International Journal of Fisheries and Aquatic Studies 2018; 6(6): 264-267

E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.549
IJFAS 2018; 6(6): 264-267

www.fisheriesjournal.com
Received: 06-09-2018
Accepted: 07-10-2018

Obany O Deng
Upper Nile University,
Faculty of Animal Production,
Department of Fisheries South Sudan

Correspondence
Obany O Deng
Upper Nile University,
Faculty of Animal Production,
Department of Fisheries South Sudan

Evaluation on nutritive value of four commercial fish species in River Nile

Obany O Deng

Abstract
The study was carried out to evaluate and assess the yield of edible, inedible parts and approximate composition of some River Nile species represented *Heterotis niloticus, clarias gariepinus, tetraodon lineatus, Malapterurus electricus.* The fillets percentage yield is 39.3±3.7%, 35.9±9.1%, 21.8±7.1%, 37.14% *Heterotis niloticus, clarias gariepinus, tetraodon lineatus, Malapterurus electricus* respectively. The mean nutritive value of protein 20.3±0.07, 18.3±0.04, 18.1±0.08, 19.3±0.08% *Heterotis niloticus, clarias gariepinus, tetraodon lineatus, Malapterurus electricus,* fat content 4.2±0.02%, 2.2±0.01%, 3.2±0.03%, 3.1±0.02% *Heterotis niloticus, clarias gariepinus, tetraodon lineatus, Malapterurus electricus*, moisture content 74.0±0.02%, 77.8±0.08%, 77.3±0.01%, 76.4±0.03%, ash content 1.5±0.06%, 1.7±0.06%, 1.3±0.04%, 1.3±0.02% respectively. At the end research concluded that all species are richest in food nutritive value.

Keywords: Evaluation, nutritive, value, commercial fish, species, river Nile

1. Introduction
Body composition of any edible animal, including fish, is a key indicator of its biological and functional condition. Measuring body composition is the key factor for evaluating the physiological condition, but is a time consuming process [11]. Proximate analysis for quantifying body composition of a fish is done through gaging different ingredients such as protein, fat, water content, Ash content, fibre and organic contents of that fish [5]. Fish Fillets according to [5], is a strip of flesh cut from a whole fish parallel to the backbone, it could be block or single fillet of which it is in high demand in developed world. The terms fillet and edible portion are difficult to define exactly since the portion eaten varied from one country to another [22] reported that the edible fraction of the different fish species varies widely between 30% -50% of total weight. The proximate composition of fishes is essential to estimate their energy value and to plan the most appropriate industrial and commercial processing [9]. Generally, composition of live-weight, whole fish is 70 to 80% moisture, 20 to 30% protein, and 2 to 12% lipid [15]. However, in different environmental conditions, the composition of the fish may differ in relation to the differences in water quality, feeding conditions, sex, and state of maturity and capture condition [4, 13, 18]. The lack of sufficient protein is one of the most widespread nutritional deficiencies in many tropical countries [6].
The purpose of this research is to evaluate and assess the yield of edible and inedible parts of some important second class fish species from River Nile (Kosti landing sites) represented by different species (clarias gariepinus, Malapterurus electricus, Heterotis niloticus, tetraodon lineatus (fahaka). To evaluate proximate chemical composition of four second class fish species.

2. Materials and Methods
2.1 Sample collection
Fresh fish samples were obtained from Kosti landing site eighty specimens of second class commercial fishes, twenty from each species. They were transported to the laboratory in fisheries research station Kosti for anatomical analysis.

2.2 Sample preparation and Estimated parameters
On arrival at the laboratory, the samples were identified to species level (using certified keys), cleaned and weighed (gm) using sensitive balance (5kg electronic balance scale).

Then the total length, standard lengths were measured in (cm). Furthermore fish samples were filleted, eviscerated, de-headed and skinned using sharpen knives. The weight of viscera, fillet with skin, head, skeleton and fins (with some adhesive meat), were weighed separately using the sensitive balance in (gm) to determine the percentages compared to the total body weight.

2.3 Proximate composition of different species

Moisture content, crude protein, fat and ash were determined for wet sample according to standard methods of Association of Official Analytical Chemists [2] as follows:

2.3.1 Determination of Moisture Content

The samples were first weight (Initial weight) then dried in an electric oven at 105 ^{0}C for 24-30 hours to obtain a constant weight. The moisture content was calculated as follows:

$$\text{Moisture content \%} = \frac{\text{Initial weight} - \text{Dry weight}}{\text{Initial weight}} \times 100$$

2.3.2 Determination of Crude Protein

The Kjeldal method for estimation of nitrogen was applied. Nitrogen content was converted to protein percentage by multiplying by 6.25 as follows:

$$\text{Nitrogen (\%)} = T \times 0.1 \times 0.014 \times 20 \div \text{Weight of sample} \times 100$$

$$\text{Crude protein \%} = N \times 6.25 = CP\%$$

2.3.3 Determination of Ash

Ash content was measured by weighing out sample into silica dish ignited and cooled before weighting then dish and content were ignited first and consequently at 500 ^{0}C until Ash got grey/white color.

$$\text{Ash \%} = \frac{\text{Fresh weight} - \text{Ashed weight}}{\text{Fresh weight}} \times 100$$

2.3.4 Determination of Fat

Fat content was measured by drying the samples at 100 ^{0}C in an oven and then extracting the crude fat with petroleum ether in a Soxhlet extractor for 4 hours.

2.3.5 Statistical analysis

The data were analysis by SPSS software (version 21), by one – way analysis of variance (ANOVA), at 5% confidence level using LSD.

All data were presented as mean ± standard deviation.

3. Result and Discussion

The present study was carried out on two mains aspect; body weight characteristics and proximate chemical composition of the four second grades fish species in White Nile River. The body characteristics of four second class fish species are shown as Heterotis niloticus had the highest edible portion percentage of 39.30%, while malapterurus electrics had 37.91%, clarias gariepinus had 35.91% and Tetraodon lineatus had lowest fillet percentage 21.84% respectively as shown in table (2) with their significant different at level (p<0.05). The means condition factor (K) of all species examines as they shown in table (3) there were no significant different at level (p>0.05) that mean all samples are in good condition.

Table 1: Body characteristics of Four Tropical Freshwater Fish Species.

Parameters	T. B.W (g)	T.L (cm)	S.L(cm)	H.W (g)	V.W (g)	S.W (g)	Frame	Fillet
Species	M±St.D	M±St.D	M±St.D	M±St.D	M±St.D	M±St.D	M±St.D	M±St.D
Heterotis niloticus	730.0±202.4^a	41.5±4.65^a	38.0±4.61^a	136.3±30.9^a	63.8±30.7^a	100.0±50.5^a	135.0±21.2^a	283.8±66.3^a
Clarias gariepinus	468.3±122.5^b	39.2±3.8^b	34.7±3.5^b	126.7±24.7^b	18.3±10.4^d	51.7±2.9^b	73.3±7.6^c	173.3±72.5^b
Tetraodon lineatus	275.0±76.0^d	24.0±5.4^c	20.2±4.7^d	43.5±21.3^c	45.0±28.1^b	31.7±16.3^c	101.5±60.9^b	60.8±30.5^d
Malapterurus electrics	356.7±122.9^c	26.7±3.5^d	23.0±3.0^c	41.7±12.6^d	23.3±10.4^c	100.0±22.5^a	51.7±22.5^d	135.0±58.9^c

^{a,b,c,d} Means superscript in the same column are significant different at level (p<0.05).
whereas:
T.B.W= total body weight, T.L= total length, S.L= standard length, H.W= head weight, V.W= viscera weight

Table 2: Slaughter yield of Four Tropical Freshwater Fish Species.

Parameters Species	Head % M±St.D	Viscera% M±St.D	Skeleton% M±St.D	Frame% M±St.D	Edible% M±St.D	Inedible% M±St.D
Heterotis niloticus	18.9±0.96^b	7.08±3.19^b	13.41±4.48^b	19.0±2.71^b	39.30±3.67^a	58.37±4.42^c
Clarias gariepinus	27.54±3.87^a	3.72±1.19^d	11.56±3.01^c	16.19±3.14^c	35.91±9.10^c	59.01±8.11^c
Tetraodon lineatus	16.22±7.15^c	15.12±7.62^a	13.26±7.62^b	35.63±16.09^a	21.84±7.05^d	78.16±7.19^a
Malapterurus electrics	11.81±0.60^d	6.42±0.72^c	28.80±3.54^a	14.15±1.51^d	37.14±3.56^b	61.19±2.11^b

^{a,b,c,d} Means superscript in the same column are significant different at level (p<0.05).

Table 4: Average length, weight and condition factor of four different fish species.

Fish species	Parameters		
	Average Weight (g)	Average Length (cm)	Condition Factor (K)
Heterotis niloticus	730.0	41.5	1.0214
clarias gariepinus	468.3	39.2	0.777
tetraodon lineatus	275.0	24.0	1.989
Malapterurus electrics	356.7	26.7	1.874

Table 4: Illustrate proximate chemical composition of four commercial fishes

Parameters Samples	Moisture	C.P	Fat	Ash	N.F.E
Heterotis niloticus	74.00±0.02^{c}	20.28±0.07^{a}	4.21±0.02^{a}	1.52±0.06^{a}	52.01±0.04^{a}
Clarias gariepinus	77.81±0.08^{a}	18.34±0.04^{c}	2.15±0.01^{c}	1.71±0.06^{a}	44.38±0.17^{c}
Tetraodon lineatus	77.30±0.01^{a}	18.17±0.08^{c}	3.22±0.03^{b}	1.32±0.04^{a}	45.40±0.03^{c}
Malapterurus electrics	76.42±0.03^{b}	19.25±0.08^{b}	3.13±0.05^{b}	1.29±0.02^{a}	47.24±0.01^{b}
^{a,b,c,} Means in the same column with superscript are significant different at ($p \leq 0.05$),					

All the fillets portions percentage of species examined in agreement with many reported that the edible fraction of the different fish species varies widely between 30% - 50% of total weight [22, 3, 17, 6] also reported 42.74% fillet for *Clarias gariepinus* with 54.83% of inedible parts. The filleting yield of the studied fish species was a reflection of their anatomy i.e. species with large heads and skeleton relative to musculature give lower filleting yield than those with smaller heads and skeletons [7, 1].

The result of proximate chemical composition of four second grades fishes in white Nile River as presented in table (4), the highest protein content was observed in *Heterotis niloticus* (20.28±0.07), followed (19.25±0.08) obtained *Malapterurus electrics* with their significant different ($p \leq 0.05$). There no significant different at level ($p > 0.05$) obtained between *clarias gariepinus* and *Tetraodon lineatus* as shown in table (4). The highest moisture content was observed from clarias, Tetraodon, while least was observed from Heterotis niloticus and malapterurus eletrics. There were no significant different ($p > 0.05$) observed among species in Ash content. Fat content and nitrogen free extract there were significant among species ($p \leq 0.05$) as shown in table (4). This result were in Agreement with [1, 21, 16, 19]. The relatively high percentage of crude protein may be attributed to the fact that these fishes are good source of protein but the differences observed among the selected groups could be as a result of fish consumption or absorption capability and conversion potentials of essential nutrients from their diets or their local environment. Similar findings were revealed by [20, 11, 8]. The four major constituents in the fillet portion of the fish are moisture, protein, fat and ash. The analysis of these four basic constituents of fish is often referred as proximate analysis [16, 14].

4. Conclusion

The research concluded that there are different variations in fillets parts and also in chemical composition in different fish species. All the four experimental fish species are richest in protein content so are important to solve hungry and food security because are source of animal protein for the people around the River and entire community.

5. References

1. Ali ME, Babiker SA, Tibin IM. Body Characteristics, yield indices and proximate composition of commercial fish species of Lake Nubian. Processing of FAO Expert Consultation on fish technology in Africa, Kenya and FAO Fisheries Report No. 1996; 574:211-214.
2. Associatioin of official Analytical chemistry, AOAC. Official methods of Analysis, Thirteenth edition, Washington DC. Association of official Analytical chemists, 1990.
3. Babiker MM. Dietary Nile Fishes: A Reclassification According to Nutritional Merit. Sudan Notes and Records. 1981; 62:161-170.
4. Brett JR, Shelbourn JE, Shoop CT. Growth rate and body composition of fingerling, sockeye salmon. *Onchorhynchus nerka* in relation to temperature and ration size. Journal of Fish Research Bd Can. 1969; 26:2363-2394.
5. Clucas IJ, Sutcliffe. An Introduction to Fish Handling and Processing. Tropical Products Institute. London, 1981.
6. Eyo AA. Fish processing Technology in the Tropics. University of Ilorin Press, Ilorin, Nigeria Ali, M., F. Iqbal, A. Salam, S. Iram and M, 2001.
7. Eyo AA. Carcass composition and filleting yield of ten fish Species from Kainji Lake. In FAO Fisheries Expert Consultation on Fish Technology in Africa, Ghana. 1989; 467:173-175.
8. FAO.The production of fish meal and oil. Fisheries Technical. 1986, paper.142.
9. Fawole OO, Ogundiran MA, Ayandiran TA, Olagunju OF. Proximate and mineral composition in some selected fresh water fishes in Nigeria. Internet Journal of Food Safety. 2007; 9:52-55.
10. Hanna GM. Proximate Composition of Certain Red Sea Fishes. NOAA Marine fisheries review. 1980; 46:71-75.
11. Jabeen F, Chaudhry AS. Monitoring trace metals in different tissues of Cyprinus carpio from the Indus River in Pakistan. Environ. Monit Assess. 2010b; 170:645-656. http://dx.doi.org/10.1007/s10661-009-1263-4.
12. Jakhar JK, Pal AK, Reddy AD, Sahu NP, Venkateshwarlu G, Vardia HK. Fatty Acid Composition of Some selected Indian Fishes. African Journal of Basic & Applied Sciences. 2012; 4(5):155-160.
13. Javaid MY, Salam A, Khan MN, Naeem M. Weight-length and condition factor relationship of a fresh water wild Mahaseer (*Tor putitora*) from Islamabad (Pakistan). Proceedings of Pakistan Congress Zoology. 1992; 12:335-340.
14. Joshi BD, Gupta DK, Chaturvedi LD. Biochemical composition of some tissues of a fresh water fish, Heteropneustes fossilis during winter months. Matsya. 1979; 5:47-49.
15. Love RM. The Chemical Biology of Fishes. Brown ME (Edn), Academic press. New York, USA, 1980.
16. Mahmoud ZN. Studies on Meat Quality of some Nile Fish. M.Sc. Thesis, Department of Zoology, University of Khartoum, Sudan. 1977; 65 pp.
17. Obanu ZA, Ikeme AI. Processing characteristics and yield of some fishes species of the river Niger in Nigeria FAO consultation of fish technology in Africa FIIU/R400 Supp. 1988; pp. 218-221.
18. Oliveira ERN, Agostinho AA, Matsushita M. Effect of Biological Variables and Capture Period on the Proximate Composition and Fatty Acid Composition of the Dorsal Muscle Tissue of *Hypophthalmus edentatus* (Spix, 1829). Brazilian Arch. Biol Technol. 2003; 46:105-114.
19. Omer AS. Preliminary Studies on the Chemical Composition of theFlesh of Hydrocyon forskali (Cuvier and Valenciennes, 1868) B.Sc. Honors dissertation

Department of Zoology, University of Khartoum, Sudan. 1984; 38 pp.
20. Onyia LU, Milan C, Manu JM, Allison DS. Proximate and mineral composition in some freshwater fishes in Upper River Benue, Yola Nigeria. Continental J.Food Science and Technology. 2010; 4:1-6.