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Impact of drying on nutrient composition of two freshwater fishes *Heteropneustes fossilis* and *Clarius batrachus*

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Abstract: Present investigation was carried to find out the nutrient composition of two freshwater fishes collected from two fish markets of Morigaon District, Assam. The work was directed towards the study of the nutrient composition of fresh and dry *Clarius batrachus* (Magur) and *Heteropneustes fossilis* (Singi) and compared the effect of drying on the nutritive value of fishes. In both fresh and dry fishes proximate analysis targeted the determination of the percentage of moisture, ash, protein and fat. Samples were analyzed by wet and dry methods. The moisture content of fresh *C.batrachus* varied from 68.8 ± 0.66 to $73.9 \pm 1.4\%$, the ash content from 10.9 ± 0.70 to $13.2 \pm 0.14\%$, the protein content from 18.2 ± 0.36 to $21.3 \pm 0.53\%$ and the fat content from 3.1 ± 0.28 to $4.8 \pm 0.97\%$. The moisture content of the fresh *H.fossilis* samples ranged from 54.5 ± 0.25 to $62.4 \pm 0.09\%$, the ash content from 9.58 ± 0.67 to $10.49 \pm 0.83\%$, the protein content ranged from 17.90 ± 0.68 to $20.5 \pm 0.25\%$ and the fat content from 2.85 ± 0.37 to $3.7 \pm 0.55\%$. After drying the values were lowered than that of the fresh fishes. Decrease of moisture (maximum by 4.15%), ash (by 1.38%), protein (by 1.91%) and fat contents showed the most prominent changes in both the fishes (by 37.53%, 24.32%) after drying. The fat content was significantly ($P < 0.01$) decreased in both the fishes. As for the proximate composition of dry fishes it was clearly observed that all the studied parameters were not significantly different ($P < 0.01$) from each other in both fresh and dry samples except fat content. Variations appeared may be due to the interaction during the drying process.

Key words: Nutrient Composition, Fresh and Dry *H.fossilis* and *C.batrachus*.

I. INTRODUCTION

Fish is one of the most important source of proteins (actin, myosin, tropomyosin, actomyosin, myoalbumin, globulin, collagen), lipids (phospholipids and triglycerides), carbohydrates, vitamins (A, B, E and K) etc. Fish meat is also valuable source of calcium, phosphorus, iron, copper and selenium [11]. In addition to the high percentages of protein, fish meat provides several nutrients and has been widely accepted as a good source of proteins and other elements for the maintenance of a healthy body [4]. The global contribution of fish as a source of protein is high, ranging from 10% to 15% of the human food basket across the world [18]. Moreover, the consumption of fish has been linked to health benefits such as disorders of the immune system [8],[10], asthma[7], reduced risk of coronary heart disease and arterial hypertension [13], inflammatory diseases [5], human breast cancer [16], fish oil helps to prevent brain aging and Alzheimer's disease [9], colon and prostate cancer [12],[17]. Salting or drying or smoking is a traditional method of fish processing in many countries of the world. No detailed study on nutrient composition of *C.batrachus* and *H.fossilis* is available. Thus, this study was carried out to determine nutrient compositions (including moisture, ash, protein and fat) of two raw fishes and two dried fishes collected from two Morigaon fish markets.

II. MATERIALS AND METHODS

Fresh and dried (salted and sun dried) *C. batrachus* and *H. fossilis* were collected from Morigaon fish markets during the study period (1st September to 31st October/2015). Each fresh fishes have 150-200 g and were preserved in iced container and transferred to the laboratory. Each salt dried fishes have 75-150 g and were taken to the laboratory for analysis. Proximate compositions were determined using the methods of AOAC [3]. The moisture content of fresh and salt dried fish was determined by drying the meat in oven 105c until a constant weight was obtained. Crude protein content was calculated by converting the nitrogen content determined by Kjeldahl's method (6.25_N). Fat was determined using the Soxhlet system. Ash content was determined by dry ashing in a furnace oven at 525_C for 24 h.



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III. RESULTS AND DISCUSSIONS

This study was carried out to evaluate the effect of drying on the nutritive value such as moisture, ash, protein and fat of fresh and dry *H.fossilis* and *C.batrachus*. The proximate compositions of the fresh and dried samples were determined and the results obtained were presented in Table-1 and Table-2. Each value is the mean±standard deviation of four determinations. Fresh samples presented high moisture, ash, protein and fat content. Decrease of moisture, ash, protein and fat contents were the most prominent changes in *C.batrachus* and *H.fossilis* after drying.

Table-1: Nutrient compositions of fresh and dried *C.batrachus*.

Parameters	Fresh <i>C.batrachus</i>				Dried <i>C.batrachus</i>			
	1	2	3	4	1	2	3	4
Moisture (%)	73.9±1.4	72.7±0.22	68.8±0.66	70.3 ±0.78	72.4±0.07 -2.07%	69.8±1.7 -4.15%	68.2±0.23 -0.87%	68.7±0.18 -2.32
Ash (%)	11.2±0.95	10.9±0.70	11.7±0.28	13.2±0.14	11.13±0.9 -0.62%	10.79±0.5 -1.01%	11.62±0.63 -0.68%	13.02±0.53 -1.38%
Protein (%)	18.7±0.20	21.3±0.53	19.7±0.56	18.2±0.36	18.5±0.25 -1.08%	20.9±0.71 -1.91%	19.50±0.72 -1.02%	17.88±0.57 -1.78%
Fat (%)	4.8 ±0.97	3.4±0.35	3.1±0.28	3.15±0.69	3.49±0.52 -37.53%	2.5±0.48 -36.0%	2.26±0.47 -37.16%	2.3±1.0 -36.9%

The chemical analysis revealed that the protein content of dried *H.fossilis* was 3.53%, 2.05%, 2.40%, and 3.46% less than the fresh weight. The fat content was significantly decreased in both the dried fishes. The other parameters such as moisture, protein and ash showed no significant differences. The insignificant decrease in protein levels when compared with the raw fish, suggests that protein nitrogen was lost during drying. The results indicate that drying methods have effects on the proximate compositions of both the fishes. The significant decrease ($P<0.01$) in fat content levels when compared with the raw fish, suggests that fat was lost in both the fishes during drying.

The moisture content of raw *C.batrachus* in fresh basis ranged between 68.3 ±0.66 and 73.9±1.4% while in dry fish ranged between 68.7±0.18 and 72.4±0.07%. The moisture content of raw *H.fossilis* ranged from 54.5±0.25 to 62.4±0.09% while dry fish varied from 52.9±0.19 to 60.9±1.2%. The result of fresh fish moisture content was similar to that of previous author [16] who found that the moisture content of fresh *Labeo* spp. was (70.4-71.2%) and the trend is in agreement with the results of previous authors [2],[14].

The protein content was ranged between 18.2±0.36 and 21.3±0.53% in fresh *C.batrachus* fish, while in salt dried *C.batrachus* varied from 17.88±0.57 to 20.9±0.71%. In fresh *H.fossilis* protein content was varied from 17.90±0.67 to 20.5 ±0.25% while in salt dried *H.fossilis* ranged in between 17.3±0.35 and 19.8±0.21%. This agrees with the findings of [6], who reported that flesh from healthy fish contained (15-24%) protein. This result is in agreement with the findings of the previous author [2] Ahmed (2006) who had reported that the protein content of fresh fish is in between 18.9-20.5% and salt dried fish is in between 16.54-19.57%. Reference [6] showed the decrease of protein level significantly proportional to the salting treatment due to dissolve of the protein in brine.

Table-2: Nutrient composition of fresh and dried *H.fossilis*.

Parameters	Fresh <i>H.fossilis</i>				Dried <i>H.fossilis</i>			
	1	2	3	4	1	2	3	4
Moisture (%)	62.4±0.09	57.2±0.28	56.9±0.65	54.5±0.25	60.9±1.2 -2.46%	56.3±0.77 -1.59%	56.1±1.3 -1.43%	53.7±0.19 -1.48%
Ash (%)	10.01±0.9	9.71±0.71	9.58±0.67	10.49±0.83	9.83±0.95 -1.83%	9.54±0.71 -1.78%	9.4±0.27 -1.91%	10.30±0.19 -1.84%
Protein (%)	20.5 ±0.25	19.9±0.76	19.15±0.82	17.90±0.68	19.8±0.21 -3.53%	19.5±0.49 -2.05%	18.7±0.56 -2.40%	17.3±0.35 -3.46%
Fat (%)	3.7±0.55	2.9±0.43	2.85±0.37	3.22±0.59	3.0 ±0.95 -23.3%	2.4±0.33 -20.8%	2.3±0.29 -23.91%	2.59±1.2 -24.32%

It is clear that fat content of fresh *C.batrachus* was recorded in between 3.1±0.28 and 4.8 ±0.97% while in dried fish it was varied from 2.26±0.47 to 3.49±0.52%. The fat content of *H.fossilis* was found in between 2.85±0.37 and 3.7±0.55% while in dried *H.fossilis* it was ranged from 2.3±0.29 to 3.0±0.95%. The result of



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fat content in fresh fish is lower than previously reported result [14], who reported 4.9% fat level in fresh *hydrocynus* spp. Similar results have also reported in *hydrocynus* spp [2] and in *C.batrachus* and *H.fossilis* [1]. There was significant difference in fat contents the fresh and dried fish, this variation might be due to loss of fat by osmotic effect. The highest percentage of ash content was found in both the dried fishes is in agreement with the results recorded by previous authors in *hydrocynus* spp [2] and in *C.batrachus* and *H.fossilis* [1].

The nutrient compositions of both the fishes were insignificantly varied from each other except fat contents. It can be concluded that application of salt may controlled the growth of microorganisms and lowering the level of protein and fat. Percentage of moisture, ash and protein were normally higher in fresh fishes than the dried one, yet the dried fishes may be used as a good source of healthy food and can be preserved for consumption to fulfill the nutrient requirement.

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