

EFFECT OF FREEZING TIME ON THE NUTRITIONAL VALUE OF *MYSTUS GULIO* (NUNA TENGRA), *MYSTUS TENGARA* (BAZARI TENGRA) AND *MYSTUS CAVASIUS* (GHULSHA TENGRA).

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ABSTRACT

Three different species of tengra; Nuna tengra (*Mystus gulio*), Bazri tengra (*Mystus tengara*), Gholsha tengra (*Mystus cavasius*) were kept in freezing condition for 20 days to investigate the effect of freezing (-5°C) time on the nutrient composition (protein, lipid, moisture). The average weight of the sample was 46.5gm, 23.94gm, and 15.48gm for Nuna tengra, Gholsha tengra and Bazri tengra respectively. Samples were collected from Gollamari, Khulna. The amount of protein and lipid reduced while amount of moisture increased with prolongation of freezing time. The amount of moisture for *Mystus tengara*, *Mystus cavasius*, *Mystus gulio* increased from 76.12% to 78.02%, 75.35% to 77.25% and 76.03% to 78.23% respectively. At fresh condition the protein content of *Mystus tengara*, *Mystus cavasius*, *Mystus gulio* were 16.26%, 15.52% and 14.80% and at the end of the experiment protein were 14.97%, 13.91% and 13.43%. At fresh condition the lipid content of *Mystus tengara*, *Mystus cavasius*, *Mystus gulio* were 6.15%, 5.98% and 6.20% and after twenty days of its freezing the observed lipid content were 4.9%, 5.37% and 4.86%. However, at the end of the study, no significant ($p>0.5$) difference was observed among different nutrient level due to increasing freezing time.

Keywords: Protein, lipid, moisture.

INTRODUCTION

Among various indigenous fish species of Bangladesh Nuna tengra (*Mystus gulio*), Bazri tengra (*Mystus tengara*), Gholsha tengra (*Mystus cavasius*) are common and popular because of their nutritional value and taste. These are a great source of protein, lipid, minerals etc., which are essential to human development and remedy for various diseases. But availability of this vital source of nutrients largely depends on storage method (Hardy and Smith, 1976.). There are various storage and preservation methods such as freezing, salting, roasting, drying, frying etc. Storage time and temperature are major factors, which affect the rate of loss of quality and shelf life of fish (Whittle, 1997). Moreover different storage methods affect the quality of fish product differently. The present study was conducted to observe the effect of freezing time on the selected fish species.

MATERIALS AND METHODS

Sample collection

Some samples of Nuna tengra (total length $1.12.12 \pm 1.08$ cm), Gholsha tengra (23.94 ± 0.82 cm) Bazari tengra (4.12 ± 0.26 cm) were collected from local fish market of Khulna city corporation at fresh condition

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and transported to the Fish Nutrition Laboratory of Fisheries and Marine Resource Technology Discipline, Khulna University for subsequent experiments.

Sample Preparation

To prepare the sample for the determination of nutritional composition, the samples were washed thoroughly with the fresh water and adherent water was removed. Then a considerable amount of specimens of each sample were taken and fish muscle was separated from fish body with a sharp knife. For analysis the nutritional or proximate composition, each experiment was conducted with three replicates.

Proximate composition analysis

Proximate analysis such as moisture, lipid and protein contents were carried out following the methods of AOAC (1984).

RESULTS AND DISCUSSION

The nutrient composition of *Mystus gulio*, *Mystus tengara* and *Mystus cavasius* in fresh condition and frozen condition at every five days interval are shown in table 1, 2 and 3.

Table 1: Protein, moisture and lipid content of Nuna tengra (*Mystus gulio*) at different freezing duration. (Compositions are in wet weight basis).

Table 2: Protein, moisture and lipid content of Bazari tengra (*Mystus tengara*) at different freezing duration.

Table 3: Protein, moisture and lipid content of Gholsha tengra (*Mystus cavasius*) at different freezing duration.

Moisture

The moisture content of the samples was determined in oven-dry method. In fresh condition the moisture contents of the three species ranged from 75.35% to 76.12% at initial stage, among the three species Bazari tengra contains the highest moisture content (76.12%) it was followed by Gholsha tengra (76.03%) and Nuna tengra (75.35%) successively. After twenty days of freezing, the amount of moisture increased gradually. After twenty days their moisture contents ranged from 77.25% to 78.23%. Nurullah *et al* (2003) reports that the moisture content of Nuna tengra was 73.67% at fresh condition and after eight days of freezing the moisture was 76.67%. Present study has affinities with the findings of M. Nurullah *et al*. (2003). Hossain *et al* (1999) found the moisture content 75.43%, 79.45%, 78.67% in Gholsha tengra, Nuna tengra and Bazari tengra respectively in fresh condition. But present study has slightly deviated from the result found by Hossain *et al* (1999). This deviation may occur due to species variation, size, processing method, temperature, season etc (Khan *et al* 1997). Moreover there is an inverse relation between size and moisture content of the fish (Hossain *et al*, 1999).

Lipid

The determined lipid contents of the study on the three species of tengra showed that their lipid contents ranged 5.98% to 6.20% in fresh condition. Among them Nuna tengra contained the highest and Gholsha tengra contained the lowest amount of lipid. But in frozen condition these values decreased gradually. The result showed the changing rate of lipid contents of three different species of tengra in frozen condition. Nurullah *et al* (2003) reported that the average lipid content of Nuna tengra is about 6.28% in fresh state and after eight days in frozen condition it was found to be around 5.09%. However, the present study approximately agreed with the amount of lipid found by others. Bligh *et al* (1959) reported that there is an inverse relation between lipid content of fish and its freezing time. But in all cases all observation did not coincide with the present study on some aspects like the amount of lipid, decreasing rate. This deviation may occur due to size, different body parts of the same fish, seasonal variation, and temperature, oxidation of fat etc. Das (2009) reported that the lipid content of *Labeo rohita* represents different amount of lipid like at ambient temperature it was 5.21% and 4.26%, 3.31% in icing and frozen condition and ambient temperature.

Protein

Like other nutrient compositions the protein content of fish is also variable at different condition. The study on nutritional value of different tengra fish revealed that protein content of it varied from 14.80% to 16.26% in fresh condition. At the end of the experiment the amount of protein varied from 13.43% to 14.97%. The result is similar with Nurullah *et al* (2003). He reported that average protein content of tengra fish was around 16.81% in its fresh condition and after eight days of its frozen condition it was 14.21%, which indicates slight deterioration of protein level in frozen condition. These findings supported the validity of the present study the determined values differed from others and within different species. This deviation is as usual because protein content of fish varies depending on some factors such as natural feeding habits and availability of feed, fasting during spawning, migration, size of fish etc. (Viswanathan and Mathew, 2000). The reduction in protein level is connected with denaturation of fish protein that is associated with freezing (Reay, 1933).

CONCLUSION

The study focused on effect of freezing duration on nutritional value specially protein, lipid and moisture. It has some effect on the nutrient compositions of the selected three species, which was taken under experiment. The study showed that there was no significance difference in nutritional value of different tengra species in frozen condition after twenty days. The condition did remain as it was in fresh condition but it was acceptable to all. So it can be concluded that we can use catfishes after preservation at -5°C. But we should try to consume the fish in fresh condition as early as possible as quality remain better in earlier stage.

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TABLES:

Table 1: Protein, moisture and lipid content of Nuna tengra (*Mystus gulio*) at different freezing duration. (Compositions are in wet weight basis).

Freezing duration	Nutrient composition		
	Protein (%)	Moisture (%)	Lipid (%)
0 day (fresh condition)	14.80	76.03	6.20
5 th	14.11	77.62	5.73
10 th	13.68	77.89	5.27
15 th	13.51	78.12	5.13
20 th	13.43	78.23	4.86

Table 2: Protein, moisture and lipid content of Bazari tengra (*Mystus tengara*) at different freezing duration.

Freezing duration	Nutrient composition		
	Protein (%)	Moisture (%)	Lipid (%)
0 day (fresh condition)	16.26	76.12	6.15
5 th	15.93	76.64	5.83
10 th	15.46	77.06	5.62
15 th	15.12	77.89	5.23
20 th	14.97	78.02	4.9

Table 3: Protein, moisture and lipid content of Gholsha tengra (*Mystus cavasius*) at different freezing duration.

Freezing duration	Nutrient composition		
	Protein (%)	Moisture (%)	Lipid (%)
0 day (fresh condition)	15.52	75.35	5.98
5 th	14.36	76.79	5.61
10 th	14.20	76.98	5.50
15 th	13.95	77.22	5.43
20 th	13.91	77.25	5.37