PROXIMATE COMPOSITION OF THREE COMMERCIAL FISHES COMMONLY CONSUMED IN AKWA IBOM STATE, NIGERIA

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ABSTRACT

Proximate compositions of *Cynoglossus senegalensis. Polydactylus quadrifilis* and *Chrysichthys nigrodigitatus* obtained from Ayadehe in Akwa Ibom State, Nigeria were determined using standard methods. Results of the mean values for moisture, protein and fat were as follows; 66.19%, 14.2% and 10.62% respectively in *Chrysichthys nigrodigitatus,* 63.97%, 18.56% and 2.57% in *Cynoglossus senegalensis,* and 67.54%, 17.83% and 3.39% in *Polydactylus quadrifilis*. The ranges of ash carbohydrate, calorific value and crude fibre were as follows; 5.3% – 7.7%, 3.69% – 7.26%, 152.0 kcal/100g – 189.02 kcal/100g and 7.67% - 10.71% respectively. The data showed that these species of fishes are rich in crude protein, lipid, moisture and ash and meet the requirement for human nutritional needs.

Keywords: Calorific value, moisture, proximate composition.

INTRODUCTION

Fish is one of the most important animal protein and other vital nutrients sources that are widely consumed by all races and classes of people (Abolude and Abdullahi, 2005; Andrew, 2001). Fish meat contains significantly low lipids and high water compared to that of beef or chicken and is favored over other white or red meats (Nestel, 2000). Lipids from fish are well known as a rich source of long-chain n-3 polyunsaturated fatty acids (LC n-3 PUFA) such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) which cannot be synthesized by humans and commonly obtained from the diet (Alasalvar *et al.,* 2002). Polyunsaturated fatty acids from fish have been reported to have preventive and/or curative effects for several diseases including arterial hypertension cancers and inflammatory diseases (Turkmen *et al.,* 2005). It may also aid in lowering the risk of Dementia, Alzheimer's diseases (Grant 1997), and prevent the cardiovascular diseases (Cahu *et al.,* 2004). Proximate composition is a good indicator of physiology which is needed for routine analysis of fisheries (Cui and Wootton, 1988). However, fish of various species do not provide the same nutrient profile to their consumers (Soriguer *et al.,* 1997; Takama *et al.,* 1999). These differences in the nutritional compositions of different species may be attributed to food composition, food and feeding habit, feeding rate, habitats, sex, age, size, genetic traits and season/migration (Dawson and Griman, 1980; Abdullahi, 2001; Ajah, 2009). Besides being used as food, fish is also increasingly demanded for use as feed. However, information concerning the chemical composition of freshwater fishes in general is valuable to nutritionists concerned with readily available sources of low-fat, high-protein foods such as most freshwater fishes (Sadiku and Oladimeji, 1991; Mozaffarian *et al.,* 2003; Foran *et al.,* 2005) and to the food scientist who is interested in developing them into high-protein foods, while ensuring the finest quality flavor, color, odor, texture, and safety obtainable with maximum nutritive value (Elagba *et al*.2010). The aim of this study is to compare the nutritional values of three selected different fishes, in other to help consumers in choosing fish based on their nutrient values.

MATERIALS AND METHODS

Fish species selected for this study were *Cynoglossus senegalensis.* (Tongue fish), *Polydactylus quadrifilis* (African giant threadfin), and *Chrysichthys nigrodigitatus* (silver catfish). These species were chosen for the study because of their abundance, high preference by people of Akwa Ibom State and market value. Eighteen (18) fresh fish samples were obtained directly from the fishermen on landing at Ayadehe in Akwa Ibom State. These comprised of six samples of *Chrysichthys nigrodigitalus* six samples of *Cynoglossus senegalensis* as well as six samples of *Polydactylus quadrifilis.* The collected samples were immediately packed into an ice chest to sustain freshness, and taken to the laboratory. Upon arrival to laboratory, the fishes were de-scaled where necessary, beheaded, gutted thoroughly washed with distilled water and filleted. Fillets of the same species were pooled together to form composite samples. These composite fillets were packed in labeled foil bowls, and kept frozen until needed for analysis.

Proximate determination

Each fish sample in its fresh state was subjected to chemical analysis in triplicate according to AOAC 1990. Water content was determined by drying samples at 105 ± 2^0C until a constant weight was obtained. Dried samples were used for determination of crude fat, protein and ash contents. Crude fat was measured by solvent extraction method in a soxhlet system where petroleum ether was used as solvent. Crude protein content was calculated by using nitrogen content obtained by Kjeldahl method. A conversion factor of 6.25 was used for calculation of protein content. Crude fibre by acid base- digestion using 1.25% H_2SO_4 (W/V) and 1.25% NaOH(W/V) solution. Carbohydrate content value were calculated based on difference calculation [Carbohydrate =100% - (%moisture+ %ash + %crude protein + %fat)], while the energy value was determined indirectly using Rubner's coefficients for aquatic organisms: The caloric values of the samples was obtained by multiplying the value of the crude protein, lipids and carbohydrates by 5.5, 9.5 and 4.1kcal respectively and taking the sum of the product (Winberg 1971).

Data analysis

Date analysis was done using Analysis of variance (ANOVA) according to the statistical analysis system (Steel and Torie, 1987). Differences among sample means were tested for significance with Duncan's multiple range test (Duncan, 1955) at a level of 0.05

RESULTS

Table 1: *The proximate composition of *Cynoglossus senegalensis, Polydactylus quadrifilis and Chrysichthys nigrodigitatus* from Ayadehe in Itu LGA.

% composition	*C. nigrodigitatus*	*C. senegalensis*	*P. quadrifilis*
Moisture	66.19	63.97	67.54
Ash	5.3	7.7	5.94
Crude fibre	7.67	10.71	9.51
Crude protein	14.2	18.56	17.83
Fat	10.62	2.57	3.39
Carbohydrates	3.69	7.26	5.30
Calorific value(Kcal/100g)	189.02	155.94	152.0

*Mean of three determinations.

The results of the nutritional values of the three species of fish selected for this study are presented in table 1. The moisture contents ranged from 63.97% in *Cynoglossus senegalensis* to 67.54% in *Polydactylus quadrifilis*. Ash content was lowest in *Chrysichthys nigrodigitatus* (5.3%), while *Cynoglossus senegalensis* had the highest % of ash (7.7%). Crude fibre ranged from 7.67% in *Chrysichthys nigrodigitatus* to 10.71% in *Cynoglossus senegalensis*, while crude protein ranged from 14.2% to 18.56% in *Chrysichthys nigrodigitatus* and *Cynoglossus senegalensis* respectively. For fats, *Chrysichthys nigrodigitatus* recorded the highest value of 10.62%, while the least value was recorded in *Cynoglossus senegalensis*. The carbohydrate content was between 3.69% (*Chrysichthys nigrodigitatus*) and 7.26% (*Cynoglossus senegalensis). Chrysichthys nigrodigitatus* had the highest energy value (189.02Kcal/100g), while the least was recorded for *Polydactylus quadrifilis.*

DISCUSSION

The proximate composition of nutrients in all fish samples showed variation among the individual species. The moisture contents in all the three species were within the acceptable level (60-80 %), which could be due to the stable water levels in the location where the fish were collected (Adewumi *et al.*, 2014). The percentage of water is also a good indicator of its relative content of energy, protein and lipid (Olagunju., *et al.* 2012). Moisture content in all the species agreed with observation of Udo and Arazu (2012), Olagunju *et al.*, (2012), and Mazumder et al., (2008) in several freshwater fish species. There were variations in the protein content of the three species examined in this study, with *Cynoglossus senegalensis* recording the highest value. The high protein content of *Cynoglossus senegalensis* may be attributed to the fact that they are carnivorous and known to feed on mollusks, shrimps, crabs and fish. Abdullahi (2001) reported that the protein content in fish vary with species due to certain factors such as the season of the year, effect of spawning and migration, food availability etc. However, despite the variations, the range of protein in fish in this study indicates that these species of fishes are good sources of protein to consumers. According to Ackman [1989], fish can be grouped into four categories according to their fat content: lean fish (< 2 %), low fat (2 to 4 %), medium fat (4 to 8%), and high fat (> 8%).

From the results obtained, the mean lipid contents in *Polydactylus quadrifilis and Cynoglossus senegalensis* indicates that they are low fat fish, while *Chrysichthys nigrodigitatus* can be classified as a high fat fish. This indicates that *Chrysichthys nigrodigitatus* are better sources of lipid in the body when consumed. Udo (2012) equally reported high values of fat for *Heterobranchus longifilis*, *Clarias gariepinus* and *Chrysichthys nigrodigitatus* of the Cross River, Nigeria. However, this result is at variance with 2.13% protein contents for *C. nigriodigitatus* obtained from Yenegoa as reported by Keremah and Amakiri (2013). The differences in these values could be due to the fact that these species were from different locations. Age variation, season and maturity in the same species may also contribute to the significant differences in the total lipid (Piggot and Tucker, 1990). Ash is a measure of the mineral content of food item. It is the inorganic residue that remains after the organic matter has been burnt off (Adewumi *et al.*, 2014). The range of ash in this study suggests that these species of fishes are good source of minerals such as calcium, potassium, zinc, iron and magnesium. Carbohydrates are sources of instant energy, which can be used in the body's development and growth (Olagunju *et al*., 2012). Fish generally have very low levels of carbohydrates because glycogen does not contribute much to the reserves in the fish body tissue (USDA (2010; Jayasree *et al.*, 1994; Das and Sahu 2001). Carbohydrate content of fishes in this study was above known values of carbohydrates as reported by Vlieg (1988). The calorific value (kcal/100g) measured in *C. nigrodigitatus*, was

significantly higher than that determined in *Cynoglossus senegalensis* and *Polydactylus quadrifilis*. The high calorific value could be attributed to high fat content observed in *C. nigrodigitatus* in this study (Keremah and Amakiri 2013). This presumes that *C nigrodigitatus* probably contain more calories than that available in the other two species.

CONCLUSION

This study revealed the importance of *C. nigrodigitatus*, *C.senegalensis* and *p. quadrifilis* as good sources of protein and other nutrients. On the other hand, the information will be useful to the consumers in choosing fish based on their nutritional values rather than taste, appearance and other physical features.

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