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COMPARATIVE STUDIES OF NUTRIENT COMPOSITION OF WILD CAUGHT AND POND REARED AFRICAN CATFISH, CLARIAS GARIEPINUS

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ABSTRACT

Proximate composition of wild caught catfish sample from oguta lake and pond reared catfish (clariasgariepinusBurchell, 1822) were studied between October 2014 and November 2015. The comparative work was carried out to find out if habitat could affect the nutrient composition of the fish. Standard method was employed in the analysis of body nutrient. From the result of this study, there were significant difference between the protein content of wild clariasgariepinus and that of pond reared clariasgariepinus ($P<0.05$) from the pond raised catfish percentage crude protein was 60±1.30 and for the wild clariasgariepinuscrudeprotein percentage was 61±1.20. Also, for the pond reared clariasgariepinus the percentage fat was 21±1.31 Ash 1.62±0.25, dry matter 5.40±4.49, percentage crude fiber 0.2± 20.23 and energy 472.65±5.39, for the wild reared clariasgariepinus percentage fat was 27.23±5.47, percentage Ash 1.47 ±0.82, dry matter4. 75±0.89, percentage crude fiber 1.04±0.63 and energy 527.56±72.1. ($P>0.05$) There was significant difference between C. gariepinus raised in the pond and the one from wild caught for all the nutrients analyzed. This indicates that wild reared clariasgariepinus accumulates more crude protein, fat, ash, dry matter, crude fiber and Energy than pond raised clariasgariepinus. Wild caught catfish is also recommended for post-operation patients as it is a good healing agent.

KEYWORDS: Catfish, pond reared, wild caught, proximate composition, OgutaLake

INTRODUCTION

Fish occupies one of the foremost places among the food products of animal origin (meat, poultry, milk, eggs, etc.) in nutritive value because of the presence of valuable protein and easily assailable oils rich in vitamin and minerals (Novikov, 1983). The importance of the nutritional value of fish (Njoku, 2005) lies on the fact that, the complex organic compounds in fish tissues are easily hydrolyzed into simple substances assimilated as "building blocks" for the restoration of worn-out tissues, body maintenance and energy sources to the consumer.

The chemical composition of fish depends upon the species, age, sex, season and environmental conditions (Novikov, 1983). The family, chloride are the most important tropical fish cultured in ponds. This is as a result of their unique qualities in cultured systems, including hardiness, resistance to diseases and parasites, tolerant of environmental conditions in captivity, fast growth, good table size and palatability (Oladosu et al, 1990, Keke and Njoku; 2008, Njoku et al, 2009).

Presently, there is a dearth of data on the nutrient composition of fish between wild caught from OgutaLakeandcultural specimens from concrete ponds. This study, therefore seeks to evaluate the nutrient profile of wild caught and pond raised catfish, clariasgariepinus with a view of finding out if there is any difference in their nutritional status.

MATERIALS AND METHODS

Study Area

The study was carried out in the fisheries and aquaculture Research farm of the AlvanIkoku Federal College of Education, Owerri which provided the farm – raised specimens used for the study, Oguta Lake, the largest natural lentic environment in South Eastern Nigeria was the source of the wild fish specimen evaluated, Owerri, the study area lies within the humid tropical climate, between longitude 6^o: 45^1 and 6^o: 56^1E and latitudes 5^o: 41^1 and 50: 44^1N (Ukagwu, 2014).

Six (6) tables – sized fish sample of Clariasgariepinus comprising of 3 from wild and 3 ponds with an average weight of 1.45kg raised was evaluated per week for a period of 13 months.

Experimental Design

Live samples of wild clariasgariepinus were caught from Oguta Lake with the help of fishermen while the pond raised sampled were sourced from the AlvanIkoku Federal College of Education, Owerri Fish Farm of the same average weight of 1.45kg. After the fish were landed, they were identified with the aid of the fish identification key by Reed et al, (1967) and Loveque et al, (1990). After identification, the fish was weighed with top load Salter balance in grams to the nearest 0.1 gramme and length measured in centimeter to the nearest 0.1cm using a measuring board. The fish was put in separate plastic buckets containing water and labeled as “wild” or “farmed”, a random sample of 1 specimen from each group was analyzed per week while the study lasted for the period of 13 months.

Samples were analyzed chemically in accordance with the Official Methods of the Association of Official Analytical Chemists (AOAC, 2003) 18^{th} edition. All analyses were carried out in duplicate.

Statistical Analysis

Gross energy was calculated using the following factors, crude protein = 23.9kj/g, crude lipids -39.8kj/g and NFE = 17.6kj/g (Schulz *et al*, 2008).

The two sets of data on the nutrient composition emanating from fish of different ecological habitats were subjected to t- test for the two sample classification in accordance with Nonnacott and Nonnacott, 1979 and Njoku, and Keke, 2003.

For significance difference. The model is as follows:

$$t = \frac{x_A - x_B - (NA - NB)}{} \text{ with } (nA + nB - 2) \text{ df}$$

$$sp = \sqrt{\left(\frac{1}{nA} + \frac{1}{nB} - 2\right)}$$

Where X_A = means values of nutrient from fish group A (wild)

X_B = mean value of nutrient from fish group B (pond)

Def= degrees of freedom

sp = pooled standard deviations defined as:

$$sp = \frac{(n_A-1)\,S^2_A + (n_B-1)\,S^2_B}{(No + NB - 2)}$$

RESULTS AND DISCUSSIONS

Tables 1-3 present result of proximate composition of clariasgariepinus from two different aquatic environments. A total of six parameters were considered, including crude protein, crude fat, crude fiber, ash, dry matter and energy.

For the wild sourced catfish from agate lake, for sample A had an average content of: crude protein was 59.69, fat 30.19, crude fiber 1.41, ash 1.43, dry-matter 4.05, energy 406.7. For sample B had an average content of: Crude protein was 60.94, fat 31.95, crude fiber 0.15, Ash 0.48, dry matter 4.20, energy 525.34. For sample C had an average content of, crude protein was 62.63, fat 19.55, crude fiber 1.56, Ash 2.51, dry matter 6.01, energy 440.34k/Cal.

For pond raised catfish, sample A had average content: crude protein was 59.57, Fat 21.93, crude fiber 0, Ash 1.97, dry matter 5.47, energy 470.48k/Cal, For sample Bit had an average content of: crude protein 62.63, fat 19.21, crude fiber 0.11, ash 1.54, dry matter 5.37, energy 467.40. For sample C had an average content of: crude protein 60.25, fat 22.05, crude fiber 0.55, ash 1.36, dry matter 5.38, energy 480.07k/Cal.

Table1: Composition of Clarias Gariepinus from Wild Caught (Oguta Lake)
Mean, Standard Error and Standard Deviation Values of Wild Caught C. Gariepinus

Sample	Nutrient %					K/Cal
	CP	Fat	Crude fiber	Ash	Dry matter	Energy
A	59.69	30.49	1.41	1.43	4.05	446.7
B	60.94	31.95	0.15	0.48	4.20	525.34
C	62.63	19.55	1.56	2.51	6.01	440.34
X + SE	61±1.20	27.23±5.47	1.01±0.63	1.47±0.82	4.75±0.89	470.21±72.1

Table 2: Composition of Clarias Gariepinus from Fish Pond
Mean, Standard Error and Standard Deviation Values of Pond Reared C.Gariepinus

Sample	Nutrient %					K/cal
	CP	Fat	Crude fibre	Ash	Dry matter	Energy
A	59.57	21.93	0	1.97	5.47	470.48
B	62.63	19.21	0.11	1.54	5.37	467.40
C	60.25	22.05	0.53	1.36	5.38	480.07
X + SE	60±1.31	21±1.31	0.22±0.23	1.62±0.25	5.40±4.49	472±5.39

Table 3: Comparism of Proximate Composition of Wild Caught and Pond Raised Catfish C. Gariepinus.

Sample	Nutrient %					K/cal
	CP X+SE	Fat X+SE	Crude fibre X+SE	Ash X+SE	Dry matter X+SE	Energy X+SE
Mean + SE	Wildpond 61±60± 1.201.31	Wildpond 27.2321 ±8.47±1.31	Wildpond 1.04±0.22 6.63±0.23	Wildpond 1.47±1.62 0.82±0.25	Wildpond 4.75±5.40 0.894.40	Wildpond 470.27±472.65 72.1±5.39
SD	1.471.31	6.701.60	0.770.29	1.010.31	1.095.50	88.36.60
t(0.05)	P < 0.05					

The protein content of wild sourced catfish crude protein was 61±1.20, Ash 1.47±0.82, fat 27.23±5.47, fibre 1.04±0.63, dry matter 4.75±0.89, energy 470.21±72.1. Shows slight variation which was supported to the findings of Ali, et al (2001), who reported that protein content which is a vital constituent of living cells tends to vary relatively little in healthy fish unless drawn upon during particular demands of reproduction or during fond deprivation periods. The slight variation observed in percentage crude fibre, protein, ash, moisture, fat, carbohydrate and energy within habitats may also be attributed to fish size, environment and type of food they eat. Boujard et al, (2004) and Gonzales et al (2006) found similar results on European sea bass (dietrarchuslabraec) and wild yellow perch (percaflavescens). These explorations validate my findings that higher crude protein and lower ash is associated with wild clariasgariepinus.

The proximate composition of pond catfish varies with that of the wild cultured catfish clariasgariepinus. This finding however supports the findings of Alsalver et al, (2002) on sea bass (DicentrarchusLabrax, Grigorakis et al (2008) on gilthead sea bream who reported higher lipid content in farmed. Labeorohita when compared with specimens from the river. This difference might be as a result of variety of factors including size, weight, species types of food and drying method. Results of the present study have revealed that environment significantly change the nutritional quality of clariasgariepinus. The proximate composition of wild and pond reared catfish have significant difference. This finding however support the findings of Alasaluar et al (2002) on sea bass (DicentrarchusLabrax), Grigorakis et al (2002) on gilthead sea bream (Spariusaurata), Grigorakis et al (2003), and Orban et al (2003) on sea bass. The result does not support the findings of Tahir (2003) who reported higher lipid content in farmed Labeorohita when compared with specimen from the river. This difference might be as a result of variety of factors including size, weight, specie, type of food and drying method. The major difference between the farm raised catfish and wild catfish is the size they reach. Farm raised catfish are harvested at 6-7 months of age while wild catfish will get bigger because thereare no time limit for wild fish to be harvested. Oduor – Odota et al (2008) found that lipids in fish vary greatly and this variation is related to feed, migratory swimming or sexual changes in connection to spawning.

Recently, Asma and Ashraf (2010) found a linear relationship between protein and age/size of fish in there carnivorous fish species (Wallaguattu, Mystusseenghala and Chinnamorulius) but quite inverse in lipids, because there was proportionate decline in the nutrient with increase in size. This might be as a result of the drying method or nutrient loss during drying.

My current finding was not supported by the finding of Cox and Karadhaddian (1998) who did not find significant differences in lipid contents when comparing wild and farmed yellow perch.The nutrient content varies slightly in the values of the fish sample analyzed, with crude protein of wild raised clariasgariepinus having slightly high values than that of pond sourced. The result does notagreewith the findings of (Steffens 2006; Ali et al 2006, ASMA & Ashraf 2010) who are of the opinion that the protein contact of a fish species is the same irrespective of the habitat where it was raised but may differ with the protein contentof another fish species. Srikanth et al (1989) reported that moisture content were lowest and protein deposition higher under the influence of fertilizer treatment. Mhbooh et al, (2004) also reported high protein contents in the farmed laborohita. Ali et al, (2001) reported that protein content which is a vital constituent of living cells tends to vary relatively little in healthy fishes unless drawn upon during particular demand of reproduction or during food deprivation period. Also, Okereke et al, (2013) recorded a significant difference in the crude protein of fresh and oven dried clariasgariepinus this shows that drying method also have a great influence on the nutritional quality of fish this result

agrees with the findings of Olayemi et al, (2011) who compared crude protein level of clariasgariepinus dried with local cut drum oven and NSPRI developed smoking kiln.

The physical appearance of the six (6) table size fish samples in this study shows that they are under the same healthy condition. Thus, the protein content only showed slight variation. In the study conducted by Ashraf et al, (2011) on grass carps it was discovered that the protein contents of farm raised grass carps (CtenophargngodonIdella) and silver carp were significantly lower than those caught from the wild. This conforms to the present study. The reason might be attributed to species difference.

The slight variation observed in percentage crude protein with habitats may also be attributed to fish's consumption absorption capability and conversion potentials of essential nutrients from their diet or their local environment into such biochemical attributes needed by the organism's body (Adewoye and Omotosho, 1997). This current finding is not supported by the findings of (Adewoye and Omotosho, 1997) and Adewoye et al., (2003).

There is also a slight variation in crude fibre,, fat, moisture,and energy of wild and pond raised catfishwith the wild clariasgariepinus significantly higher ($p<0.05$) than the pond raised clariasgariepinus and the pond raised clariasgariepinus significantly higher than the wild sourced clariasgariepinus in ash and carbohydrate.

This study shows that there is significant difference in crude protein, fat, fibre, ash, dry matter and energy of pond raised and wild sourced cat fish clariasgariepinus. This might be as a result of variety of factors including size, weight, type of food and feeding pattern, and method of drying.

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