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Comparative Studies on the Proximate Composition of the Various Body Part of *Clarias gariepinus* and *Scomber scomrus*

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ABSTRACT: Study on the proximate a composition of flesh and other body parts of *Clarias gariepinus and scomber scombrus* was carried out in January, 2020 using standard procedures. For *Clarias gariepinu*s the highest protein (25.69%) was observed in the head, followed by flesh (21.70%) and *while* the lowest protein (18.61%) was discovered in the bone. Highest fats (3.61%) was recorded in the flesh, followed by head (2.25) *while* (0.80%) recorded in the fins as the lowest fats. In fibre the highest (1.87%) was observed in head followed by (1.72) in the bone. The lowest fibre (0.60%) was reported in the flesh. The highest ash (22.03%) was recorded in fins, followed by bone (19.83%) *while* the lowest (1.30%) was discovered in the flesh. The highest moisture (75.76%) was recorded in the flesh, followed by fins (73.23) while the lowest (56.48%) was observed in the head. For *scomber scombrus* the highest protein (29.44%) was observed in the head, followed by bone (28.40%) and *while* the lowest protein (24.30%) was discovered in the flesh. Highest fats (6.42%) was recorded in the flesh, followed by head (1.48%) *while* (0.95%) recorded in the bone as the lowest fats. In fibre the highest (1.11%) was observed in fin followed by (0.69%) in the flesh. The lowest fibre (0.59%) was reported in the head. The highest ash (6.37%) was recorded in head, followed by bone (5.07%) *while* the lowest (0.33%) was discovered in the flesh .The highest moisture (68.68%) was recorded in the flesh, followed by head (66.56%) while the lowest (37.20%) was observed in the fin. .The highest carbohydrate (5.58%) was recorded in the bone, followed by fin (5.28%). The study showed that the best body parts in terms protein content of the two fish samples were the head. The Head has the highest crude protein content thus it can be recommended as a possible effective ways to solve protein malnutrition

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Fish is very important food stuff, especially in developing countries due to its high protein content and nutritional value of unsaturated fatty matter. It may be the solely accessible and / or affordable source of animal protein for poor households in urban semi-urban areas (Bene and Heck, 2005). Fish is also widely acceptable because of its high palatability, low cholesterol and tender flesh (Eyo, 2001). However the feeding habit, sex, species, seasonal variation and other factors greatly affect the nutrient composition of an individual fish species (Effiong and Fakunle, 2011). Despite its nutritive value, fish is highly susceptible to damage once caught and so have become source of pollution in the environment (Vignesh and Srinivan, 2012). However, processing methods such as salting, boiling, frying, sun drying, roasting and smoking have been used to preserve and increase its availability to consumers (Olayemi *et al*., 2011). Most processing methods often times involve removal of the head, viscera and other parts of the fish which may have either negative or positive effect on the total nutritive values of the fish (Saliu, 2008). Previous works reported the effect of processing methods on different fish types (Oluwaniyi and Dosum, 2008; Osibona, 2011). Determination of some proximate profiles such as protein content, lipid, ash and other nutrients is often necessary to ensure that they are within the range of dietary requirement and commercial specifications (Watchman, 2000). The study of micro- nutrients present in living organisms is of biological importance because many of such micro-nutrients take part in some metabolic processes and are known to be indispensable to all living things (Shul'man, 1974). Fishes contain small amount of these micro-nutrients some of which are essential nutrients, being components of many enzymes system and metabolic mechanisms that contribute to the growth of the fish.. The deficiency in these principal nutritional mineral elements induces a lot of malfunctioning as it reduces productivity and causes diseases such as inability of blood to clot, osteoporosis, anemia etc (Shul'man, 1974, Mills, 1980). This research is therefore

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conducted to determine the proximate contents of *Clarias gariepinus* and *Scomber scombrus*

METERIALS AND METHOD

Biometric measurements: Individual data for length, weight and sex were taken and recorded in their fresh state. The standard length was measured with the aid of a graduated fish measuring board. The weight was measured in gram (g) and centimeter (cm) using weighing balance (Sartorrus 1219MP) standard and a meter rule respectively. The sex was determined by visual examination of the gonads. The size range of the fish sampled are as follows; *clarias gariepinus* 6.21-12.10cm, *Scomber scombrus* 8.34-16.40c

Preparation for analysis: Fish samples were gutted, washed, filleted and finely crushed into a uniform paste. Each homogenized sample was neatly packed into a sterile transparent container and appropriately labelled. The proximate composition of processed fish samples was determined according to the AOAC (2005) methods.

Determination of moisture content: Approximately 10 g of each processed samples was placed in drying oven at 105 ^{0}C for 6 hrs. And was allowed to cool down before weighing. Later, the sample was dried and weighed one (1) hourly for few hours until a constant weight was obtained. The moisture content of the sample was calculated using the formula below:

$$MC\ (\%) = \frac{W_1 - W_2}{W_1}\ x\ 100$$

Where MC = moisture content; W_1 = weight of processed sample; W_2 = weight of dried sample

Determination of ash content: Approximately 3g of each sample was weighed and placed in a crucible prior to ashing in a furnace. The sample was heated at 550 ^{0}C for 12 hours and allowed to cool. The weight of ash was obtained by weighing the crucible on the analytical balance. The crude ash content was obtained using the formula below

$$\%\ AC = \frac{W_1}{W_2}\ x\ 100$$

Where AC = ash content; W_1 = weight of ash; W_2 = weight of proocessed sample

Determination of crude fibre: Fibre was determined using trichloroacetic acid method as recommended by AOAC (2001). The percentage of crude fibre was obtained using this formula:

$$\%\ CF = \frac{W_1 - W_2}{W_3}\ x\ 100$$

Where CF = crude fibre; W_1 = final weight; W_2 = initial weight; W_3 = weight of processed sample

Determination of fat content: Approximately 5 g of sample was weighed into a bag made of muslin cloth and placed in a soxhlet extraction unit. The unit was then connected to a round bottom flask containing 2/3 full of petroleum ether (boiling point is 60-80 ^{0}C). The petroleum ether was allowed to boil for 6 hrs. xThen, the ether evaporated into a fume hood and the flask was allowed to cool down at room temperature. The fat content was calculated using the formula below:

$$\%\ CFC = \frac{W_1\ - W_2}{W_2}\ x100$$

Where CFC = crude fat content; W_1 = weight of round bottom flask with sample; W_2 = weight of clean empty round bottom flask

Determination of protein: The crude protein was determine by Kjeldahl method of digestion, distillation and titration. The percentage of crude protein was determined using the following calculation:
For standard HCl titrant:

$$\%\ Nirogen = \frac{(A - B)\ \times\ N\ \times\ 1{,}4007}{W}$$

Where A = NHCl required for sample, B = NHCl required for blanck, N = normality of titrant, W = weight of sample (g)

Crude protein content (%) = %Nitrogen × 6.25

Determination of carbohydrate content: Carbohydrate was determined using differential method as recommended by AOAC (2001). The percentage carbohydrate was obtained using the formula:

% CHO = 100 – Ash% + fibre% + protein% + fat%.

Statistical Analysis: The data of positive results obtained were subjected to Analysis of Variance (one-way ANOVA) to compare difference of proximate composition of various body parts

RESULTS AND DISCUSION

The results of the proximate composition of flesh, head, bones and fins of *Clarias gariepinus* presented in table 1. The highest protein (25.69%) was observed in the head, followed by flesh (21.76%) and *while* the

lowest protein (18.61%) was discovered in the bone. Highest fats (3.61%) was recorded in the flesh, followed by head (2.25) *while* (0.80%) recorded in the fins as the lowest fats. In fibre the highest (1.87%) was observed in head followed by (1.72) in the bone. The lowest fibre (0.60%) was reported in the flesh. The highest ash (22.02%) was recorded in fins, followed by bone (19.83%) *while* the lowest (1.30%) was discovered in the flesh

The highest moisture (75.76%) was recorded in the flesh, followed by fins (73.23) while the lowest (56.48%) was observed in the head.

The results of the proximate composition of flesh, head, bones and fins of *Scomber scombrus is presented* in table 2. The highest protein (29.44%) was observed in the head, followed by bone (28.40%) and *while* the lowest protein (24.30%) was discovered in the flesh. Highest fats (6.42%) was recorded in the flesh, followed by head (1.48%) *while* (0.95%) recorded in the bone as the lowest fats. In fibrate highest (1.11%) was observed in fin followed by (0.69%) in the flesh. The lowest fibre (0.59%) was reported in the head. The highest ash (6.37%) was recorded in head, followed by bone (5.07%) *while* the lowest (0.33%) was discovered in the flesh .The highest moisture (68.68%) was recorded in the flesh, followed by head (66.56%) while the lowest (37.20%) was observed in the fin. .The highest carbohydrate (5.58%) was recorded in the bone, followed by fin (5.28%).

Table 1 Proximate Compositions of the Various Part of *Clarias gariepinus (*mean ±standard deviation)

Body components	Protein %	Fat%	Fibre%	Ash%	Moisture %	Carbohydrate %
Flesh	21.76±0.42	3.61±0.28	0.60±0.13	1.30±0.35	75.76±0.71	0
Head	25.69±0.89	2.25±0.35	1.87±0.07	15.59±0.58	56.48±0.68	0
Bone	18.61±0.23	1.18±0.03	1.72±0.14	19.83±0.25	60.81±0.27	0
Fins	19.14±0.71	0.80±0.01	1.32±0.01	22.02±0.02	73.23±0.35	0

Table 2. Proximate Compositions of the Various Part of *Scomber scombrus (*mean ±standard deviation)

Body components	Protein%	Fat%	Fibre%	Ash%	Moisture%	Carbohydrate %
Flesh	24.30±0.42	6.42±0.59	0.69±0.01	0.33±0.07	68.68±0.95	0.00
Head	29.44±0.47	1.48±0.67	0.59±0.21	6.37±0.52	66.56±0.62	0.00
Bone	28..40±0.25	0.95±0.14	0.67±0.01	5.07±0.09	58.40±0.57	5.58±0.50
Fins	27.25±0.64	1.06±0.08	1.11±0.01	2.10±0.07	37.26±0.36	5.28±0.39

Every consumer wants to obtain a good quality nutrient especially protein from fish. Fish like any other animals show preferential bio-accumulation of nutrients in the various organs of the body. From this study, it has been observed that protein is more concentrated in the head than other parts of the body under investigation, followed by flesh then fins and lastly bone. The result of this study is at variance with that of Abolude and abdullahi (2005) where protein was more concentrated in the flesh of Bargus filamentous and hydrocynus brevis. The values of protein obtained from fish is less than (21.62-60.57%) reported by Effiong and Fakule (2011). These values indicate they are a rich source of protein to consumers. This finding similar to that reported by Eyo (2001). The values were higher than those reported in mackerel and oyster (Eyo, 2001). The protein content in fish range with species due to certain factors such as the season of the year, effect of spawing and migration, food availability etc. (Abdullahi, 2001).

The ash content was higher in the fish used for this experiment than those reported by Effiong and Mohammed (2008) with highest values (5.88 and 5.50) respectively in *late niloticus and Bagrus Bayad.* This could be attributed to the fish species, season, sex, or food availability (Effiong and Mohammed, 2008).

The high moisture contents recorded for the fish are comparable to those reported by other fresh water fish species such as *Mormyrus rume, Oreochromis niloticus* and *Clarias lazera* (Otitologbon *et al.,* 1997).

The fat concentration in this report is higher than the value (5.21%) of *Gymnarchus niloticus (*Adeyeye, and Adamu, 2005). This shows that the fish species mighty be very good sources of fish oil. This is required for food therapy in humans (Oyebanmiji *et al*., 2008). The significant reduction of fibre observed in this study posed no threat because fish is usually consumed as adjuncts or additives to other food. This observation concurred with the report of Adeyemi *et.al* (2013) who demonstrated that higher fibre is poorly digested by animals and interferes with other nutrients. Recently, the interest in dietary fiber has been stimulated due to its ability to prevent chronic diseases such as cardiovascular disease, cancer and diabetes mellitus (Adeyemi *et al* 2013).

In conclusion, this study have shown these fish species are good source of nutrients to the consumers and within the limits required by the body for healthy growth and development

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