	7.13[a]	2
Parachanna obscura	6.5	7.5	7.5	7.0	6.88[ab]	3
Heterotis niloticus	5.0	4.0	3.5	5.6	4.52[b]	4

*Means followed by same letter (a and b) are not statistically significant at P≤0.05.

Table 2: Summary of Eating quality acceptability of some smoke-dried freshwater fishes in Toru-Orua, Bayelsa State by 28 member Taste Panel.

Rating	*Heterobranchus longifilis*	*Clarias gariepinus*	*Parachanna Obscura*	*Heterotis niloticus*
1	10	5	10	14
2	9	7	8	8
3	5	6	7	5
4	1	7	3	1
5	0	*0*	*0*	*0*
Mean	5.6	5.6	7	7
% Acceptability	85.7	64.29	89.2	96.43
Rating	3	4	2	1

The overall eating quality acceptability of all fishes studied were rated as above average 64.29% to 96.43% hence adjudged acceptable by the student panelists who were often indifferent in terms of what to eat.

DISCUSSION

The organoleptic evaluation revealed a low rating given to the *Heterotis niloticus* by the taste panel, as shown by the organoleptic characteristics mean value (4.52) which is below the weighted mean values (6.7). This indicate a low perception and acceptability of *Heterotis niloticus*, reason they feel was over its long bristle thoracic bones and the poor taste which influence their scoring. This is consistent with the findings of Ekanem *et al*. (2020) whose study was to improve the poor taste, market value, and consumers' acceptability of *Heterotis niloticus*. Also, major statistical difference was observed between *Heterotis niloticus* (4.52 ± 0.47) and the other fishes. *Heterobranchus longifilis* and *C. gariepinus* were observed to be similar in the evaluation statistically. This is understandable, since both fishes belong to the catfish family Clariidae. Similar observation was also reported by Wasiu *et al*. (2017), that there was no significant difference between *C. garipinus* and *Heterobranchus longifilis* in their qualitative properties (aroma, flavor, texture, and colour). Their organoleptic mean values (7.13 ± 0.31 and 8.17 ± 0.39) are above the weighted mean value revealing that the taste panel have a high perception and acceptability of the Clariidae family used in this study. However, the taste mean value (7.0) for *C. gariepinus* is lower than the weighted organoleptic weighted mean value (7.23). The reason could be due to the high fat or ether extract which was reported in the study of Wasiu *et al*. (2017), in their comparison of proximate composition *C. gariepinus* and *H. bidorsalis*. The result for *P. Obscura* was not statistically different from the Clariidae family, however the mean for its taste was different (7.0) (but similar to *C. gariepinus*) and against the weighted mean for organoleptic characteristics on taste (7.23). In appearance the mean (6.5) is same with the organoleptic characteristics weighted mean. This is in conformity with the findings of Omoruyi *et.al.* (2017) and Akinwumi *et.al.* (2022), their studies revealed a low rating for *P. Obscura* smoke dried.

Eating quality acceptability result revealed that *Heterotis niloticus* had the highest rating (96.43%) and *C. garipinus* had the lowest (64.29%). This difference in preference for eating quality could be explained in terms of the fish chemical body composition especially the content of fat and oil, water content, protein and non-protein materials. This aspect was not covered in this preliminary study but it's known that *Heterotis niloticus* and *C. obscura* is a low fat fishes which produces a fairly tough and dry flesh which gives it a distinct flavour when smoke-dried (Reed *et.al.*, 1967) and is cherished locally in the Niger Delta (Alfred-Ockiya, 1979). The Clariidae studied are also preferred because they produced large chucks of juicy flesh full of oil (as revealed by the study of Wasiu *et al*., 2017) when smoke-dried and offered ready to consume products especially for students.

CONCLUSION

The study results showed that fishes that have pleasant appearance, juicy flesh like the catfishes and allied are preferred when smoke-dried in terms of organoleptic characteristics. Whereas, eating quality acceptance is based on the type of flesh produced after smoke-drying especially flesh that can be cut into large chucks and fairly tough and juicy flesh like beef meat giving it a strong flavour and taste but less muscular bones.

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