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Analysis of the Proximate Composition of Domesticated Stock of Pangas (*Pangasianodon hypophthalmus*) in Laboratory Condition

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Abstract
A study was undertaken to determine the proximate composition of aquarium reared pangus (*Pangasianodon hypophthalmus*) fish. Fresh aquarium pangas fish were used during the whole experiment and the fishes were under identical rearing conditions from fingerling till adult. The proximate biochemical composition of domesticated stock of raw pangas muscles were determined through determination of moisture, Protein, Fat and Ash of the edible portion. And the results indicates the moisture, protein, fat and ash percentage (%) were 78.29 ±0.22, 12.78 ±0.16, 16.55 ± 1.52 and 1.78 ±0.19, respectively. Therefore, this fish can play a significant role to fulfill the nutrient demand of the people in Bangladesh.

Key words: Aquarium fish, Pangus, Proximate composition

Introduction

Bangladesh has the third largest aquatic fish biodiversity in Asia with about 800 species in fresh, brackish and marine water (Hussain and Mazid, 2001). The country has a total of 265 freshwater species and 475 marine species and 24 exotic species (DoF, 2010). Fisheries sector contributed about 3% of the total export earning, 3.74% of GDP and 22.23% of agricultural sector in 2008-09 (DoF, 2010). Annual total fish production in 2008-09 in Bangladesh is about 2,701,370 MT (DoF, 2010). Fish also contributed about 58% to the nation's animal protein (DoF, 2010). At present annual fish intake by an individual is 17.52 kg and the annual fish demand is 29.74 metric tons (DoF, 2010). So it can reduce its malnutrition problem by increasing the production of fish.

Fish muscle comprises of moisture, protein and fat as a major nutrient components and carbohydrates, vitamins and minerals as minor components. So fish muscle contains all the nutrient components that is required most for human body maintenance. Fish and fish products are the most important sources of animal protein in the human diet. It comprises of all the ten essential amino acids in desirable quantity for human consumption. Fish protein is very rich in such amino acid as methionine, lysine and low in tryptophan compared to mammalian protein (Nowsad, 2007). Fish have rich source of essential nutrients required for supplementing both infant and adult diets (Abdullahi *et al*., 2001).

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 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). The assessment of the proximate composition of the fish is not only important to know its nutritive value, but also for its better processing and preservation (Mridha, 2005).

Due to increased demand for fish resources (fish being one of the major sources of protein), caused by the human population explosion, fish species capable of producing a higher biomass in a shorter period than native species were introduced. About 15 alien species of fish, mostly carps, were introduced to Bangladesh (Rahman, 1997).

Pangasianodon hypophthalmus is commonly known as pangas or iridescent shark in Bangladesh, belonging to the family pangasiidae, under the order Siluriformes. According to Roberts and Vidthayanon (1991) reported the origin of *P. hypophthalmus* was Siluriformes. According to Roberts and Vidthayanon (1991) the origin of *P. hypophthalmus* was from the Mekong river of Vietnam to the Chao Phraya River to Thailand from; subsequently it was spread over other countries such as Malaysia, Indonesia and China. According to David (1962) *Pangasius sp.* is highly tolerant to salinity, pH, dissolved oxygen, temperature or even pollution. *P. hypophthalmus* is well accepted by a wide range of people and

therefore, it has been a good source of protein and calorie. Poor, medium and better-off people in rural as well as urban areas. Their omnivorous diet consists of crustaceans, other fish, and plant matter (Axelrod, 1996).

Juvenile iridescent sharks are often sold as pets for home aquariums. However, they are not easy fish to keep, and are not recommended for home aquariums. Iridescent sharks are schooling fish that prefer to be kept in groups of five or more. If given enough room and feed adequately, an individual of this species can reach 1m (3 feet) in length. In most home aquariums, the amount of space an iridescent shark has severely stunts its growth. For this reason, most iridescent sharks kept in home aquaria grow to only 15 to 30 cm (6 to 12 inches) in length and die prematurely from organ failure.

The processor, the nutritionist, the cook and the consumer all have a direct interest in the composition of fish. 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 consumer is interested mainly in the edible part of the fish that is the flesh or muscle, the fish meal manufacturer is concerned with the composition of the whole fish. So, to know the composition of nutrients of the body of fish is very important for different users. Therefore, the aim of the present study was to determine the proximate composition of domesticated stock of pangus in laboratory condition.

Materials and Methods

The experimental fishes were collected from aquariums which were brought to the laboratory at fingerling stage in 2009. The average length of the fish at the time of experiment was 11 inch as they stayed in the aquarium which is not a suitable place for growing. The whole experiment was carried out at Fish Technology Research section of the Institute of Food Science and Technology (IFST) of Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhanmondi, Dhaka during September to December, 2011**.**

Preparation of the sample for test

The sample was cut into very small pieces for test various examinations. Determination of moisture content of the raw fish was conducted by AOAC method (AOAC, 1975). The crude protein of the fish was determined by Micro- Kjeldhal method (Pearson, 1999). The estimation of fat content of experimental raw fish had been accomplished by Bligh and Dyer method (Bligh and Dryer, 1999). The fresh raw samples (2/3 grams) were minced, weighed and ignited in the crucible. Then it was transferred in the Muffle Furnace held at dark red at a rate of 550^0-600^0C for 6-8 hours until the residue was white. Finally the percentage of ash content was calculated.

(a) Calculation of moisture :-

$$\%of\ moisture = \frac{Weight\ loss}{Original\ weight\ of\ the\ sample\ taken} \times 100$$

(b) **Calculation of protein :-**

The percentage of nitrogen I sample was calculated by the following formula-

% of N_2 = (Titration reading-blank reading) × Strength of Acid × 100/5 × 100/ weight of the sample. For most routine purpose the % of protein in the sample is the calculated by multiplying the % of N_2 with an empirical factor 6.25 for the fish.

% of the protein = % of total N_2 × 6.25

(c) Calculation of fat :-

$$\%of\ fat = \frac{Weight\ of\ the\ residue}{Weight\ of\ the\ sample\ taken} \times 100$$

(d) Calculation of ash :-

$$\%of\ ash = \frac{Weight\ of\ dry\ sample}{Original\ weight\ of\ the\ sample\ taken} \times 100$$

Statistical analysis: The data were collected from the experiment was tabulated and the final result was prepared by using both M.S Excel and SPSS 11.5 for windows.

Results and Discussion

The proximate composition of the studied fish found in the experiment has been shown in the table 1 and in figure 1.

Table 1. Proximate composition of Pangus.

Number of Samples	Moisture	Protein	Fat	Ash
1	78.26	12.78	14.53	1.37
2	78.47	12.94	18.54	1.89
3	78.60	12.50	15.58	1.99
4	77.90	13.00	16.74	1.87
5	78.05	12.63	17.89	1.83
6	78.36	12.58	16.14	1.92
7	78.50	12.85	15.90	1.85
8	78.40	12.69	14.24	1.88
9	78.15	12.88	18.03	1.56
10	78.20	12.85	17.95	1.68
Mean ± S.D	78.29 ± 0.22	12.78 ± 0.16	16.55 ± 1.52	1.78 ± 0.19

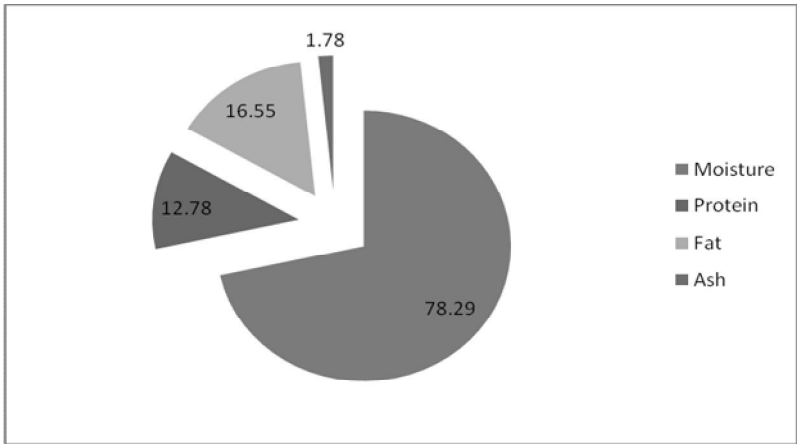

Fig. 1. Proximate composition of *Pangasianodon hypophthalamu*

Moisture

From the above results, the moisture percentage (%) was found 78.29 ± 0.22. This results coincides with the findings of Nabi and Hossain (1989) in *M. aculetus,* Salam *et al.* (1995) in *P.gonionotus* and Mazumder *et al.* (2008) in *A. mola, P. chola, G. chapra* and in *P. atherinoides.* These findings also agreed with observation of Marias and Erasmus (1977) in several freshwater fish species. Usually moisture and lipid contents in fish fillets are inversely related and their sum is approximately 80% (FAO, 1999).

Protein

The protein content (%) was 12.78 ± 0.16 which is more or less coincides with the findings of Mazumder *et al.* (2008) in *G. chapra* and *P. chola.* The results of protein percentage in *Labeo rohita* and *L. calabasu* of the research findings of Saha and Guha which were 16.6% and 14.7% respectively. Gheyasuddin *et al.*

(1979) also found the result of protein percentage in silver pomfret (*Stromateus cinereus*) was 16.70% and Ribbon fish (*Trichiurus haumela*) was 16.6% while the percentage was much higher in *C. gariepinus* 19.64% and in *Cirrhinus reba* 19.74% found by Osibona (2006) and Mridha *et al.* (2005) respectively.

Fat

The fat content (%) was 16.55 ± 1.52. Saha and Guha (1939) on their study about 34 species estimated

highest amount of fat in Hilsha 19.4%. The result is very much higher than some other commercial native fish to Bangladesh like Shoal (*Channa striatus*), Lata (*Ophiocephalus punctatus*) and Shingi (*Heteropneustes fossilis*) whose fat content was 0.64%, 1.08% and 1.23% respectively estimated by Qudrat-I-Khuda *et al.* (1962).

Ash

The ash content was 1.78 ± 0.19 which was nearer to the result of Abimbola (2010) in *Tilapia guineensis and Tilapia melanotheron* which contained 1.30% and 1.06% respectively. Mazumder *et al.* (2008) in *A. coila* and in *A. mola* also find similar ash percentage varied within 1.6% to 3.2%. The ash content of the fish (*O. rubicundus*) was also more or less similar to that of small indigenous species. Chakwa and Shaba (2009) found higher amount of ash content in *C. gariepinus* (3.06%) than the studied fish, while Devadsan *et al.* (1978) in his experiment found lower amount of ash content in six freshwater fishes *L. rohita* (1.31%), *Catla catla* (0.93%), *Cirrihinus cirrhosus* (1.40%), *L. calabasu* (1.02%), *Mystus seeghala* (0.91%) and *Wallagu attu* (0.72%).

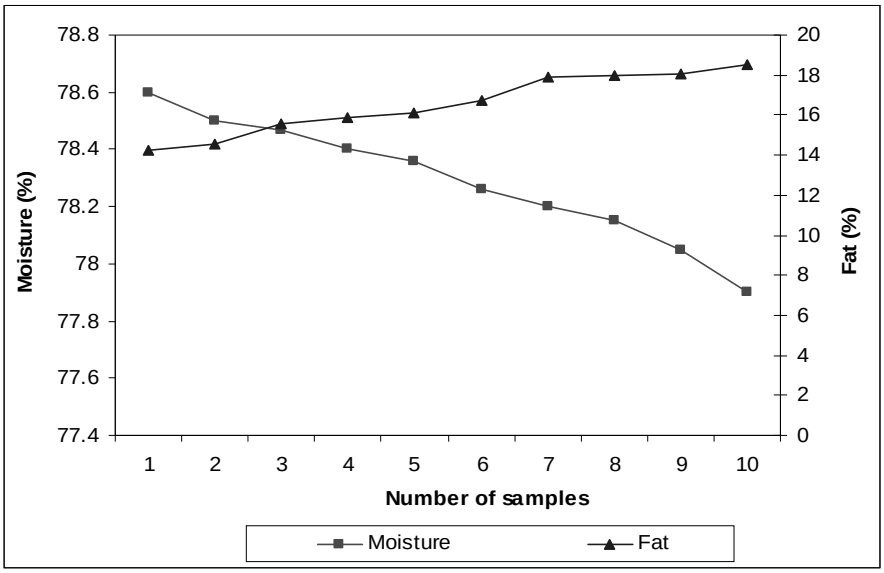

Fig. 2. Inverse relationship found between Moisture (%) and Fat (%).

According to Stansby (1954) and Salam *et al.* (1995), variation in proximate composition of fish flesh may vary with species variation, season, age and feeding habit of the fish. Generally moisture content shows inverse relationship with lipid content also found in the Pungus fish (Fig. 2). The inverse relationship has also been reported in marine fishes such as *Mugil cephalus* (Das, 1978); *Sarda sarda* (Zaboukas, 2006) and freshwater fishes *Mystus seenghala* (Jafri, 1968) and *Ophicephalus punctatus* (Jafri and Khawaja, 1968). Jacquot (1961) in his experiment found that fatty fish contained 68.6% moisture, semi fatty fish contained 77.2% and lean fish contained 81.8% moisture which showed the inverse relationship between fat and moisture content. Therefore, this fish can play a significant role to fulfill the nutrient demand of the people in Bangladesh.

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