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Proximate composition of *Oreochromis niloticus, Heteropneustes fossilis* and *Pangasius sutchi* collected from pond and open water

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ABSTRACT

The study was conducted on the three popular freshwater fish species of tilapia (*Oreochromis niloticus)*, shing, (*Heteropneustes fossilis)* and pangus, *(Pangasius sutchi)* collected from pond and open water in Mymensingh. All samples were evaluated by studying proximate composition. Crude protein, lipid, moisture and ash content (%) of *O. niloticus* collected from pond water were 19.27±0.82, 3.91±0.31, 73.42±0.60 and 0.96±0.06 respectively and 17.55±1.39, 3.77±0.34, 78.08±1.86 and 2.27±0.34 respectively for *O. niloticus* collected from open water. Crude protein, lipid, moisture and ash content (%) of *H. fossilis* of pond water were 14.09±0.96, 6.47±0.56, 78.94±1.08 and 0.95±0.07 respectively and 15.40±0.63, 4.00±0.11, 79.91±1.02 and 1.22±0.22 respectively for open water *H. fossilis*. Protein, lipid, moisture and ash content (%) of pond water *P. sutchi* were 20.89±1.03, 4.40±0.53, 75.77±0.66 and 0.94±0.03 respectively and for open water *P. sutchi* those were 19.06±1.80, 6.01±0.13, 75.22±0.87 and 1.26±0.28 respectively. The result revealed that pond water fishes have higher percentage of protein and lipid and lower percentage of moisture and ash in their body than the fishes of open water. The proximate composition may vary due to supply of higher protein and lipid concentrated artificial feed in the pond whereas open water sources have no opportunity to supply of artificial feed.

INTRODUCTION

The aquatic environment of Bangladesh is diversified and its bio-diversity is well rich in productivity. Many fish species are surviving in our water body from year after year. Our aquatic resources like; rivers, canals, ponds, haors, baors, lakes, ditches, and flood plains are very much productive for aquatic flora and fauna. But our water body has degraded and its glorious days of fish assets from a few years ago. Once upon a time, we could not think a single day without fish consumption and then we were termed as "Mache Bhate Bangali".

Bangladesh is blessed with large water reservoirs containing 260 freshwater species and 475 marine species (DoF, 2014). Among the freshwater fishes, catfish is an important group of fish in our Country. Indigenous catfish such as *Heteropneustes fossilis, Mystus vittatus, Clarias batrachus, Rita rita, Mystus aor, Aila coila* etc. have been contributed greatly as a delicious and nutritive food fish of our country. The meat of catfish is well known for palatability and has great market value. Fish normally has more poly unsaturated fatty acids than animal fats. Since their importance from medical point of view is obvious. An increasing amount of evidences suggest that due to its high content of polyunsaturated fatty acid fish flesh and fish oil are beneficial in reducing the serum cholesterol (Stansby, 1985). Proximate composition generally comprises the estimation of moisture, protein, fat and ash

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contents of the fresh fish body. The percentage composition of these constituents accounts for about 96-98% of the total tissue constituents in fish (Nowsad, 2007).

Seasonal variations in the various biochemical constituents of muscle and liver were studied in the catfish, *Heteropneustes* (Bloch). The fat content of the muscle showed two peak periods of accumulation—one during November and other during May–July. Liver was richer in fat than the muscle and it was also characterized by two distinct phases of high fat contents in May and in September. Moisture variations were found related inversely to the quantitative changes in the fat content. Protein and ash contents were also greatly influenced by seasons. In general protein and ash values were low during winter and high during summer or monsoon months.

Tilapias are currently having important impacts on poor people in developing countries (Edwards, 2003; and little, 2003). But the culture practice of tilapia varies to a great extent from country to country and even among the different farms.

The species *Pangasius sutchi is* very popular in Bangladesh due to its delicious taste, lucrative size, high maket demand and cheap price, fast growth rate, disease resistance and ability to tolerate poor quality condition. These featured make it as a vast culturable species in Bangladesh. The fish has also higher amount of fat and protein content.

Proximate composition of fish varied widely from species to species and even within the same species from one individual to another. This individual variation is normally due to some factors such as size, age, season, sex and geographical location (Stansby, 1962).

The present study was undertaken with the objectives to analyze the proximate composition of three freshwater fish species of tilapia (*Oreochromis niloticus)*, shing (*Heteropneustes fossilis)* and pangus *(Pangasius sutchi)* that harvested from pond and open water stock and evaluate their nutritional quality.

MATERIALS AND METHODS

Sample collection and processing

The study was conducted during July 2013 to December 2014 and the freshwater fish species of tilapia (*O. niloticus)*, shing (*H. fossilis)* and pangus *(P. sutchi)* were collected from Mymensingh Messua Bazar, Mymensingh Town, Bangladesh. The collected fishes were brought to the laboratory of Fisheries Technology Department, Bangladesh Agricultural University, Mymensingh with ice in insulated box. The average weight of the experimental species was tilapia 350g/species and 170g/species, shing 115g/species and 135g/species and pangus 1.25kg and 4.50kg, pond and open water respectively. Two representative samples of each fish were packed and kept in -20°C for further study.

The frequency of monitoring was once a week up to 12 weeks. Frozen fishes were thawed and soaked with wet tissue paper. Only fish muscle was collected for the further examination. Then the muscle was chopped and finally ground with a blender for homogenous mixture.

Bio-chemical analysis

The analytical methods for proximate analysis were: Protein, Lipid, moisture and ash contents of the fishes were determined by AOAC method (1980). The samples were subjected to analysis by Atomic Absorption Spectrophotometer (HG-AAS, PG-990, PG Instruments Ltd. UK) at "Professor Mohammad Hossain Central Laboratory", Bangladesh Agricultural University, Mymensingh, according to the method of Clesceri et al. (1989).

RESULTS AND DISCUSSION

Sensory assessment of fishes

During sample collection the sensory assessment of the collected fishes were performed. The scores of sensory assesment were varied from 1 to 3 (Table 1). Sensory characteristics were fresh, bright, soft and fresh odour. Since the prosperity of most fish businesses depends on maintaining the quality of their products at a consistently high level, the importance of sensory assessment is obvious (FAO, 1989).

Table 1
The sensory assessment of fishes.

Type of fish	Organoleptic characteristics	Grage point	Degree of freshness
Type-1	Natural odour of gills and flesh**,** slightly Pinkish red colour of gills, full bloom, bright, shining, iridescent appearance, transparent eye, flesh of fish is moderately soft and elastic. Slime of fish is usually clear, transparent and uniformly spread but occasionally may be slightly opaque or milky.	<2	Excellent
Type-2	Sour odour, brown or gray colour of gills covered with mucus, Flesh of fish some loss of elasticity. Slime is becoming turbid opaque and milky, amount of slime present in skin.	2 to <5	Good
Type-3	Bad odour of fish, Flesh,of fish loss of elasticity. Dull, sunken, cloudy eye and whitish or graish gill. Slime of fish is thick, sticky, yellowish greenish in colour.	5	Rejected

Table 2
Proximate composition of *O. niloticus, H. fossilis* and *P. sutchi.*

Species	Protien content %		Lipid content %		Moisture content %		Ash content %	
	Pond Water	Open water	Pond Water	Open water	Pond Water	Open water	Pond Water	Open water
O. niloticus	19.27±0.82	17.55±1.39	3.91±0.31	3.77±0.34	73.42±0.60	78.08±1.86	0.96±0.06	2.27±0.34
H. fossili	14.09±0.96	15.40±0.63	6.47±0.56	4.00±0.11	78.94±1.08	79.91±1.02	0.95±0.07	1.22±0.22
P. sutchi	20.89±1.03	19.06±1.80	4.40±0.53	6.01±0.13	75.77±0.66	75.22±0.87	0.94±0.03	1.26±0.28

Proximate composition

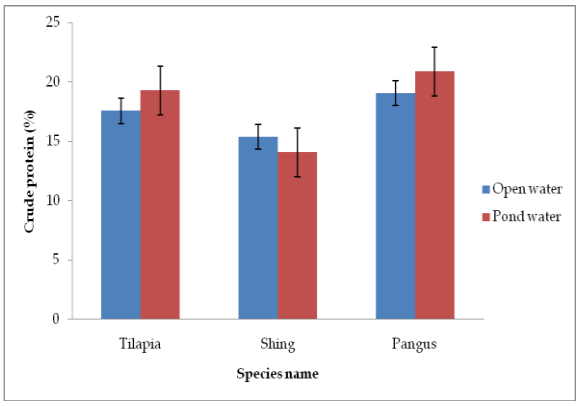

Figure 1
Protein content of *O. niloticus, H. fossilis* and *P. sutchi.*

Protein

The average protein content (%) was 19.27±0.82 and 17.55±1.39 for *O. niloticus*, 14.09±0.96 and 15.40±0.63 for *H. fossilis* 20.89±1.03 and 19.06±1.80 for *P. sutchi* collected from pond water and river water respectively (Table 2). *O. niloticus* and *P. sutchi* grown in pond water have more protein than the fishes collected from open water. Whereas the protein content of *H. fossilis* was more in open water than pond water (Figure 1).

The protein content of the fishes in this study was more or less similar to the result of Hussain et al. (1999). Shreni and Jarif (1977) reported that the muscle protein values did not registered wide range of seasonal fluctuations. In a year, the range of variations was found to from 11% to 19% approximately.

Lipid

The average lipid content (%) was 3.91±0.31 and 3.77±0.34 for *O. niloticus* 6.47±0.56 and 4.00±0.11 for *H. fossilis* and 4.40±0.53 and

4.00±0.11 for *P. sutchi* collected from pond water and river water respectively (Table 2). The lipid content of *P. sutchi* was more in pond water than open water, whereas the lipid content of *H. fossilis* was more in pond water than open water (Figure 2).

Hossain et al. (1999) reported the lipid contents of some selected fishes from Mymensingh ranged from 1.87 to 9.55%, the findings of the present study were within the range. Similar results were also reported by Rahman et al. (1994).

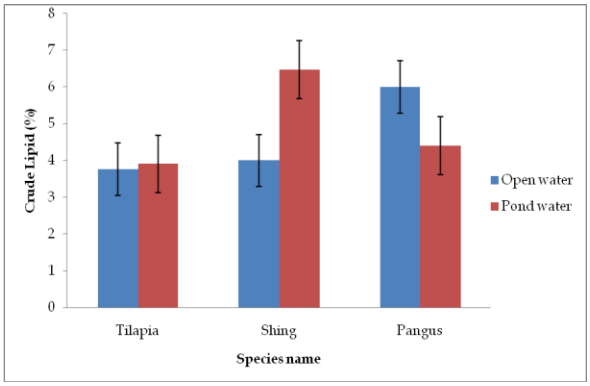

Figure 2
Lipid content of *O. niloticus*, *H. fossilis* and *P. sutchi.*

Moisture content

The average moisture content (%) was 73.42±0.60 and 78.08±1.86 for *O. niloticus*, 78.94±1.08 and 79.91±1.02 for *H. fossilis* and 75.77±0.66 and 75.22±0.87 for *P. sutchi* collected from pond water and river water respectively (Table 2). *H. fossilis* contains more moisture than *O. niloticus* and *P. sutchi*. Pond water fishes have less moisture than the fishes collected from open water except *P. sutchi*.

The high moisture content of the fish sample would increase the deterioration level of fish when kept for a long time. This is because the micro-organisms would be highly active with high moisture content (Figure 3) Chowdhury (1981) reported more or less similar result for the same species. He showed an inverse relationship between fat and moisture which was supported by the present study.

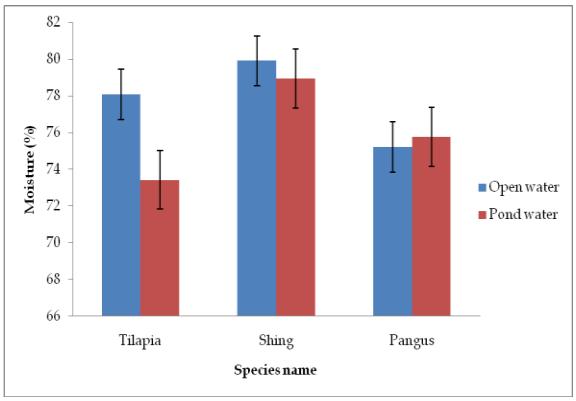

Figure 3
Moisture content of *O. niloticus*, *H. fossilis* and *P. sutchi*

Ash

The average ash content (%) was 0.96±0.06 and 2.27±0.34 for *O. niloticus*, 0.95±0.07 and 1.22±0.22 for *H. fossilis* and 0.94±0.03 and 1.26±0.28 for *P. sutchi* collected from pond water and river water respectively (Table 2). *O. niloticus* contain more ash than *H. fossili* and *P. sutchi*. All the open water fishes present more ash content than the fishes collected from pond water (Figure 4). Chowdhury (1981) reported higher ash content in *H. fossilis* (3.15±0.25%) which might be due to variation in season and methos used in the studies (Figure 4).

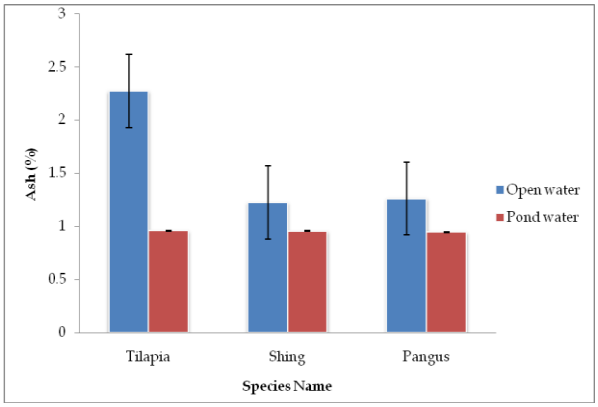

Figure 4
Ash content of *O. niloticus*, *H. fossilis* and *P. sutchi.*

CONCLUSION

The protein content of *O. niloticus*, *H. fossilis and P. sutchi* was minimum and moisture was very

high level. The result revealed that pond water fishes have higher proximate composition percentage of protein and lipid and lower percentage of moisture and ash in their body than the fishes of open water. The proximate composition may vary due to supply of higher protein and lipid concentrated artificial feed in the pond whereas open water sources are not limited. The study will care the people about the nutritional value of the pond and open water that is essential for health.

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