E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.549
IJFAS 2018; 6(6): 183-185
© 2018 IJFAS
www.fisheriesjournal.com
Received: 16-09-2018
Accepted: 17-10-2018

Jasmin Naher
Lecturer, Department of Fisheries Technology, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh

Shirin Akter
Lecturer, Department of Fisheries and Marine Bioscience, Bangabandhu Sheikh Mujibur, Rahman Science and Technology University, Gopalganj, Bangladesh

Rubaiya Parvin
Assistant Professor, Department of Fisheries Management, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh

Vikash Chandra Roy
Vikash Chandra Roy, Lecturer, Dept. of Fisheries Technology, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh

Md. Abul Mansur
Professor, Department of Fisheries Technology, Bangladesh Agricultural University, Mymensingh, Bangladesh

Correspondence
Jasmin Naher
Lecturer, Department of Fisheries Technology, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh

A comparative study on quality aspect of three native species *Wallago attu* (Boal), *Notopterus chitala* (Chital), *Mystus aor* (Ayr) as fresh and frozen storage condition

Jasmin Naher, Shirin Akter, Rubaiya Parvin, Vikash Chandra Roy and Md. Abul Mansur

Abstract
This objectives of the study was conducted on various quality attributes of three important fish species *viz*. Boal *(Wallago attu*), Chital (*Notopterus chitala*), Ayr (*Mystus aor*). The mean moisture changes during fresh and frozen stored condition of three native species- Boal, Chital, Ayr was 79 ±0.45, 78 ± 0.12, 77 ± 0.34 and 75 ± 1.01, 73 ± 0.72, 74 ± 0.35 respectively. Proximate analysis showed, the mean protein changes during fresh and frozen stored condition of three native species- Boal, Chital, Ayr was 16.15 ± 1.50, 15.14 ± 1.16, 15.44 ± 0.98 and 14 ± 0.08, 14 ± 0.16, 13 ± 0.27 respectively. The mean lipid changes during fresh and frozen stored condition of three native species- Boal, Chital, Ayr was 2.28 ± 1.78, 2.24 ± 1.50, 2.23 ± 1.85 and 3 ± 0.18, 3 ± 0.11, 3 ± 0.19 respectively. The range of pH changes in fresh to frozen stored condition was 7.00 ± 1.85, TVB-N value changes from fresh to fourth week time interval was 3- 15 mg/100 g flesh and microbial changes from fresh to frozen stored condition were insignificant for those three fish species. So deviation from ideal freezing temperature (-40^0 C), the quality of frozen fish much fluctuates.

Keywords: Quality, freshness test, proximate composition, TVB-N, bacterial loads, pH

1. Introduction
During live condition, the fish are called in premium quality depending its freshness status hence eating quality of those fish are excellent, but after harvesting of fish quality deteriorates very rapidly, so preservation techniques should be applied to maintain the best quality from those fish species and further getting the best fishery products. In various types of preservation technique freezing is one kind of technique where fish would preserve for longer period of time. During freezing ideal temperature is -40 °C when fish body remain its body temperature is about -18° C, so all of the water content become ice crystal to slow down the enzymatic or microbial activity hence spoilage is slowed down. But in household purposes normal freezing temperature is around -18 to -20C, which is not ideal freezing temperature so quality of fish in that condition fluctuated much.

2. Materials and Methods
The research work was conducted in the fish processing laboratory and fisheries microbiology laboratory of the department of fisheries technology, Bangladesh Agricultural University, Mymensingh. The research work was conducted to evaluate organoleptic characteristics and chemical composition of fish species during fresh and frozen storage condition. Proximate composition was determined according to Association of Analytical Chemists (AOAC, 1990) [5] methods. Crude protein content was determined using the Kjeldahl method (Kjeltex System-Texator, Sweden). Crude lipid content was determined by the Soxhlet method (Soxtec System-Texator, Sweden) (AOAC, 1990) [5]. Ash content was determined by heating samples for 6 hours at 550°C. The moisture content was determined by drying samples for 24 h at 105°C until constant weight was achieved. Total volatile basic nitrogen (TVBN) was determined according to Pearson (1975) [11]. pH was determined by using pH meter and bacterial loads were determined by consecutive decimal dilution, later using spread plate technique.

3. Results and Discussions

Table 1: Gross Freshness scoring for *Wallago attu, Notopterus chitala, Mystusaor* with grading.

Species name	Fresh	Grade	First week	Grade	Second week	Grade	Third week	Grade	Fourth week	Grade
Wallago attu	1	A	2.14	B	2.14	B	2.57	B	3.43	B
Notopterus chitala	1	A	2.14	B	2.14	B	2.42	B	3.00	B
Myrtus aor	1	A	2.00	B	2.00	B	2.29	B	2.86	B

Sensory assessment has always played a key role in quality and freshness evaluation in fish industry) [1]. Sensory analysis, is of vital importance to the fish industry, for assessment of products freshness. Fish consumers expect a product that is safe and has good appearance, odor, taste and texture and their decision to purchase a fish product is based first on appearance, followed by flavor and then texture [10]. The sensory evaluation considered as one of the important tests used for general acceptance of meat, consumer desire; this includes flavor, tenderness, juiciness and general acceptance. Although the fish muscle have great nutritional value so the consumption can be increased by improving the palatability through flavor, smell, color, appearance, juiciness and tenderness [2].

Table 2: Proximate composition of *Wallago attu, otopterus chitala, Mystus aor* during first week stored wet fish sample with ± SD values

Species name	Moisture%	Protein%	Lipid%	Ash%
Wallago attu	79 ±0.45	16.15 ± 1.50	2.28 ± 1.78	0.803 ± 0.50
Notopterus chitala	78 ± 0.12	15.14 ± 1.16	2.24 ± 1.50	1.051 ± 0.35
Mystus aor	77 ± 0.34	15.44 ± 0.98	2.23 ± 1.85	0.980 ± 0.26

Table 3: Proximate composition of *Wallago attu, Notopterus chitala, Mystus aor* during fourth week stored wet fish sample with ± SD values

Species name	Moisture%	Protein%	Lipid%	Ash%
Wallago attu	75 ± 1.01	14 ± 0.08	3 ± 0.18	1.89 ± 0.32
Notopterus chitala	73 ± 0.72	14 ± 0.16	3 ± 0.11	2. 58± 0.47
Mystus aor	74 ± 0.35	13 ± 0.27	3 ± 0.19	1.87 ± 0.54

The mean protein content of *Wallago attu, Notopterus chitala, Mystus aor* during first week and fourth weeks are 16.15 ± 1.50, 15.14 ± 1.16, 15.44 ± 0.98% and 14 ± 0.08, 14 ± 0.16, 13 ± 0.27% respectively. Mean moisture content 79 ± 0.45, 78 ± 0.12, 77 ± 0.34% and 75 ± 0.01, 73 ± 0.72, 74 ± 0.35% respectively. The mean lipid content, 2.28 ± 1.78, 2.24 ± 1.50, 2.23 ± 1.85% and 3 ± 0.18, 3 ± 0.11, 3 ± 0.19% respectively. The mean ash content are 0.803 ± 0.50, 1.051 ± 0.35, 0.980 ± 0.26% and 1.89 ± 0.32, 2.58 ± 0.47, 1.87 ± 0.54% respectively. Proximate composition of the fresh cat fish (*Pangasianodon hypophthalmus*) meat showed 77% moisture, 16.5% protein, 4% crude fat and 0.97% ash [10].

The ratio of edible and inedible protein of the fishes ranged from 1:0.25 to 1:3.35. Considerable variation was observed in the proximate composition of the different fish species. The highest protein, lipid and ash content of edible parts were 20.14, 17.80 and 4.34% respectively in *Labeo boga, Hilsa ilisha* and *Setipinna phasa*. On the other hand the lowest values of these parameters were 13.50, 1.30 and 1.00% respectively in *Chanda Nama. Glossogobius giuris* and *Chanda reticul* [6].

Table 4: TVB-N values of *Wallago attu, Notopterus chitala, Mystus aor* during definite time intervals during frozen storage with ± SD values

Name of fish species	TVB-N values after first week frozen storage condition	TVB-N values after second week frozen storage condition	TVB-N values after third week frozen storage condition	TVB-N values after fourth week frozen storage condition
Wallago attu	3.39 ±0.23	5.19 ± 0.56	8.12 ± 1.35	14.50 ± 1.56
Notopterus chitala	3.50 ± 0.17	5.93 ± 0.78	7.43 ± 1.62	15.35 ± 1.47
Mystus aor	3.68 ± 0.35	4.56 ± 0.87	7.87 ± 1.23	13.25 ± 1.39

From the research data for boal (*Wallago attu*) TVB-N value for first to fourth week are 3.39 ± 0.23, 5.19 ± 0.56, 8.12 ± 1.35, 14.50 ± 1.56 respectively. For chital fish (*Notopterus chitala*) the TVB-N value are 3.50 ± 0.17, 5.93 ± 0.78, 7.43 ± 1.62, 15.35 ± 1.47 respectively. For Ayr (*Mystus aor*) TVB-N value are 3.68 ± 0.35, 4.56 ± 0.87, 7.87 ± 1.23, 13.25 ± 1.39 respectively

The TVB-N contents of Boal fish fillet stored on frozen storage condition for 30 days was increased from 8.4 to 41.1 mg N/100 g in 4 year male fish, 9.2 to 39.4 mg N/100 g in 5 year male fish, 7.5 to 39.4 mg N/100 g in 4 year female fish and 7.5 to 34.4 mg N/100 g in 5 year female fish[3].The TVB-N values for the five types of fresh fish were 12.89, 16.41, 15.31, 12.23 and 13.61 mg N/ 100 g for Grass carp, Silver carp, Common carp, boal respectively. Silver carp was of the highest value while boal showed the lowest. If the TVB-N value reaches 30mg N/100g most authorities would consider the fish to be stale, whilst at 40 mg N/100 g the fish is regarded as unfit for consumption. The level of TVBN for white fish is generally considered to be fresh if the TVB-N is less than 20mg N/100 g sample according to the Codex Alimentarius Committee proposed in 1968. Fish and fish products is unfit for human consumption when exceeding the value (TVB-N) 30mg N/100g meat [9] TVB-N in frozen storage condition Boal, Ayr, and Chital which were 14.2, 13.8, 13.2 N/100 g respectively [4].

Table 5: Aerobic plate count (APC) of *Wallago attu, Notopterus chitala, Mystus aor* during fresh and frozen storage condition

Scientific name	Aerobic plate count (CFU/g) during fresh condition	Aerobic plate count (CFU/g) during frozen storage condition
Wallago attu	3.35×10^7	2.04×10^6
Notopterus chitala	4.12×10^7	3.03×10^6
Mystus aor	3.20×10^8	2.60×10^6

Microbial load during fresh condition of six fish species (*Wallago attu, Notopterus chitala, Mystus aor, Cyprinus carpio var communis, Cyprinus carpio var specularis* and *Ctenophyryngodon idella*) was 3.35×10^7, 4.12×10^7, 3.20×10^8 CFU/g.

Total Plate Count was found to increase from 1.38±0.01 log CFU/g to 8.10±0.03 log CFU/g and in frozen samples from 0.72±0.01 log CFU/g to 4.96 ±0.04 log CFU/g. In present studies, it has been found that the TPC in frozen samples was within the permissible limit i.e.6 log CFU/g (ICMSF, 1986) [8] up to 21s day and in raw samples, it crossed the permissible limit after 7th day. TPC for frozen fish muscle shows comparatively slow increment as compared to raw muscle which is because of the significant water loss during freezing and thawing process on decreased bacterial load 2.4x107 CFU/g in fresh chital and 2.4x107 CFU/g in fresh Ayr to 9.7x106 CFU/g in frozen condition.

Table 6: pH values of (*Wallago attu, Notopterus chitala, Mystus aor* during first week and fourth week time intervals

Scientific name	pH values during fresh condition	pH values during first week storage condition	pH values during fourth week storage condition
Wallago attu	7.10	6.67	8.25
Notopterus chitala	7.20	6.78	8.27
Mystus aor	7.10	6.47	8.56

The values of pH which were recorded from the experimental fish species Boal, Chital, Ayr during first week of storage condition to fourth week are 6.67, 6.78, 6.47 and 8. 25, 8.27, 8.56 respectively. The pH value of common carp and *Wallago attu* of 7 day,14 days frozen storage condition was recorded 6.62 ± 0.19, 6.57 ± 0.22, 6.40 ± 0.18 and 6.51 ± 0.15, 6.42 ± 0.14, 6.28 ± 0.23 respectively [7].

4. Conclusion

For these three native species, freshness, the chemical composition (moisture, protein, lipid, ash), TVB-N, bacterial load, and pH for four week time intervals there were significant changes occurred under the fluctuated temperature between -18 to -20 C. Under the ideal freezing temperature that is -40 C fish quality changes very slowly.

5. References

1. Abbas KA, Mohamed A, Jamilah B, Ebrahimian M. A Review on Correlations between Fish Freshness and pH during Cold Storage. American Journal of Biochemistry and Biotechnology. 2008; 4(4):416-421.
2. Al-Aswad MB. Meat science and technology. 3rd ed, Dar alkatp for printing and publisher, Mosul University, 2000, 466.
3. A lemu lema A. Microbiological and chemiccal changes of boal (*Wallago attu*) fillet during ice storage, 2013, 1262.
4. Al-Shatty SMH. Technological, Chemical, and Microbial Study on Smoking, Marinating, and Drying Of Four Common Marine Fish Species in Basrah. Doctor of Philosophy. In Food Science and Biotechnology (Fish Technology). College Of Agriculture, University Of Basrah, 2006.
5. Association of Analytical Chemists (AOAC) Official Methods of Analysis. 15th edn. Washington, DC, 1990.
6. Chakrabarty SC. A study on proximate composition of common freshwater fishes of Bangladesh. Bangladesh Journal Fish. 2007; 26(1-2):23-36.
7. Frantisek J, Hana B. Shelf-life of freeze-thawed fillets of common carp (*Cyprinus carpio* L.) and silver carp (*hypophthalmichthys molitrix* V.) packed under air, 2012, 276.
8. International Commission on Microbiological Specifications for Foods (ICMSF) Sampling plans for fish and shellfish, In: Microorganisms in Foods. Sampling for Microbiological Analysis: Principles and Scientific Applications, 2(2) University of Toronto Press, Toronto, Canada, 1986, 181-196.
9. Sikorski Z, Kolakowska A, Burt J. Postharvest biochemical and microbial changes in Seafood Resources. Nutritional Composition and Preservation (ed. Z. Sikorski).CRC Press, Boca Raton, Florida, 1990, 55-75.
10. Parisi G, Franci O, Poli BM. Application of multivariate analysis to sensorial and instrumental parameters of freshness in refrigerated sea bass (*Dicentrarchus labrax*) during shelf life. Aquaculture. 2002; 214:153-167.
11. Pearson D. Laboratory techniques in food analysis. The Butterworth Group and Co (publishers) Inc., London, UK, 1975.
12. Viji P, Tanuja S, George N, Zynudheen AA, Lalitha KV. Quality characteristics and shelf life of sutchi cat fish (*Pangasiadon hypopthalmus*) steaks during refrigerated storage, 2014, 107-108.