

Nutritional analysis of three different cultured fishes of Bangladesh

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Abstract: Nutritional Analysis of the farmed fish species named Pangas (*Pangasianodon hypophthalmus*), Mrigal (*Cirrhinus cirrhosus*), Carfu (*Cyprinus carpio*) from cultured ponds, wholesale markets and local retail markets were studied in order to evaluate their percentage of moisture, protein, fat, ash. The study focused on the proximate composition and the mean value of moisture was 72.86% in Pangas, 75.16% in Mrigal, 73.23% in Carfu. In case of ash the average value was 1.75% in Pangas, 2.25% in Mrigal, 2.23% in Carfu. The mean value of fat content was 8.17% in Pangas, 3.56% in Mrigal and 7.11% in Carfu. It was observed that the average value of protein were 15.30% in Pangas, 20.89% in Mrigal and 18.10% in Carfu. Each of these three fishes was collected from 9 different sources. We collected these species from Cultured ponds, Wholesale Markets and Local Retail Markets. Highest amount of moisture content was 79.57% in Pangas (*Pangasianodon hypophthalmus*), Ash and Fat variation was highest in Pangas (*Pangasianodon hypophthalmus*) fishes, Protein variation was highest in Mrigal (*Cirrhinus cirrhosus*).

Keywords: biochemical, pangas, mrigal, Carfu, Bangladesh.

I. INTRODUCTION

Bangladesh is one of the world's leading inland fisheries producers with a production of 3410254 metric tonnes during 2012-13 [1]. They have significant role in nutrition, income, employment and foreign exchange earning of the country. Frozen fish and fisheries products contribute to nearly 5% of the country's foreign exchange earnings of Bangladesh [2]. Fish is an essential and irreplaceable food item in the rural Bangladeshi diet [3]. Fish have rich source of essential nutrients required for supplementing both infant and adult diets [4]. Fish is predominantly composed of water, lipid, ash and protein and small amounts of carbohydrates and non-protein compounds [5-9]. Most fish have protein contents between 15 and 30 wt%, fat contents between 0 and 25 wt%, and moisture contents between 50 and 80 wt% [10]. Percentage of composition may change within and between species and also with size, sexual condition, feeding, time of the year and physical activity [11]. So it is important to analyse biochemical composition of protein, fat and ash of fishes that we consume regularly. Although some quality research work have been done [12-15] on the proximate analysis of some commercially important fishes of Bangladesh but no work on Pangas, Mrigal, Carfu that reflects the proximate analysis of fish species with environmental variation. This study was carried out in order to assess the percentage of proximate composition of the three fish species from different environmental condition through laboratory analysis.

II. MATERIALS AND METHODS

A. Samples Collection

The sample of 3 species of fishes were collected from 3 cultured ponds of Comilla, 3 wholesale market of Dhaka,

and 3 retail local retail market of Dhaka in the early hours of the day and carried to Food Microbiology section of Institute of Food Science and Technology, Bangladesh Council of Scientific and Industrial Research, Bangladesh. Samples were collected with and transported to laboratory with a sterile aseptic container.

For the analysis following 3 species of fish were selected- Pangas (*Pangasianodon hypophthalmus*), Mrigal (*Cirrhinus cirrhosus*), Carfu (*Cyprinus carpio*). Following parameters were examined in this study - Moisture, Ash, Protein, Fat.

B. Sample Preparations

Samples were taken away from ice box and washed thoroughly with distilled water. After that the samples were cut into very small pieces (2/3 g) for analysis.

C. Methods of estimation

We estimated Moisture and ash contents of the fishes by AOAC method [16] with the help of controlled oven and Muffle furnace.

The estimation of fat content of experimental raw fish were conducted by Bligh and Dryer method [17]. For the determination of the crude protein of fish Micro- Kjeldhal method was used [18].

Calculations:

Calculation of Moisture:

$$\text{Moisture (\%)} = \frac{\text{Weight loss}}{\text{Original weight of the sample taken}} \times 100$$

Calculation of Ash:

$$\text{Ash (\%)} = \frac{\text{Weight of dry samples}}{\text{Original weight of the samples taken}} \times 100$$

Calculation of Fat:

$$\text{Fat (\%)} = \frac{\text{Weight of the residus}}{\text{Weight of the samples taken}} \times 100$$

Calculation of Protein:

$$(\%) \text{ Of Nitrogen} = \frac{(\text{Titration Reading} - \text{Blank Reading}) \times \text{Strength Of Acid} \times 100/5 \times 100}{\text{Weight Of The Sample}}$$

in this case empirical factor was 6.25 for the fish
Protein (%) = % of Total N2 × 6.

III. RESULTS AND DISCUSSIONS

Tables (1-3) shows Moisture %, Ash %, Fat %, Protein % of 27 samples of three fishes collected from 9 different environment-

Table 1: Proximate Composition of Pangas (Pangasianodon hypophthalmus) fishes

Samples	Moisture %	Ash %	Fat %	Protein %
Comilla Pond-1-Pangas	72.60	1.39	8.99	13.85
Comilla Pond-2-Pangas	75.16	1.25	7.03	15.91
Comilla Pond-3-Pangas	69.72	1.04	9.69	16.85
Wholesale Market-1-Pangas	71.22	1.26	8.36	16.78
Wholesale Market-2-Pangas	71.96	2.26	9.70	15.23
Wholesale Market-3-Pangas	72.70	1.94	8.52	14.31
Local Retail Market-1-Pangas	69.01	2.95	8.43	16.95
Local Retail Market-2-Pangas	73.87	1.98	7.55	14.33
Local Retail Market-3-Pangas	79.57	1.75	5.33	13.52

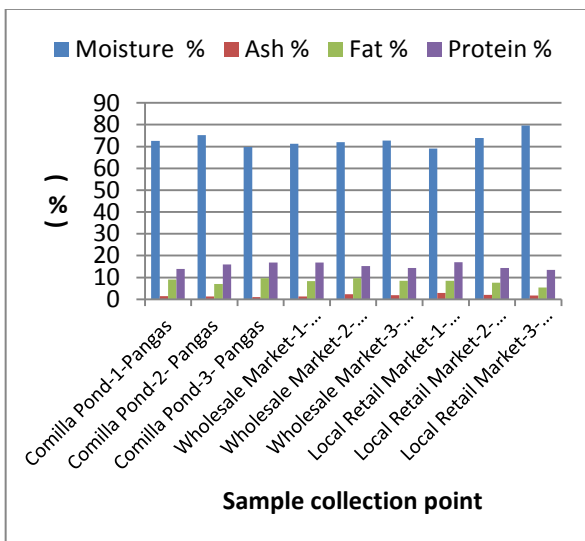


Fig-1: Variation of moisture, ash, fat and protein among Pangas (Pangasianodon hypophthalmus) fishes which collected from nine different sources.

Table 2: Proximate Composition of Mrigal (Cirrhinus cirrhosus) fishes

Samples	Moisture %	Ash %	Fat %	Protein %
Comilla Pond-1-Mrigal	74.68	2.27	2.92	20.94
Comilla Pond-2-Mrigal	71.87	2.25	4.63	21.99
Comilla Pond-3-Mrigal	77.35	2.54	2.49	22.43
Wholesale Market-1-Mrigal	74.59	2.20	5.09	21.53
Wholesale Market-2-Mrigal	72.11	2.22	2.58	20.99
Wholesale Market-3-Mrigal	76.74	2.75	2.29	19.83
Local Retail Market-1-Mrigal	76.77	1.99	4.48	20.67
Local Retail Market-2-Mrigal	75.07	2.54	2.84	20.45
Local Retail Market-3-Mrigal	77.26	1.53	4.74	19.20

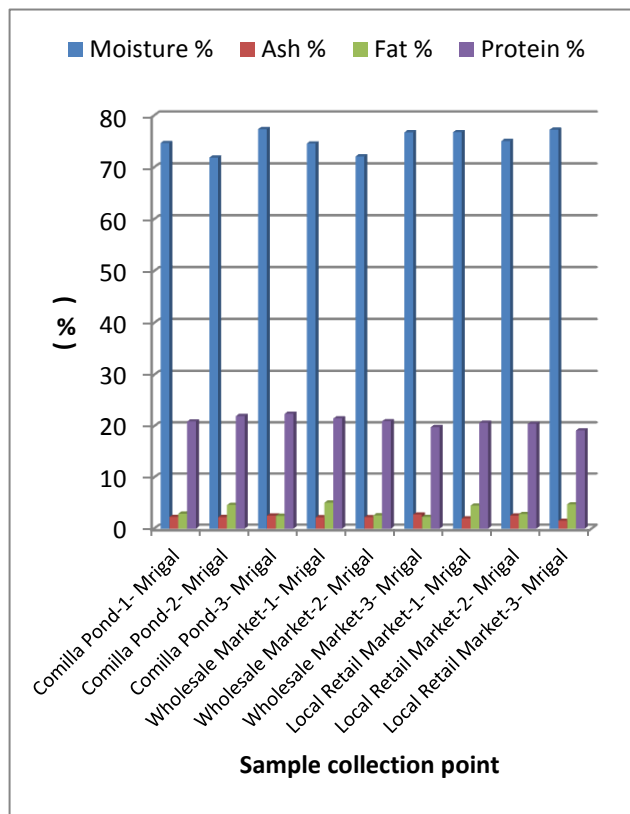


Fig-2: Variation of moisture, ash, fat and protein among Mrigal (Cirrhinus cirrhosus) fishes which collected from nine different sources.

Table 3: Proximate Composition of Carfu (Cyprinus carpio) fishes

Samples	Moisture %	Ash %	Fat %	Protein %
Comilla Pond-1-Carfu	76.03	1.55	6.88	15.90
Comilla Pond-2-Carfu	70.43	2.35	7.86	19.10
Comilla Pond-3-Carfu	73.07	2.58	8.56	17.03
Wholesale Market-1-Carfu	73.88	2.26	6.90	16.92

Wholesale Market-2- Carfu	74.76	2.02	6.31	18.20
Wholesale Market-3- Carfu	75.65	2.39	6.01	16.98
Local Retail Market-1- Carfu	75.37	2.22	8.06	17.84
Local Retail Market-2- Carfu	69.88	2.65	6.27	21.08
Local Retail Market-3- Carfu	70.08	2.10	7.17	19.91

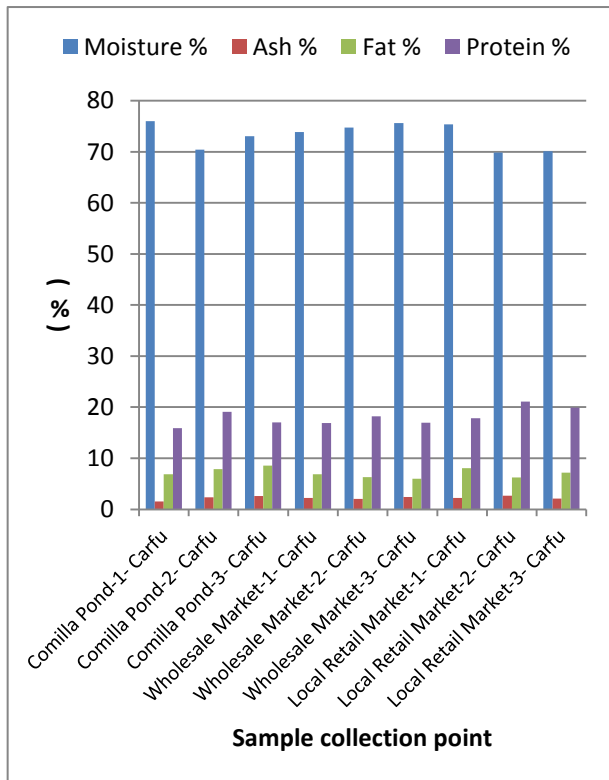


Fig-3: Variation of moisture, ash, fat and protein among Carfu (Cyprinus carpio) fishes which collected from nine different sources.

In case pangas fishes we can see that moisture varies from 69.01% to 79.47%. Average value of moisture content is 72.86% which is the near about the finding of Thammapat et al[19] and Karl et al[20]. The highest value of moisture among the all Pangas sample found in the sample collected from Local retail market -3 and lowest found in the sample collected from the Local retail Market -1.

Among the 9 samples of Mrigal, highest moisture found was 77.26% and lowest was 71.87%. Average value of moisture in Mrigal samples was 75.16% which is the similar to the finding of The highest value of moisture among the all Mrigal samples found in the sample collected from Local retail market -3 and lowest found in the sample collected from the Comilla Pond -2. Our findings are near to the finding of the study of *Mrigal (Cirrhinus cirrhosus)* by Manirujjaman et al[21]

The highest value of moisture in all Carfu samples was 76.03% and lowest value was 69.88%. The average value of moisture in all 9 samples of Carfu was 73.23%. The highest value of moisture among the all Carfu samples

found in the sample collected from Comilla Pond-1 and lowest found in the sample collected from the Local Retail market-2. The finding of the present study are similar to the study of Chatakondi et al [22].

Fat and Protein contents:

It is observed that fat content of pangas fishes differs from 5.33% to 9.70%. The highest fat content is found in pangas fishes which are collected from Wholesale Market-2 and the lowest amount of fat is found in the fishes which are collected from Local Retail Market-3. The difference between the two values is 4.27%. The difference value is almost double. The examination shows that Pangas fishes from Local Retail Market-3 contains the lowest amount of protein- 13.52% and Pangas fishes from the Local Retail Market-1 contain highest amount of protein-16.95%. These results are more or less similar to the findings of Thammapat et al[19] and Karl et al[20].

In the case of Mrigal fishes highest value of fat content is found in the fishes which are collected from Wholesale Market-1 and the value is 5.09 and the lowest amount of fat content is found in the Mrigal fishes which is bought from Wholesale Market-3. The lowest amount of fat content is 2.29%. The difference value is 2.80%. In the case of Mrigal fishes it is found that differences between highest value and lowest value is almost double as like as Pangas fishes. Protein content of Mrigal fishes varies from 19.20% to 22.43%. Highest value Mrigal fish is collected from Comilla Pond-3 and lowest valued Mrigal fish is collected from Wholesale Market-3. Our findings are near to the finding of the study of *Mrigal (Cirrhinus cirrhosus)* by Manirujjaman et al[21]

In the regards of fat content of Carfu fishes fat content is differs from 6.01% to 8.56% and the Carfu fishes are collected respectively from Wholesale Market-3 and Comilla Pond-3. Highest amount of protein content is 21.08% which is examined in the sample of Local Retail Market-2- Carfu and lowest amount of protein content is found in the sample of Comilla Pond-1- Carfu-15.90%. The findings of the present study are similar to the study of Chatakondi et al [22].

Ash contents:

We got maximum 2.95% Ash contents in Local Retail market-1 sample among the 9 Pangas samples collected from 9 different environment and lowest amount was 1.04%. The average value of Ash content in Pangas was 1.75% this was more or less similar to the result of Thammapat et al[19] and Karl et al[20].

We found 2.75% highest value of Ash in Wholesale Market -3 of all Mrigal Samples and lowest in local retail Market samples. Lowest value was 1.99%. The average value of Ash content of Mrigal samples was 2.25%. Our findings are near to the finding of the study of *Mrigal (Cirrhinus cirrhosus)* by Manirujjaman et al[21]

In case of Carfu we found Highest amount of Ash content-2.65% in Local retail Market and lowest amount of Ash content in Comilla pond -1 sample that was 1.55%. The average value of ash content in Carfu was

2.23%. The findings of the present study are similar to the study of Schwarz et al [23]

IV. CONCLUSION

The Present Findings describe the major nutritional composition of three different fish species for three different environmental conditions. Every fish species are reach in protein and fat content so they are suitable for daily diet. So, these species serve as an important source of animal protein and fat for the local people.

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