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Comparative study on the nutritional composition of native Koi and cultured Thai Koi (*Anabas testudineus*) in Bangladesh

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Abstract

The study was carried out to analyze and compare the nutritional composition of native and Thai Koi (*Anabas testudineus*). The moisture, protein, lipid, carbohydrate, ash, and fiber contents were estimated in wet and dry matter basis of the samples. In wet matter basis, the mean value of moisture, lipid, protein, ash, fiber and carbohydrate were found as $67.20 \pm 2.78\%$, $7.84 \pm 1.01\%$, $15.60 \pm 0.70\%$, $6.81 \pm 1.34\%$, $1.33 \pm 0.18\%$ and $1.23 \pm 0.10\%$ respectively in native Koi while it was $68.72 \pm 5.27\%$, $7.88 \pm 2.01\%$, $16.14 \pm 2.18\%$, $5.30 \pm 0.33\%$, $1.02 \pm 0.25\%$ and $0.87 \pm 0.57\%$ respectively in Thai Koi. On the other hand, in dry matter basis, the mean value of lipid, protein, ash, fiber and carbohydrate were found as $32.80 \pm 2.78\%$, $23.85 \pm 1.08\%$, $47.63 \pm 1.88\%$, $20.64 \pm 2.33\%$, $4.09 \pm 0.90\%$ and $3.78 \pm 0.62\%$ respectively in native Koi while it was estimated as $31.28 \pm 5.27\%$, $25.11 \pm 2.10\%$, $51.75 \pm 1.75\%$, $17.10 \pm 1.84\%$, $2.94 \pm 0.70\%$ and $2.50 \pm 1.63\%$ respectively in Thai Koi. The study revealed that cultured Thai Koi contains higher nutrients than native Koi.

Keywords: Cultured Thai Koi, Native Koi, nutritional composition, dry matter basis, wet matter basis

1. Introduction

The nutritional excellence of fish flesh makes it one of the most valued foodstuffs in almost all the countries. Fish contain a rich source of essential nutrients required for supplementing both Infant and adult diet. About 85 to 90% fish protein is digestible and all the dietary essential amino acid is present in fish flesh^[1]. Fish normally has more poly-unsaturated fatty acids than animal fats. An increasing amount of evidences suggested that due to its high content of poly-unsaturated fatty acid, fish flesh and fish oil are beneficial in reducing the serum cholesterol^[2]. The special type of fatty acid, omega-3 polyunsaturated fatty acid, recognized as an important drug to prevent a number of coronary heart diseases^[3]. Fish contributes about 60% of the nation's animal protein intake and fish intake by an individual is 21.90 kg per annum in Bangladesh^[4].

Climbing perch (*Anabas testudineus*) is a small indigenous species of our country. It is very popular to the people of Bangladesh for its exceptional taste. Native climbing perch are freshwater fish, looks like greenish in color, contain high nutritional value and breed naturally. On the contrary, Thai climbing perch (*Anabas testudineus*) is one of the species having body spots all over the body surface (92.3%) and in some cases; limited spots were found (7.69%)^[5]. Because of higher growth rate and greater size of Thai climbing perch, it was first introduced in the aquaculture of Bangladesh around 2002 and nowadays farmers are passionate for its induced breeding and culture^[6].

At present many people of Bangladesh is found to suffer acute protein and calorie which shows growth retardation and also other disorders. Bangladesh has one of the highest rates of child and maternal malnutrition in the world. Roughly, half of its 126 million citizens live in deprivation while half of children under 6 years show evidence of chronic malnutrition^[7]. Therefore, the primary objectives of this study were to assess and compare the nutritional composition of native and cultured Thai koi (*Anabas testudineus*) and to convey an appropriate and authenticated message to the consumer about the nutritional quality of these species.

2. Materials and Methods

2.1 Collection of samples: Three samples from each variety (Thai Koi and native Koi) were collected and analyzed their nutritional composition for the present study. Thai Koi was collected from Kanasokhala market and Hazir market of Sherpur district and the native Koi from nearby natural floodplains. Then the samples were kept in an insulated cool box with ice and immediately transported to the laboratory of Aquaculture Department, Bangladesh Agricultural University, Mymensingh for analysis. Then the samples were labeled and stored at -20 °C until laboratory analysis.

2.2 Sample preparation for laboratory analysis: The samples were cut into small pieces with a sharp knife and grinded with an electric blender to make a homogenous pulp for analytical evaluation.

2.3 Determination of nutritional composition: The nutritional composition of fish samples were analyzed in triplicate following standard procedures AOAC (Association of Official Analytical Chemicals) on both dry and wet matter basis (AOAC, 2000) [8]. Moisture content of the samples were estimated by drying in an oven at 105 °C for 24 hours; crude protein content (N×6.25) by the Kjeldahl method using a BehrosetInKje M digestion apparatus and a Behr S I steam distillation apparatus (both labor- Technik GmbH, Dusseldorf, Germany), lipid by ether extraction in a soxhlet system SOCS, ash by incineration in a muffle furnace at 600 °C for 6 hours and crude fiber by filter crucible and hot extractor unit with 150 ml 0.128 H₂SO₄ at 230 °C. Carbohydrate content was calculated as total carbohydrate by difference that is subtracting the measured protein, lipid, ash, moisture and fiber content from 100.

2.4 Data analysis: The data were analyzed by MS EXCEL 2010 and XL-stat version 16 for DMRT to understand the differences of the variables and presented mostly in tabular and graphical form to illustrate the nutritional composition of the samples.

3. Results and discussion

3.1 Moisture and dry matter content

In wet matter basis, the moisture content in native and cultured Thai Koi was determined as 67.20±2.78% and 68.72±5.27% (Table 1) and the values of dry matter were found as 32.80±2.78% and 31.28±5.27% respectively in dry matter basis (Table 2). In this study, the contents of moisture were found to be slightly higher in cultured Thai Koi than native Koi while the dry matter was higher in the native Koi than Thai Koi. It could be as a result of balanced diet, age and aquatic environmental factors [9]. Similar result was found where the moisture content in native Koi was 69.27±1.04% [10]. The percentage of moisture between native and Thai Koi were 70.26±1.31% and 65.82±1.25% respectively [11]. This result is also coinciding with the present study.

3.2 Lipid content

The lipid contents of the analyzed native and cultured Thai Koi were analyzed as 7.84±1.01% and 7.88±2.01% respectively in wet matter basis (Table 1) while it was 23.85±1.08% and 25.11±2.10% respectively in dry matter basis (Table 2). In the present examination, the lipid content was found to be higher in cultured Thai Koi in both wet and dry matter basis. This distinction could be the result of

feeding artificial diet in cultured pond. Islam *et al.* (2017) also found the similar result in their experiment where they reported that cultured prawn and shrimp contain more lipid content than in collected from wild [12]. Content of lipid is also affected by many other environmental as well as physiological factors like gonad maturation, spawning period, and starvation [13]. Kamal *et al.* (2007) found that native Koi contained 7.79±2.73% lipid [10]. The experimental result is almost similar with prior studies of Monalisa *et al.* (2013) which showed that native and Thai Koi contain 8.64±0.56% and 11.28±1.35% lipid respectively [11].

3.3 Protein content

The protein content of native and cultured Thai Koi was estimated as 15.60±0.70% and 16.14±2.18% respectively in wet matter basis (Table 1) while it was 47.63±1.88% and 51.75±1.75% respectively in dry matter basis (Table 2). In this experiment, the content of protein was found to be higher in cultured Thai Koi than native Koi in both wet and dry matter basis. The considerable high amount of protein indicates that the Thai Koi is a good source of protein [13]. The variation in protein content could be due to the supply of balanced feed in Thai Koi during their culture period in ponds or tanks. The results are mostly coinciding with Kamal *et al.* (2007) [10] where they found that native Koi contained 19.63±0.5% protein. Again Monalisa *et al.* (2013) [11] found that native and Thai Koi contained 18.05±1.06% and 20.22±1.94% protein which nearly the same with the findings of the present study.

3.4 Ash content

The value of ash content of native and cultured Thai Koi was found as 6.81±1.34% and 5.30±0.33% respectively in wet matter basis (Table 1) while 20.64±2.33% and 17.10±1.84% found in dry matter basis (Table 2). This result indicate that native Koi contain higher amount of ash than the cultured Thai Koi. The findings of this experiment were more or less similar to the reports of Kamal *et al.* (2007) [10] where native Koi contained 3.31±0.83% ash. In another experiment Monalisa *et al.*, (2013) [11] showed that native and Thai Koi contained 1.30±0.09% and 0.98±0.04% of ash respectively.

3.5 Fiber content

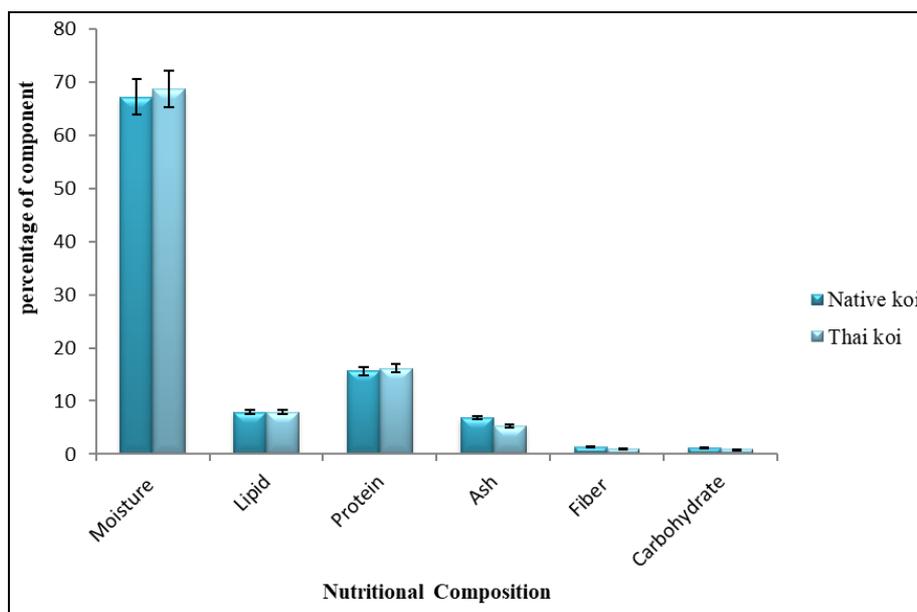
The fiber content of the samples of experimented native Koi was determined as 1.33±0.18% in wet matter basis (Table 1) and 4.09±0.90% in dry matter basis (Table 2) while in the samples of cultured Thai Koi it was 1.02±0.25% in wet matter basis (Table 1) and 2.94±0.70% in dry matter basis (Table 2). From the analysis it was observed that there is no significant variation of crude fiber content between two varieties on wet matter basis whereas notable variation found on dry matter basis. As native Koi consumes more plant origin food in the natural habitat, it contains higher amount of fiber than the other one.

3.6 Carbohydrate content

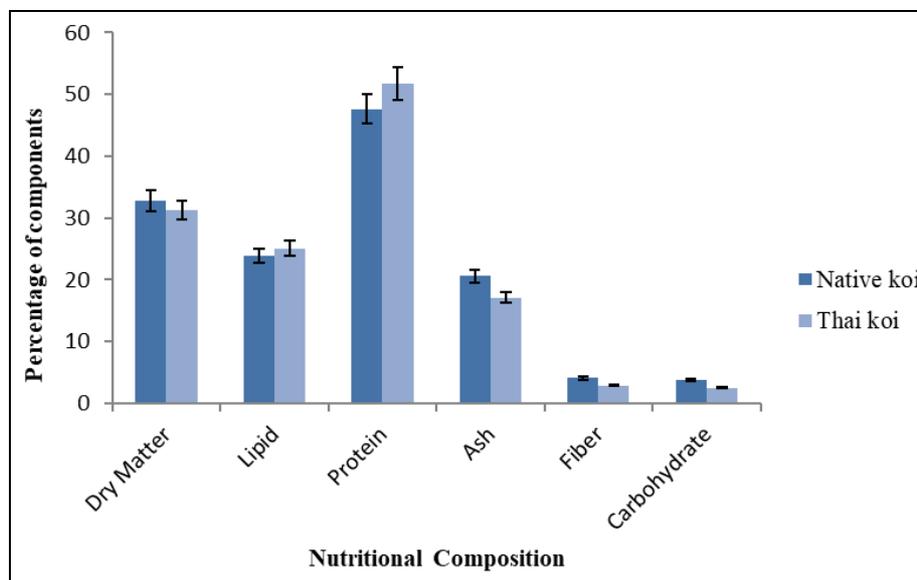
The carbohydrate content of native and cultured Thai Koi was calculated as 1.23±0.10% and 0.87±0.57% respectively in wet matter basis (Table 1) whereas 3.78±0.62% and 2.51±1.63% respectively in dry matter basis (Table 2). The result is mostly similar with the findings of Monalisa *et al.*, (2013) [11] where they found the carbohydrate content in native Koi was 1.74±0.93% and in Thai Koi it was 1.59±1.33%.

Table 1: Nutritional composition (Mean±SD) of cultured Thai Koi and native Koi (*Anabas testudineus*) in wet matter basis

Sample	Moisture (%)	Lipid (%)	Protein (%)	Ash (%)	Fiber (%)	Carbohydrate (%)
Native Koi	67.20±2.78	7.84±1.01	15.60±0.70	6.81±1.34	1.33±0.18	1.23±0.10
Cultured Thai Koi	68.72±5.27	7.88±2.01	16.14±2.18	5.30±0.33	1.02±0.25	0.87±0.57

**Fig 1:** Comparison on nutritional composition of native and cultured Thai Koi in wet matter basis.**Table 2:** Nutritional composition (Mean±SD) of cultured Thai Koi and native Koi (*Anabas testudineus*) in dry matter basis

Sample	Dry matter (%)	Lipid (%)	Protein (%)	Ash (%)	Fiber (%)	Carbohydrate (%)
Native Koi	32.80±2.78	23.85±1.08	47.63±1.88	20.64±2.33	4.09±0.90	3.78±0.62
Cultured Thai Koi	31.28±5.27	25.11±2.10	51.75±1.75	17.10±1.84	2.94±0.70	2.50±1.63

**Fig 2:** Comparison on nutritional composition of native and cultured Thai Koi in dry matter basis

4. Conclusion

The nutritional compositions of native and cultured Thai Koi estimated were significantly different which might be the influence of various factors like feeding regimes, living conditions, environmental factors and nutrition. However, the findings revealed that both the experimented native and cultured Thai Koi have excellent nutritive value. So these fish can play a significant role to fulfill the required nutrient demand of poor people of the country. However, further researches are needed to find out the variation of other

nutritive compounds like amino acid profile, fatty acid profile and minerals value of both native and cultured Thai Koi from different places.

5. Acknowledgement

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6. References

1. Cappell R, Wright S, Nimmo FA. Sustainable production and consumption of fish and shellfish. Environmental impact analysis. Final report of Defra LCA project. Haskoning UK Ltd, UK, 2007.
2. Stansby ME. Fish or Fish oil in the diet and heart attack. Mar. Fish. Review. 1985; 46(2):60-63.
3. Edirisinghe EM, Perera WM, Jayasooriya SP, Bamunuarachchi A. Health related fatty acids in some pelagic fishes in Sri Lanka. Sri Lanka J Aquat. Sci. 1998; 3:97-107.
4. DoF, National fish week 2019 compendium. Department of Fisheries. Ministry of Fisheries and Livestock. Bangladesh, 2019.
5. Biswas B, Shah MS. Taxonomic comparison of local and Thai koi (*Anabas testudineus*, Bloch) from Khulna, Bangladesh. SAARC Journal of Agriculture. 2009; 7(1):19-28.
6. Kohinoor AH, Zaher M. Breeding of exotic koi (*Anabas testudineus*) at BFRI. Fisheries Newsletter. 2006; 14(1):1-2.
7. United Nations Children's Fund (UNICEF). The state of the world's children 2009: maternal and newborn health. Unicef, 2008.
8. AOAC. Official methods of analysis of AOAC International. 17th edn. AOAC International Gaithersburg, MD, USA, 2000.
9. Gupta A, Sehgal HS, Sehgal GK. Growth and carcass composition of giant freshwater prawn, *Macrobrachium rosenbergii* (De Man), fed different isonitrogenous and isocaloric diets. Aquaculture research. 2007; 38(13):1355-1363.
10. Kamal D, Khan AN, Rahman MA, Ahamed F. Biochemical composition of some small indigenous fresh water fishes from the River Mouri, Khulna, Bangladesh. Pakistan journal of biological sciences: PJBS. 2007; 10(9):1559-1561.
11. Monalisa K, Islam MZ, Khan TA, Abdullah AT, Hoque MM. Comparative study on nutrient contents of native and hybrid Koi (*Anabas testudineus*) and Pangas (*Pangasius pangasius*, *Pangasius hypophthalmus*) fish in Bangladesh. International Food Research Journal. 2013; 20(2).
12. Islam A, Mondal S, Bhowmik S, Islam SB, Begum M. A comparative analysis of the proximate composition of wild and cultured prawn (*Macrobrachium rosenbergii*) and shrimp (*Penaeus monodon*). International Journal of Fisheries and Aquatic Studies. 2017; 5(4):59-62.
13. Bumb S. Studies on the Biology of Commerson's Glassy Perchlet *Ambassis commersoni* (Cuvier) (Doctoral dissertation, Goa University), 1992.