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COMPARATIVE STUDY ON THE MAJOR COMPONENTS IN DIFFERENT BODY REGIONS OF THE FARMED AND WILD *Osteobrama belangeri*

Biochemistry

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ABSTRACT

The present study was to analyse and compare the major components of farmed and wild captured *Osteobrama belangeri.* Major components of dorsal, ventral and caudal muscles were analysed. Higher moisture content (76.23± .26) was observed in farmed dorsal muscle collected during summer. The lipid content was found highest (14.38± .08) in the ventral muscle of wild fish which was collected during winter season. Farmed fish showed highest protein (%) in all selected body parts than wild captured fish in both seasons. The ash content was found in the ranges of 2.86± .15 to 5.43± .40 in all selected body parts.From the above study was revealed that all the fishes studied were good sources of moisture, lipid, protein and ash. Thus, consumption of this fish should be encouraged.

KEYWORDS:

Major components, farmed, wild, protein.

INTRODUCTION:

Fish is known to be one of the cheapest sources of animal protein and other essential nutrients required in human diet (Barua *et. al.,* 2012). It provides superior quality protein to that of meat, milk and eggs and well balanced essential amino acid profile, necessary minerals and fatty acids (Hossain, 1996). In addition to the fact that, fish flesh is tasty and highly digestible, it also minimizes the risk of heart diseases and increases life expectancy (Ashraf *et.al.,* 2011). The increase awareness of the health benefits of eating fish has raised the estimated fish demand in India. Fish regardless of location of capture is highly nutritious, tasty and easily digestible but it is not clearly known whether the culture fish have the same nutrient composition as their wild counterparts. This study targerted on the comparative analysis of the major components of farmed and wild *Osteobrama belangeri* (Pengba) in two different seasons of the year. Knowledge of composition of farm- raised and wild *Osteobrama belangeri* is very much important because it provides information on the nutritional data that is relevant for dieticians and the entire populace and also shows how the content varies with location as well as season.

O. belangeri (Valenciennes, 1844), which is locally known as "Pengba" is a medium carp, belongs to cyprinid group of finfish. It has made significant impact on fishery of Loktak Lake of Manipur and Northeastern states of India. Due to its unique taste and commercial value, it is also regarded as "State Fish" of Manipur in the year 2007. Pengba which used to be found abundantly in the freshwater Loktak Lake and Nambul River are extinct in wild habitat and now are cultured and bred only in the farms due to the destruction of migratory habit of fish by the construction of barrage. Besides its food value, this fish play a vital role in preserving the rich culture and tradition of Manipuris. It is of immense value to human being. Fishes have long been a staple food item in the diet of people of Manipur. Moreover, wild population undergone drastic decline in freshwater ecosystems and it was reported as near threatened and endangered fish species (Menon, 2004; Vishwanath, 2010). Now it is occasionally found in the river of Manipur often caught from River Lokchao and sold in the Moreh Market which is a border town of Manipur.

There are some reports on the biochemical composition and nutritive values of fresh water fishes of Manipur (Abdul H. and Sarojnalini Ch. 2012; Sarjubala W. and Sarojnalini Ch. 2013; Sarjubala W. and Sarojnalini Ch., 2014; Romharsha H., *et.al*., 2014; Sarojnalini Ch. and Abdul H., 2015). However there is no report so far on the major composition of different body regions of fishes. The aim of the present purpose study was to analyse and compare the major components of dorsal, ventral and caudal muscles of *Osteobrama belangeri* in two different sources (Farm and wild) and two different seasons of the year (summer and winter).

MATERIALS AND METHODS:

Sample collection: Farmed and wild fresh *Osteobrama belangeri* of similar length and weight were selected for the major composition of different regions of the body for two different seasons (summer and winter) of two consecutive years. The farmed fish was collected from local fish farm located at Hiyangthang, Imphal- West and the wild fishes were collected from the Moreh Market of Manipur. All the fishes were immediately kept in cold chain and transported to the Fishery Research Laboratory, Centre of Advanced studies in Life Sciences, Manipur University, Canchipur, where length and weight of the each and every fish samples were measured (Table 1).

Table 1: The range and mean (±SD) weights and standard lengths of Farmed and Wild *Osteobrama belangeri* of two different seasons.

Season		Farmed	Wild
Summer	Weight (cm)	125-155 (138±1.52)	558-590 (570±1.74)
	Standard length (cm)	17.3-17.6 (17.13±.53)	26.6-27.2 (26.83±.32)
Winter	Weight (cm)	118-162 (141±2.83)	618-672 (640±2.83)
	Standard length (cm)	17.2-18.5 (17.73±.68)	28-29.5 (28.67±.76)

Values are mean of three replicate.

Preparation of fish samples: On arrival, all the fish specimens were washed properly with running tap water and blotted dry and weight on a digital balance. The fishes were filleted by using a sharp knife. The fillets were further separated into dorsal, ventral and caudal muscles. They are homogenized separately to a fine mince in a domestic food processor. The skin and bones were clear from flesh. Samples were taken in triplicate for every analysis.

Analysis of major components: Various major components viz., moisture, total lipid, crude protein and ash were determined. Moisture, total lipid, crude protein and ash in dorsal, ventral and caudal muscles of *Osteobrama belangeri* in two different seasons of the year were analysed.

Moisture: Analysis of moisture was done by hot air oven method of AOAC, 2000.

Total Lipid: Lipid content was evaluated by following the method of Singh *et. al.,*1990.

Crude protein: Protein content was determined by the modified Micro Kjedahl's method by using conversion factor of 6.25.

Ash: Ashing was done in a muffle furnace by igniting at 550°C by the

method of AOAC 2000.

Statistical Analysis: Three samples were used for determination. The data were subjected to one way-ANOVA and the significance mean were compared by Duncan's multiple range tests using SPSS version 16.0 and the data are presented as means ± standard deviation.

RESULTS AND DISCUSSION:

Moisture contents: Moisture contents of an organism play an important role in the body metabolism (Suresh *et. al.,* 2013). Highest moisture content was recorded in dorsal muscle of farmed fish (76.23±0.26) than those of wild fish of summer season (Table 2) which was found similar with that of Anwarul Hassan *et. al.,* 2015, where he found that the water content of *Labeo rohita* was 76.62%. In winter season, maximum moisture were found in dorsal, and caudal muscles of wild fish (75.02±0.27 and 75.66±0.53 respectively) which was found similar to that of Sunil Chandra *et. al.,* 2012 in *Labeo rohita*. Moreover, lower moisture content was found in ventral region of both fishes which may reflect the increase in lipid content. As moisture content is usually inversely related to fat content (Sargent *et. al.,* 1989).

Total Lipid: Higher lipid content were found in dorsal and caudal muscles of farmed fish in both summer (4.3±0.18 and 5.13±0.27) and winter (5.25±0.79 and 5.36±0.45) respectively. However, lipid content was found highest (14.03±0.11 and 14.38±0.08) in the ventral region of wild fish in both seasons (Table 3). The distribution of the total fat content showed higher levels in the ventral for both seasons in wild fishes, which agrees with those results found in sea bass, sea bream and rainbow trout (Testi *et. al.,* 2006). Ali Hossain *et. al.,* 2011 also reported that the lipid was found highest in the ventral region than the dorsal portion. Moreover, it is also known that ventral areas usually contain more lipids than the dorsal area in fishes (Thammapat *et. al.,* 2010).

Crude protein: Protein is considered to be a stable component of fish body in respect to their diet and feeding habits (Shearer ,1994).The protein contents in farm cultured was noted significantly higher as compared to wild captured fish species in all selected body parts (i.e., dorsal, ventral and caudal)in two different season(Table 4). Maximum protein was recorded 18.06± 0.06 and 19.66±0.00 in farmed ventral parts of both seasons. Similar findings were also reported in ventral portion (18.9± 0.6) of *Arapaima gigas* (Martins *et. al.,* 2017). Higher protein deposition in farmed fish might be attributed to protein rich supplementary diet which is usually fed during rearing in farms. While in natural water bodies fish usually on crustaceans, insects and vascular plants which are poor in protein. Improved protein contents in farm raised fish in comparison of wild fish were also observed in other fish species (Mahboob *et. al.,* 2003; Dempson *et. al.,* 2004; Osman *et. al.,* 2007). Thus, the results indicate that compared to the wild fish, the farmed fish exhibits significantly higher concentration of protein with well known health benefits.

Ash contents: Collected in both seasons showed ash content in the ranges of 2.60±0.36 to 5.43±0.40 (Table 5) was recorded from farmed and wild Pengba in all three parts. Ash content remained stable between seasons, but its distribution was significantly different between the three fillet portions with the highest value observed in the dorsal muscle (5.43± 0.40) of farmed fish collected during summer which supported the finding reported by (Ayeloja *et. al.,* 2013) in *Clarias gariepnus*. The higher ash content was found in dorsal portion compared with the ventral (Nakamura *et. al.,* 2006).

Table 2: Comparison of moisture contents (% in wet weight basis) between farmed and wild captured *Osteobrama belangeri* of different body parts and season.

Fish Source	Farmed Captured		Wild Captured	
Body parts	Summer	Winter	Summer	Winter
Dorsal	76.23 ± 0.26^{c}	73.13± 0.59^{a}	75.98± 0.20^{c}	75.02± 0.27^{b}
Ventral	65.67± 0.67^{c}	59.31± 0.29^{a}	68.82± 1.00^{d}	63.44± 0.10^{b}
Caudal	73.74± 0.58^{a}	75.1 ± 0.16^{b}	74.2± 0.19^{b}	75.66± 0.53^{c}

Values are mean of three replicate.

Mean (±SD) followed the same latter are not significantly different (P ≤ 0.05).

Table 3: Comparison of crude lipid (% in wet weight basis) between farmed and wild captured Osteobrama belangeri.

Fish Source	Farmed Captured		Wild Captured	
Body Parts	Summer	Winter	Summer	Winter
Dorsal	4.3± 0.18^{b}	5.25± 0.79^{a}	3.38± 0.36^{a}	4.17± 0.08^{ab}
Ventral	12.4± 0.30^{a}	14.13± 0.29^{b}	14.03± 0.11^{b}	14.38± 0.08^{b}
Caudal	5.13± 0.27^{b}	5.36± 0.45^{b}	4.06± 0.23^{a}	4.46± 0.21^{a}

Values are mean of three replicate.

Mean (±SD) followed the same latter are not significantly different (P ≤ 0.05).

Table 4: Comparison of crude protein (% in wet weight basis) between farmed and wild captured *Osteobrama belangeri.*

Fish Source	Farmed Captured		Wild Captured	
Body Parts	Summer	Winter	Summer	Winter
Dorsal	13.41± 0.26^{c}	15.63± 0.00^{d}	10.08± 0.20^{a}	12.62± 0.24^{b}
Ventral	18.06± 0.00^{b}	19.66± 0.00^{c}	17.24± 0.65^{a}	19.09± 0.00^{c}
Caudal	13.49± 0.57^{c}	13.42± 0.00^{b}	7.99± 0.23^{a}	8.70± 0.00^{b}

Values are mean of three replicate.

Mean (±SD) followed the same latter are not significantly different (P ≤ 0.05).

Table 5: Comparison of ash (% in dry weight basis) between farmed and wild captured *Osteobrama belangeri.*

Fish Source	Farmed Captured		Wild Captured	
Body Parts	Summer	Winter	Summer	Winter
Dorsal	5.43± 0.40c	4.66± 0.42b	4.33± 0.15b	3.13± 0.06a
Ventral	5.06± 1.02b	2.86± 0.15a	3.05± 0.20a	2.6± 0.36a
Caudal	4.53± 0.30ab	4.73±0.25a	5.06± 0.30b	4.2± 0.10a

Values are mean of three replicate.

Mean (±SD) followed the same latter are not significantly different (P ≤ 0.05).

CONCLUSIONS: The results indicate the biochemical differences between the farmed and wild *Osteobrama belangeri* in their body parts at different seasons. In comparison to wild, the farmed fish exhibit higher protein content in all selected body muscles during summer and winter. Significant differences in lipid and moisture content were observed. The major constituents of the fillets have seasonal and anatomical variations that provide the option to market products to consumers differently based on the varying nutritional composition observed seasonally and in the different fillet portion as well as provide more specific information to the consumer. Thus, these fishes have a comparable nutritional values characterized by good fat and protein contents. Significant differences observed in the concentrations of lipid, protein, moisture and ash between the two fishes were mainly related to the fish diet but also to the environmental conditions and season.

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References:

1. Abdul H and Sarojnalini C, 2012. Proximate Composition, Macro and Micro Elements of Some Smoke- Dried Hill Stream Fishes from Manipur, India. Nat. and Sci, 10(1): 59-65.
2. Anwarul Hasan GMM, Sabir H, Mohajira B, 2015. Biochemical Composition of Rui (Labeo rohita), Catla(Catla catla), Tilapia (Oreochromis mossambicus) of Cultured Ponds and Different Markets of Bangladesh. Inter. J. Res. App. Sci. Eng. Tech., 3(1): 222-226.
3. Ali HS, Kawser A and Abu TMA, 2011. Proximate Composition of Different Portions of Hilsa, Tenualosa ilisha from Two Regions of the Bay of Bengal in Bangladesh. J. Biol. Sci, 20(2):109-115.
4. AOAC, 2000. Official Methods of Analysis. Association of official Analytical Chemists,Washington D.C.
5. Ashraf M, Asma Z, Abdul R, Shahid M and Naureen, 2011. Nutritional Values of Wild and Cultured Silver Carp (Hypophthalmichthys molitrix) and Grass Carp (Ctenopharyngodon idella). Inter. J. Agri. Biol., 13(2): 210-214.
6. Ayeloja AA, George FOA, Dauda TO, Jemoh WA and Popoola MA, 2013. Nutritional Comparison of Captured Clarias gariepinus. Inter. Res. J. Nat. Sci., 1(1): 9-13.
7. Barua P, Pervez MA, Sarkar D and Sarker S, 2012. Proximate Composition of Some Commercial Marine Fishes of Bay of Bengal, Bangladesh, Mesopot J. Mar. Sci., 27(1):59-66.
8. Dempson JB, Schwarz CJ, Shears M and Furey G, 2004. Comparative Proximate

Composition of Atlantic Salmon with Emphasis on Par from Fluvial and Lacustrine habitats. J. Fish Biol., 64:1257-1271.
9. Hossain MA, 1996. Proximate and Amino Acid Composition of Some Potential Bangladeshi Fish Feed Ingredients, Bangladesh J. Zool., 24:163-168.
10. Mahboob S, Kanwal M, Hassan A, Hussain and Nadeem S, 2003. Fatty Acid Composition in Meat, Liver and Gonad from Wild and Farmed Cirrhina mrigala. Aquacult. Eur., 16:15-20.
11. Martins, Mayara G, Martins, Elena G, Pena and Rosinelson S, 2017. Chemical Composition of Different Muscle Zones in Pirarucu (Arapaima gigas). Food Sci. Tech., DOI: http://dx.doi.org/10.1590/1678-457X.30116 , ISSN: 0101-2061.
12. Menon AGK, 2004. Threatened Fishes of India and Their Conservation. Zool. Soc. India, 170.
13. Nakamura Y, Masashi A, Manabu S, Ken IK and Yasuyuki T, 2006. The Changes in Proximate Compositions and Glycogen Contents in the Dorsal Ordinary Muscles of the Full Cycle Cultured Pacific Bluefin Tuna Thunnus orientalis Occuring with Growth. Fish. Sci., 72: 301-312.
14. Osman F, Jaswir I, Khaza'ai H, Hashim R, 2007. Fatty Acid Profiles of Fin Fish in Langkawi Island, Malaysia. J. Oleo. Sci., 56:101-113.
15. Romharsha H, Abdul H, Sarojnalini C, 2014. Proximate Composition and Amino Acid Profile of Some Hill- Stream Fishes of Manipur. Inter. J. Scific. Res., 3(8): 170- 172.
16. Sargent J, Henderson RJ, Tocher DR, 1989. Lipids. In: Fish Nutrition, 2ndedition (edited by J.E. Halver). London Academic Press, 153-218.
17. Sarojnalini C and Abdul H, 2015. Amino Acid Profile and Score of Some Smoke Dried Hill Stream Fishes from the Markets of Manipur, India. Nat. and Sci., 13(12):120-126.
18. Sarjubala W and Sarojnalini C, 2013. Estimation of Protein Content Mahseer (Neolissochilus hexagonolepis, McClelland) of Ithai River of Manipur. Inter. J. Sci. Res., 2(2):257-259.
19. Shearer KD, 1994. Factors Affecting the Proximate Composition of Cultured Fishes with Emphasis on Salmonids. Aqua. 119, 63-88.
20. Singh MB, Sarojnalini C and Vishwanath W, 1990. Nutritive Values of Sundried Esomus danricus and Smoked Lepidocephalus guntea. Food Chem.36: 89-96.
21. Sunil CP, Ajeya KP and Kapil CM, 2012. Biochemical Studies of Muscle and Liver of Labeo rohita (Ham.) in Relation to Season and Sex. Inter. J. Curr. Res., 4(12): 228-234.
22. Suresh BCH, Shailender M, Amarnath D, Kishor B, 2013. Comparison on Meat Composition of Indian Major Carps (Catla catla, Labeo rohita, Cirrhinus mrigala) and Fresh Water Cat Fish (Pangasius hypophthalmus) under Different Treatment. Int. J. Res. Zool., 3(2): 10-15.
23. Tanveer A, Syed MAN, Sajid A, Khalid A, Sayed ZHS and Anjum Z, 2015. Comparative Proximate Body Composition of Wild Captured and Farm Cultured Cirrhinus mrigala. Pak. J. Agri. Sci., 52(1):203-207.
24. Testi S, Alessio B, Paolo PG, Anna B, 2006. Nutritional Traits of Dorsal and Ventral Fillets from Three Farmed Species. Food Chem., 98:104-111.
25. Thammapat P, Raviyan P, Siriamornpun S, 2010. Proximate and Fatty Acids Composition of the Muscles Viscera of Asian Catfish (Pangasius bocourti). Food Chem., 122: 223-227.
26. Vishwanath W 2010. Osteobrama belangeri. In: IUCN, 2012, IUCN Red List of Threatened Species, Version 2012.1.