Middle-East Journal of Scientific Research 15 (10): 1363-1367, 2013
ISSN 1990-9233
© IDOSI Publications, 2013
DOI: 10.5829/idosi.mejsr.2013.15.10.7594

Quality Assessment of Salted Chapila (*Gudusia chapra*), Kachki (*Corica soborna*), Kajoli (*Ailiichthys punctata*) and Tin Kanta (*Clupisoma psendeutropius atherinoides*) in Laboratory Condition

[1]Mohajira Begum, [2]Maruf Hossain Minar, [3]Farzana Binte Farid,
[3]Mosarrat Nabila Nahid, [3]Tanjina Akter and [4,5]M. Belal Hossain

[1]Institute of Food Science and Technology,
Bangladesh Council of Scientific and Industrial Research, Dhaka, Bangladesh
[2]Department of Fisheries Biology and Genetics, Bangladesh Agricultural University, Mymensingh-2202
[3]Department of Zoology (Fisheries), University of Dhaka, Bangladesh
[4]Department of Fisheries and Marine Science,
Noakhali Science and Technology University, Sonapur, Noakhali 3814
[5]Department of Biology, Faculty of Science, University Brunei Darussalam, Brunei BE1410

Abstract: Salting method reduces the water content and reduces the activity of spoilage bacteria. This experiment was performed to obtain a better understanding of several different methods of salting (dry, pickle, mixed and brine salting) by using chapila, kachki, kajoli and tin kanta. The differences were observed during the estimation of moisture, protein, fat and ash. All fish have been found to have better nutrient property, although the protein content decreased with increasing salt concentration. The effects of changes in the absorption of salt, the weight of the fish during the salting process were observed and found to be more or less constant level after a specific period of the process of curing salt. From the overall performance, salting methods can be arranged as follows: dry > pickle >mixed >brine. The sensory score value have been found to have inverse relationship with Total Volatile Nitrogen (TVN) value. The content of TVN value increases when decrease of sensory score value with the increase of study period.

Key words: Salt Curing · Lean Fish · Sensory Score TVN Value

INTRODUCTION

The people of Bangladesh depend on fish for 58% of its demand for animal protein and fish consumption rate is currently18.94 kg/person/year while the demand for fish is 20.44kg/year/person and the total demand for fish is 29.74 metric tons per year [1-3]. Fish contains essential amino acid and other important minerals such as Phosphorus, Calcium, Magnesium etc [4, 5]. In addition it contains polyunsaturated fatty acid, which plays important role in reducing the cholesterol level in human blood [6, 7]. Impairment begins to occur as soon dies. Bacteria were introduced into a series of dots, through gill, blood vessels, through the lining of the abdominal cavity and finally through the skin. They produce unpleasant odors and flavors grow and multiply [8]. Protein degradation, oxidative rancidity and the action of microorganism are the principle causes of fish spoilage [2].

Salting process can be divided into three stages. In the first chemical transformation did not occur in fish. Besides fish have the same smell and taste raw fish but the fish is exposed to a high osmotic pressure. In the second step, the salt concentration in the fish tissue surface reaches equilibrium with the surrounding brine. In the last stage, move smaller amounts of salt in the fish tissue and as a result, the fish are slightly increased in weight [2, 9].

Corresponding Author: Mohajira Begum, Fish technology research section, Institute of Food Science and Technology, Bangladesh Council of Scientific and Industrial Research, Dhanmondi, Bangladesh.
Cell: +88-01914893794.

Hilsa is traditionally salt cured in Bangladesh from many years ago. But now days due to ever decreasing production level of hilsa fish as well as for its ever increasing demand in fish market in frozen and in raw condition both in home and abroad [3, 5]. But the small indigenous fishes are not cultured in our country and the natural supply of this fishes is monsoon dependent [10, 11]. Therefore, we feel the necessary of producing of salt cured lean fish with a view to meet the requirement of ever-increasing population by providing nutritionally enriched salt cured kacki, chapila, kajoli, tinkata in laboratory condition.

MATERIALS AND METHODS

Raw fishes were collected from different markets in Dhaka city in the early hours of the day and the fishes were brought to the Fish Technology Research Section, Institute of Food Science and Technology, BCSIR, Dhaka for conducting the research activities. The raw fishes were eviscerated, cleaned, washed, weighed and prepared for salting in different methods. Four different salting methods such as dry, pickle, mixed and brine salting were adopted.

The raw fishes were enrolled with dry salt (fish weight: salt weight = 3: 1), stacked in containers and stored for a salting or curing period, at room temperature. Then the extracted water of the fishes due to salt action was removed from the container. Thus the fishes were always allowed to remain in dry condition for the production of dry salt cured fish. From beginning till end change in weight, salt content, moisture and physical appearance have been observed.

The raw fishes were pickle salted as dry salting. But the extracted water was not removed from the container. As the fish muscle absorbs salt, water diffuses from a pickle meat and let it drain ways. In brine salting fish also salted with dry salt but the fish are kept in tanks so that water diffuses from the fish forming strong brine as salt dissolves in. Thus the fishes were always allowed to remain in salt solution for the production of pickle-cured fish.

During brine salting method, the raw fishes were kept in 30% saturated brine solution (30 g salt and 70 ml distilled water) and stacked in containers and stored for a salting or curing period, at room temperature for the production of brine salted fish.

Mixed salting method is a combined form of dry salting and brine salting method. The fishes had been enrolled by salt (fish weight: salt weight = 3: 1). Then another 30% brine solution prepared and then added to it, in containers and stored for a salting or curing period, at room temperature for the production of mixed salt product.

The moisture content of the raw and salt-cured fishes was determined by AOAC method [12]. The crude protein of the fish was determined by Micro-Kjedhal method [12] using a factor of 6.25 [13]. For fat determination, the method of Bligh and Dyer [14] was followed. Salt content of the salt-cured fish products was estimated by Mohor method [15]

After 7 days, when the fishes become dry and crispy, each kind of salt cured fish has been divided into four parts. Each portion then weighed and kept into four different storage conditions.

RESULTS AND DISCUSSION

Fish Processed and preserved after complete curing salt have been found to achieve a level of quality. But storage of salted product is very important to extend its use full life. Table 1 shows the various composition of the salted process.

In dry salting (Figure 1), the moisture content (%) ranges from 38.00 (Kajoli) to 40.36 (Tinkata), protein content (%) ranges from 22.50 (Kajoli) to 27.35 (Tinkata), fat content (%) ranges from 4.2 (Kachki) to 7.08 (Kajoli), ash content (%) ranges from 3.0 (Chapila) and 5.91 (Kajoli) and salt content (%) from 20.19 (Tin kanta) to 25.78 (Kajoli).

In pickle salting (Figure 2), the moisture content (%) ranges from 39.3 (Kachki) to 48.40 (Tin kata), protein content (%) ranges from 22.3 (Chapila) to 26.4 (Kachki), fat content (%) ranges from 3.39 (Tin Kanta) to 4.98 (Kajoli), ash content (%) ranges from 3.14 (Chapila) and 5.91 (Kajoli) and salt content (%) from 17.31 (Tin kanta) to 20.35 (Kajoli).

In mixed salting (Figure 3), the moisture content (%) ranges from 46.5 (Chapila) to 46.99 (Kajoli), protein content (%) ranges from 23.8 (Chapila) to 25.5 (Kachki), fat content (%) ranges from 2.76 (Kajoli) to 6.91 (Tin Kanta), ash content (%) ranges from 2.01 (Tin Kanta) and 5.4 (Kachki) and salt content (%) from 19.75 (Kajoli) to 24.1 (Kachki).

Table 1: Showing the biochemical composition of salt cured chapila, kacki, kajoli and tinkata

Salting method	Name of the species	Moisture (%)	Protein (%)	Fat (%)	Ash (%)	Salt (%)
Dry salting	Chapila	39.1	27.3	5.1	3.0	24.5
	Kachki	39.3	26.4	4.2	4.1	22.1
	Kajoli	38.00	22.50	7.08	5.91	25.78
	Tin Kanta	40.36	27.35	5.31	3.14	20.19
Pickle salting	Chapila	48.3	22.3	4.8	3.8	19.2
	Kachki	39.3	26.4	4.2	4.1	22.1
	Kajoli	46.17	22.81	4.98	5.91	20.35
	Tin Kanta	48.40	25.45	3.39	3.14	17.31
Mixed salting	Chapila	46.5	23.8	3.9	2.9	21.1
	Kachki	46.9	25.5	5.6	5.4	24.1
	Kajoli	46.99	24.81	2.76	4.24	19.75
	Tin Kanta	46.58	25.10	6.91	2.01	20.82
Brine salting	Chapila	56.3	20.5	1.3	4.4	17.2
	Kachki	56.0	19.0	1.4	5.1	17.2
	Kajoli	54.83	19.80	1.25	4.28	17.71
	Tin Kanta	55.32	2o.02	1.22	5.53	16.98

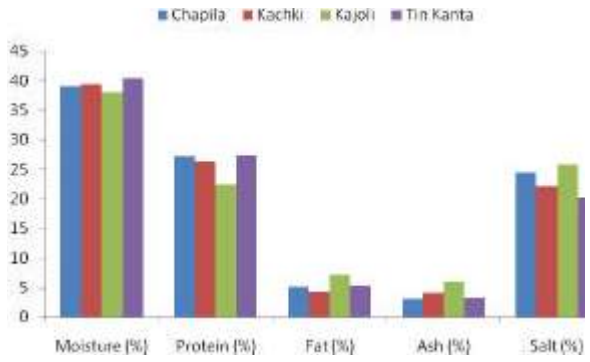

Fig. 1: Biochemical composition of the lean fish using dry salt

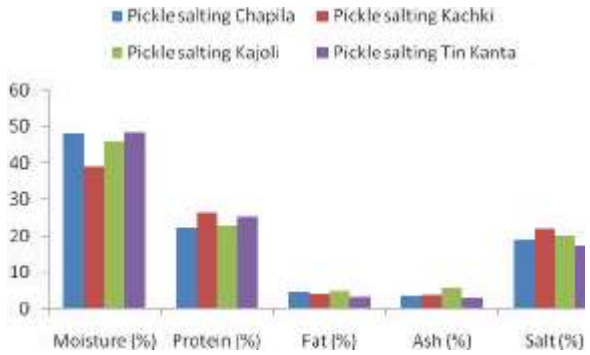

Fig. 2: Biochemical composition of the lean fish using pickle salt

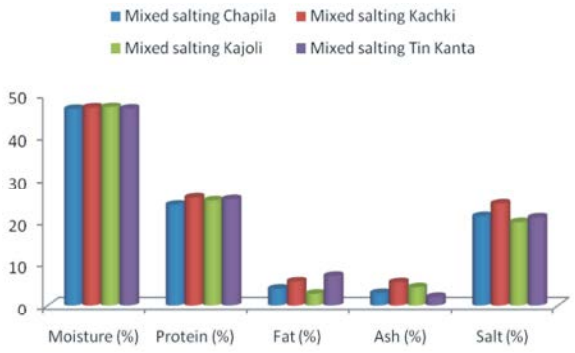

Fig. 3: Biochemical composition of the lean fish using mixed salt

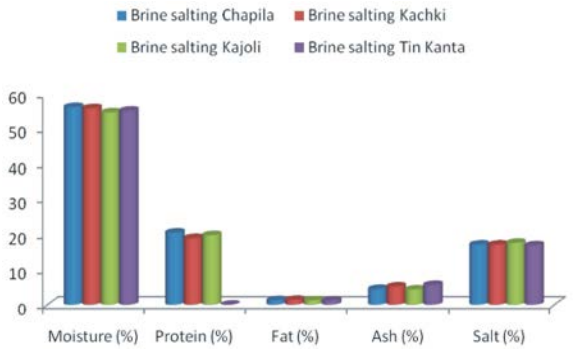

Fig. 4: Biochemical composition of the lean fish using brine salt

In Brine salting (Figure 4), the moisture content (%) ranges from 54.83 (Kajoli) to 56.3 (Chapila), protein content (%) ranges from 19.0 (Kachki) to 20.5 (Chapila), fat content (%) ranges from 1.22 (Tin Kanta) to 1.4 (Kachki), ash content (%) ranges from 4.28 (Kajoli) to 5.53 (Tin Kanta) and salt content (%) from 16.98 (Tin Kanta) to 17.71 (Kajoli). The surrounding brine has a much higher salt content than the fish muscle. So the salt from the brine penetrates into the fish muscle until the fish muscle and the surrounding brine has reached equilibrium [16].

Table 2: Showing sensory score value of the salt cured product pin pointing to the level of acceptability by the panel judges

Salting Method		Dry		Pickle		Mixed		Brine	
Species	Days	Sensory Score	TVN	Sensory Score	TVN	Sensory Score	TVN	Sensory Score	TVN
Kachki	0								
	30	5	60	4	110	3.5	115	4	95
	60	4	120	3.5	115	3	140	3.5	120
	90	3.5	170	3	145	2.5	200	3	140
	120	3	150	1	170	1.5	275	2	204
Chapila	0								
	30	5	55	4	110	4	105	4	85
	60	4	70	3	120	3.5	120	3.5	110
	90	3.5	110	2.5	140	3	150	3	145
	120	3	140	2	240	1	270	2	235
Kajoli	0								
	6	4	95	4	105	4	95	3	155
	12	3.5	125	3	130	4	100	3	165
	18	2	230	2	205	3	130	2	220
	24	1	290	1	290	2	230	1	280
Tin Kanta	0								
	6	4	100	4	100	3.5	115	4	100
	12	3.5	115	3.5	120	3	140	3	165
	18	3	160	3	155	2.5	200	3	170
	24	2	250	1	285	1.5	275	2	225

From the above discussion, salting methods can be arranged as follows: dry > pickle > mixed > brine. The results something differ from the findings of Mustafa *et al.,* [17] in case of hilsa and sarpunti in different salt curing methods where he found that mixed > dry > pickle > brine salting. The moisture content found to be increasing higher for the other salting than dry salting. The protein content was reduced after brining. This would be due to leaching of water soluble proteins such as myogen (an albumin type protein) and salt soluble fractions, myosin (a globulin). Myosin constitutes about 75% to 80% of the total protein [18]. The protein content in brine solution after brining supports this interpretation. This findings coincides with the findings with [9]

Quality Assessment and Storage Stability: Determination of sensory score had been performed using the basis of consumer acceptance which was dependent on 4 physical parameters those were appearance, texture, flavour and color of the fish product. The sensory factor of the salt cured product is presented in Table 2:

This diversity range indicated in the final quality and can be attributed largely to the effect of various conditions on salting agents and activities. It is seen that the main factor affecting the quality is the storage time.

REFERENCES

1. Kabir, K.M.R., R.K. Adhikary, M.B. Hossain and M.H. Minar, 2012. Livelihood Status of Fishermen of the Old Brahmaputra River, Bangladesh. World Applied Sciences Journal, 16(6): 869-873.
2. Hossain, M., R.K. Adhikary, K.R. Mahbub, M. Begum and M.R. Islam, 2012. Effect of 10% Concentrations of Salt, Garlic and Coriander on the Quality of Smoked Hilsa Fish (*Tenualosa ilisha*). American Journal of Food Technology, 7: 501-5.
3. Rahman, M.S., A.A. Mamun, M. Rahman, M.B. Hossain, M.H. Minar and N.J. Maheen, 2013. Illegal Marketing of Freshwater Turtles and Tortoises in Different Markets of Bangladesh. American-Eurasian Journal of Scientific Research, 8(1): 15-23.
4. Mahfuj, M.S.E., M.B. Hossain and M.H. Minar, 2012. Biochemical Composition of an Endangered Fish, *Labeo bata* (Hamilton, 1822) from Bangladesh Waters. American Journal of Food Technology, 7: 633-41
5. Azim, M.A., M.R. Islam, M.B. Hossain and M.H. Minar, 2012. Seasonal Variations in the Proximate Composition of Gangetic Sillago, *Sillaginopsis panijus* (Perciformes: Sillaginidae). Middle-East Journal of Scientific Research, 11(5): 559-562.

6. Rao, C.C.C.C. and P.M.M. Basu, 1977. Prasad Studies on solar tent dryer for drying fish. Seminar on diversification of post harvest technology in low cost fish. Society of Fisheries Technology, India.
7. Begum, M., T. Akhter and M.H. Minar, 2012. Analysis of the proximate composition of domesticated pangus (*Pangasius hypophthalamus*) in laboratory condition. Environ. Sci. and Natural Resources, 5(1): 69-74.
8. Johnston, W.A., F.J. Nicholson and A. Roger, 1994. Freezing and Refrigerated Storage in Fisheries. Stroud Series, FAO Fisheries Technical Paper, T340: 143.
9. Munasinghe, M.A.J.P., 1999. Changes in chemical content and yield of herring (*Clupea harengus*) and blue whiting (*Micromesistius poutassou*) under different methods of salting. Final projects. UNU-Fisheries Training Program.
10. Begum, M. and M.H. Minar, 2012a. Comparative study about body composition of different sis, shell fish and ilish; commonly available in Bangladesh. Trends in Fisheries Research, 1(1): 38-42.
11. Begum, M. and M.H. Minar, 2012b. Weight-length relationships of koi (*Anabas testudineus*) along with condition factor fed on formulated feed. Trends in Fisheries Research, 1(2): 01-06.
12. AOAC, 1990. Official Methods of Analysis of the Association of Official Agricultural Chemist. K. HeIritz, (Ed.). 15th ed. Vol.2. Association of Official Analytical Chemists, Inc., Suite 400, 2200 Wilson Boulevard, Arlington, Virginia 22201 USA., pp: 685-1298.
13. Pearson, D., 1970. The chemical analysis of foods. London, J. and A. Churchill, 6th ed.
14. Bligh, E. and W. Dyer, 1959. Total lipid extraction and purification. Canadian J. Biochem. Physiol., 37: 911.
15. Alexiyev, V., 1978. A textbook of quantitative analysis. Foreign language publishing house, Moscow, pp: 379.
16. Voskresensky, N.A., 1965. Salting of herring. Fish as Food. G. Borgstrom, ed. Vol III. New York: Academic Press.
17. Mustafa, M.G., S.R. Begum, M.A. Khaleque, M. Jannat and D.A. Ahsan, 2012. Nutritional qualities of hilsha and sarpunti in different salt curing methods. Dhaka Univ. J. Biol. Sci., 21(1): 97-104.
18. Dyer, W.J., H.V. French and J.M. Snow, 1950. Protein in fish muscle I. Extraction of protein fractions in fresh fish. Journal Fish. Res. Bd. Canada, 7(10): 585-93.