Internet Journal of Food Safety, Vol.13, 2011, p.130-133

Internet Journal of Food Safety

COMPARATIVE STUDIES ON THE PROXIMATE COMPOSITION OF NUTRIENTS IN Clarias gariepinus WILD AND CULTURED

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Abstract

Comparative studies was carried out to evaluate the proximate nutrient composition and organoleptic characteristics of Clarias gariepinus wild and cultured.Ten fish samples of fish of approximately the same length and body weight were examined The samples were gutted, washed properly and divided into two equal parts designated Treatment 1 and Treatment 2 . The samples were divided into two, wild and cultured. The first batch were analyzed fresh while the other batch were analysed after smoked drying. Results showed that fresh wild C. gariepinus had higher values in all nutrients than fresh cultured C. gariepinus except in the dry matter content, where cultured C. gariepinus (28.13 ± 1.41%) was higher (P< 0.05) than wild C. gariepinus (24.13 ± 0.18%). Smoked cultured C. gariepinus had higher values in all nutrients than smoked wild C. gariepinus except in the moisture content, where wild C. gariepinus (9.85 ± 3.19%) was slightly higher than Cultured C. gariepinus (9.05 ± 2.25%). Results also showed the crude protein content of fresh wild C. gariepinus(23.58 ± 3.53%) was higher (p> 0.05) than the Cultured C. gariepinus (18.13 ± 1.41%) while the smoked cultured samples (64.86 ± 2.47%) was higher(p > 0.05) than smoked wild samples (54.28 ± 4.06%).
The panelist assessment rated wild C. gariepinus higher than cultured C. gariepinus in all the organoleptic test.

Introduction

Due to its chemical composition, fish is a perishable raw material and it undergoes spoilage as soon as it is landed especially in hot climates and tropical areas where cold preservation techniques are often missing. Apart from temperature, it has been observed that several factors are responsible for fish spoilage; these include bacteria, other microorganisms, enzyme action, chemical spoilage and oxidation of fat.

All these conditions can upturn the nutritional composition of fish (Eyo, 2001) and become progressively more unacceptable for human consumption. This has a double impact on food security by reducing the total quantity of fish available to consumers (Bene and Heck, 2005). Therefore if fish is not sold fresh preservations methods should be applied in order to extend shelf life.

The development of fishing machinery and techniques that can be employed for effective fish handling, harvesting, processing and storage can never be over emphasized especially in the age when aquaculture's development is fast gathering momentum in Nigeria (Akinneye, etal, 2007). Fish curing includes drying, salting, smoking and pickling, or by combination of these processes which have been employed since ancient times. In West African region, the most popular method of curing is smoking and it is estimated that 70 % of the total fish supply is marketed in smoked or dried form (Essuman, 1992).There is an overwhelming preference for smoked fishes throughout Nigeria, and about 85% of the total fish supply is estimated to be consumed in the smoked form, 14% in fresh and 1% in can (FAO, 1982).

Smoking increases the shelf – life of fish as a result of the combined effects of dehydration, anti microbial and anti oxidant activities of several smoke constituents mainly formaldehyde, carboxylic acids and phenols (Doe, 1998). The smoke particles also have a positive effect on the taste and colour of the product. However, despite these

the handling and treatment given or applied on fish caught during harvesting and processing have great effect on the fish quality, value and proximate composition (Eyo, 1977). Smoking affects the nutritional value of fish mainly by reducing the biological availability of proteins(Stroud, 1988).

As consumers awareness increased there is a need to access the quality, enhance product safety and nutritional value in fish and in particular cultured fish in line with international requirements. This study was therefore undertaken to compare proximate compositions and organoleptic characteristics of wild and cultured *Clarias gariepinus* in fresh and smoked states.

Materials and Methods

Live C. *gariepinus* used in this experiment were purchase from fishermen operating on Oyan dam and a fish farm both in Ayetoro in Ogun state. A total of 10 fish samples each were purchased from the two locations. The mean weight and length of the fish were 500 ±1.41g and 46.31 ±2.15cm respectively. The samples were gutted, properly washed and divided into two equal parts designated Treatment 1 and 2. Treatment 1 samples were analysed after smoked drying and Treatment 2. The samples were stored live in water bath for 30 minutes before processing commenced . Fish preparation following the method described by Eyo (1981). Fish samples were smoked on open drum – type smoking kiln. Smoking of the fishes was carried out for 8 hours and the temperature in the smoking chamber ranged between 650^{o}C to 100^{o}C.

BIOCHEMICAL ESTIMATIONS

The proximate composition for both fresh and smoked samples of wild and cultured *C. gariepinus* were determined according to AOAC (1990). Each analysis was carried out in triplicates.

ORGANOLEPTIC EVALUATION

For the organoleptic evaluation, various characteristics like flavour, tenderness, juiciness, texture and acceptability were evaluated by a group of twenty trained panelist using a nine points hedonic scale. The average of scores given by panelists were taken.

STATISTICAL ANALYSIS

Data from parameters investigated were analyzed in a completely randomized block design using the procedure of statistical Analysis System SAS(1988).

Results and Discussion

The mean proximate composition of fresh and smoked *C. gariepinus* from wild and cultured systems are presented in Table 1 indicating that fresh wild *C. gariepinus* had higher values in all nutrients than fresh cultured *C. gariepinus* except in the dry matter content , where cultured *C. gariepinus* (28.13±1.41%) was higher ($p < 0.05$) than wild *C. gariepinus* (24.92±0.18%). Smoked cultured *C. gariepinus* (9.85±3.19%) was slightly higher than cultured *C. gariepinus* (9.05±3.19). Slightly higher moisture value of 10.86% was reported by Kumolu Johnson *et al* (2010) for smoked cultured *C. gariepinus* in Lagos, Nigeria.

The dry matter content of smoked cultured *C. gariepinus* (90.97±3.35%was higher ($p<0.05$) than that of smoked wild C. *gariepinus (90.29±3.35%)* Also fresh cultured *C. gariepinus* was higher ($p < 0.05$) than fresh wild *C. gariepinus* (Table 1). Ash content was lower in fresh cultured *C. gariepinus* than fresh wild *C. gariepinus* while the ash content of smoked cultured *C. gariepinus* (12.72 ±2.12% was higher than smoked wild *C. gariepinus* (11.85±3.53%). Salan et al (2006) opined that the increase in ash content when fish are smoked is due to loss of humidity.

The crude protein content of fresh wild *C. gariepinus* (23.58±3.53%) was higher ($p > 0.05$) than the cultured *C. gariepinus* (18.13±1.41%) while the protein content of smoked *C. gariepinus* indicated that the smoked cultured samples (64.86±2.47%) were higher ($p > 0.05$)than smoked wild samples (54.28±4.06%). Kumolu Johnson etal (2010) reported 64.14% protein value in the smoked wild *C. gariepinus* The higher protein value in the smoked cultured C. gariepinus than smoked wild C.gariepinus may be attributed to quality feeds given to cultured fish (Rizwan etal 2000). The crude protein content of smoked *C. gariepinus* was higher than fresh *C. gariepinus*. This could be related to the extent of drying which lower moisture content. The loss of water increases the concentration of nutrients and the de-naturation effect of smoking increases the digestibility of protein and hence the availability of some essential amino acid (Eyo, 2001). Olly (1983) also reported that smoking resulted in concentration of nutrients like crude protein and fat.

The fat content of smoked cultured *C. gariepinus*(8.94±3.53%)was higher than the smoked wild *C. gariepinus* (7.28±3.34%) while the fat content of fresh *C. gariepinus* from wild samples (2.78±0.12%) was higher than *C. gariepinus* (2.14±1.41%) from cultured system. The higher fat value in the smoked *C. gariepinus* was higher than the fresh *C. gariepinus and* this can be related to lower moisture content in fish. Generally as the fat content rises the water content falls and vive versa (Eyo, 2001). The crude fibre content was very low. The crude fibre values of 1.09±0.094% was recorded for smoked wild C. gariepinus and 1.28±1.41% for the smoked cultured C. gariepinus.

The mean score of the quality attribute of smoked wild and cultured *C. gariepinus* by a sensory panel is presented in Table 2. The panelist assessment rated wild *C. gariepinus* higher than cultured *C. gariepinus* in all the organoleptic tests. The most important contribution sensory

attribute to eating quality was tenderness with flavour and juiciness (Safari et al 2001). The panelist rated wild *C. gariepinus* higher than cultured *C. gariepinus* all the three. Flavour is a combination of odour and taste and is considered as important factor in consumer acceptance of smoked fish (Eyo, 2001). The panelist rated wild *C. gariepinus* (1.55±1.29%) higher than cultured *C. gariepinus* (0.80±0.14) in terms of flavour. A scores of 3.00± 1.16 was recorded for smoked cultured *C. gariepinus* in terms of acceptability.

Conclusion

In this present study, results show that proximate composition of nutrients in fresh wild *C. gariepinus* were higher than *C. gariepinus* from cultured system smoked C. gariepinus from cultured system was higher in all the nutrients than smoked *C. gariepinus* from wild except in the moisture content. The results further showed that organoleptic scores were higher in the smoked wild *C. gariepinus* than unsmoked cultured *C. gariepinus*.

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Table 1 Comparative proximate composition of fresh and smoked claries gariepinus wild and cultured

Variable	**Wild *Clarias gariepinus***		**Culture of *Clarias***	***gariepinus***
	Smoked	**Fresh**	**Smoked**	**Fresh**
Crude protein Content %	54.28±4.06[b]	23.58±3.53[b]	64.86±2.47[b]	18.13±1.41[b]
Fat content %	7.28±3.34	2.78±0.12	8.94±3.53	2.14±1.47
Crude fibre content %	1.09±0.94[b]	0.00±0.00	1.28±0.94[a]	0.00±0.00
Ash content %	11.85±3.53	4.50±0.89	12.72±2.12	3.34±1.07
Dry matter content %	90.29±3.35[a]	24.92±0.18[a]	90.97±2.29[b]	28.13±1.41[b]
Moisture content %	9.85±3.18[a]	74.92±4.24[b]	9.05±2.29[a]	71.70±0.25[b]

Mean along the same row with different superscript alphabets are significantly different (P<0.05

Table 2: Mean scores of the quality Attribute to smoked wild and Culture C gariepinus by a sensory panel (n = _)?

Samples	Wild C. gariepinus	Cultured C. gariepinus
Tenderness	2.50 ± 1.65	1.40 ± 1.07
Juiciness	2.25 ± 1.89	0.60 ± 0.29
Texture	1.50 ± 0.57	1.40 ± 0.52
Flavour	1.55 ± 1.29	0.80 ± 0.14
Acceptability	3.00 ± 2.16	2.60 ± 2.07