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Proximate analysis of smoked and unsmoked fish (cat and tilapia) in Ombi River Lafia Nasarawa State Nigeria

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ABSTRACT

Two different samples of fish were procured from Ombi River, Lafia – Jos Road, Nasarawa State, North-central Nigeria. Catfish (Claria gariepinus) and Tilapia fish (Oreochronis niloticus) and shared into two parts, smoked and unsmoked: The fish samples were analysed for protein, moisture, ash, lipid and carbohydrate content. The unsmoked and smoked Tilapia fish showed higher protein and carbohydrate content (31.50 % - 32.81 % and 13.00% - 16.27%) respectively compared to unsmoked and smoked cat fish (21.00% - 19.80% and 0.48% - 2.47%) respectively. While the unsmoked and smoked Tilapia fish showed low moisture, ash, and lipid content (12.00 % - 10.40 %; 15.60 %-16.00 % and 26.50 % - 25.83 %) compare to the unsmoked and smoked cat fish (21.00% - 19.80 %, 20.40% - 21.40 %, 28.33 % - 27.50%) respectively. High protein content in Tilapia fish proved the fact that Tilapia fish belongs to the category of fish with high protein. While high lipid content in Catfish, gave an indication of cat fish belonging to category of fish with higher lipid. The results of the analysis showed variation compared to the result of other similar researches. This could be as a result of some factors, which may include geographical location, sex, species, age, nutrient, migration and Season. The processing method altered the composition of the Cat and Tilapia fish as a result of heat where denaturisation of the fish composition is believed to have occurred. The low moisture content in smoked fish samples is as a result of water loss during smoking process and low ash content in the unsmoked fish samples can be ascribed to low content of inorganic elements. It can thus be concluded that fresh fish is more nutritious for human consumption.

Introduction

Throughout history, fish has been an important substainer of human life, second only to cereals in that respect. It ranks first as a source of complete protein, edging out meat because of the lattest relative scarcity and consequent higher price.

"Fish" here means a cold blooded animal that lives in water, has a backbone and pamanent gills for breathing, fins for swimming, scales for protection and sttreamlined easily through the water. This definition excludes fish like mammals, such as porpoises and whales, shellfish, cuttle fish, custanceans and creatures such as starfish and jelly fish. Recent world wide catch of fish was estimated at about 70 – 100 million metric tons annually for food. People cosume about 70% of fish caught and yearly 30% are used as mammal feed that helps produce other forms of protein.

Fish is the largest family in the animal kingdom with about 25,000 species, most of which are edible. This is more than mammals, birds, reptiles and amphibians put together. Fish can be divided into two major groups, fresh water and salt water. Certain exceptional species can exist in both such as salmon, eel and gray mullet (Carol *et al.*, 1981).Tilapia and catfish belong to the fresh water. The chemical composition of fish varies greatly from one species and one individual to another depending on age, sex, environment and season. The principal chemical composition of constituents of fish and mammals may be divided into the same categories. The basic cause of change in composition of fish are usually in the amount of food that the fish eats and the amount of movement it makes. Reduction in basic food resource, plankton for example can afford the whole food chain and abundance of food can makedly improve and change the composition of a species. Species performing long migration before they specific spawing grounds or rivers may utilize protein in addition to lipids for energy , thus depleting both lipid and protein reserves, resulting in a general reduction of the biological condition of the fish. Most species, in addition do usually not ingest much food during spaning migration and are therefore not able to supply energy through feeding.

Fish processing is mainly concerned with the technology of preserving fish, in such a way that they retain nutritive value and acceptable to the consumer. That is , preservation is a process of keeping fish close to its fresh state or minimizing changes in its physical appearance, texture and taste. This can be achieved by creating conditions on or inside the fish totally unsuitable for the optimum poeration of bacteria and enzymes activities. Spoilage bacteria and enzymes can be killed by heat or irridation and recontamination prevented as supresed by the application of low temperature and chemical compounds, examples. Salt, and smoke and remove of water by solar, wood or wind energy. In Nigeria, fish is eaten fresh, preserved or processed . The process of smoking combines the effects of salting, drying, heating an

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smoking. The first step, salting, usually involves soaking in a prepared salt solution to firm the flesh and impart flavour. Subsequent drying often performed outdoors or occasionally in a smokehouse, removes excess water from the flesh. A combined heating/drying/smoking process entails application of smoke, at temperatures of 30 +°C for a cold smoked product or alternatively 70 to 80 °C for a hot smoked product (Bligh *et al*., 1989).

This particular study was aimed at carrying out the proximate analysis of the two common species of fish widely consumed from the Ombi River in Nasarawa State which is located in the North-central zone of Nigeria. Nasarawa State lies between latitudes 7^0 and 9^0 North and longitudes 7^0 and 10^0. Furthermore, it shares common boundaries with Benue State to the South, Kogi State to the West, Federal Capital Territory (FCT), Abuja to the North-West and Kaduna, Plateau and Taraba States to the North-East and South-East respectively.

The research was to specifically ascertain the nutritional value and whether smoking as a method which is a popular preservation method has any effect on the fish samples based on the parameters used.

Experimental

Sampling

Two Pieces each of Orechronis niloticus (Tilapia) and Clarius gariepinus (catfish) were procured from Ombi River, Jos. Lafia Road, Nasarawa State North-central Nigeria, during the dry season. The samples were brought to the laboratory of fishery department, Nasarawa state University, Keffi (NSUK) for proximate analysis of smoked and unsmoked fish. The two fishes, out of the fishes procured were immediately smoked for 3 days using firewood to avoid gross contamination. The muscle tissue samples were taken (smoked and unsmoked) and cleaned with 10% alcohol.

Proximate Composition

The proximate composition of collected fish samples was determined according to the AOAC (2005) methods. The moisture content was determined by drying samples overnight at 105 ^oC for 2 hr 30 mins. Crude protein content was determined using the Kjeldahi method. Fat content was determined as per using soxhlet method and the ash content was by ashing at 500 ^oC until fully ashed. Carbohydrate content was determined by calculating the difference i.e. the sum total of moisture; protein, fat and ash content were subtracted from 100 %.

Results

Discussion

Table 1 presents the proximate composition of smoked and unsmoked Tilapia fish; While Table 2 presents the proximate composition of smoke and unsmoked cat fish. Tables 1 and 2 both showed high moisture content in unsmoked fish samples compared to smoke fish samples. This is due to lost in water during smoking. This observation is in agreement with the findings of Salan *et al., (*2006).

The moisture content of smoke cat fish (19.80%) and unsmoked cat fish (21.00%) samples are highly compared to that of smoke tilapia fish (10.4%) and unsmoked tilapia fish (12.00%) samples. This is as a result of cat fish belonging to category of fish having high water or moisture content (Gallagher *et al*, 1991).

The experimental finding also shows that the smoked (31.50%) and unsmoked tilapia fish (32.81%) samples have high protein content compared to smoke (28.83%) and unsmoked cat fish (29.79%) samples. While smoked (27.50%) and unsmoked cat fish (28.33%) samples showed high lipid content compared also to smoked (25.83%) and unsmoked tilapia fish (26.60%) samples. This proved the fact that tilapia fish belongs to the category of fish with high protein content while catfish belongs to the category of fish with high lipid content (Stanby, 1982).

The ash content of smoked and unsmoked tilapia fish is 10.4-12.00% and that of smoked and unsmoked cat fish is 19.80-21.00% respectively. Both fish samples (smoked and unsmoked cat and tilapia fish) show good percentage of ash content. The range for the ash content gave an indication that the fish samples may be good sources of minerals such as calcium, potassium, zinc, iron and magnesium (Andrew, 2001). The ash content show high percentage in smoke fish samples compare to unsmoked fish samples. The increase in ash content of smoked fish sample is due to loss of humidity (Salan *et al.,* 2006).

The proximate analysis also showed variations in results compared to other researchers like Mofohiro, (1989), Usydu, *et al.,* (2009) and Adebowale *et al.,* (2008).

This means that a composition of fish will different according to environment, age, sex, species, migration, nutrient and method of preservation.

Both the smoked and unsmoked fish samples showed good content of lipid, protein, ash, moisture and carbohydrate. The result indicates that the processing method use for preservation of the fish samples have no much effect on the composition of the fish rather than the colour and the texture of the fish. However the little variation in the result comes as a result of heat denaturing the composition of the fish (Asiedu *et al*, 1991).

Conclusion

From the result of analysis obtained, smoking process has altered the composition of the fish samples. The findings showed high protein, lipid and moisture content in unsmoked fish samples (catfish and tilapia fish). While smoked fish samples (catfish and tilapia fish) showed high ash and carbohydrate content.

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Table 1: Result of proximate composition of smoked and unsmoked tilapia Fish

	Moisture %	Ash %	Protein %	Lipid %	Carbohydrate %
Smoked	10.4	16.00	31.50	25.83	16.27
Unsmoked	12.00	15.60	32.81	26.60	13.00

Table 2: Result of proximate composition of smoked and unsmoked catfish

	Moisture %	Ash %	Protein %	Lipid %	Carbohydrate %
Smoked	19.80	21.4	28.83	27.50	2.47
Unsmoked	21.00	20.4	29.79	28.33	0.48

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