Journal of the Indian Fisheries Association
23, 1993, 87-90

SURIMI BASED DRIED FISH CAKE

SUBRATA BASU*
Central Institute of Fisheries Technology
Kakinada - 533 003, Andhra Pradesh.

ABSTRACT

Minced fish prepared from the fillets of the sciaenid fish (*Lutjanus* sp.) was washed with cold water (<10°C) three times. The washed muscle was pressed through a piece of fine cloth to a moisture content around 80%. The pressed cake (Surimi) was ground with 2.5% sodium chloride and 3% tapioca starch. The mixed material was shaped in the form of a cake and left for one hour for the gel to set. The cakes were then steamed. The cooled cakes were cut into pieces of 1 cm length x 1 cm width x 0.5 cm thick. The pieces were either dried in an electrical oven at 50°C or dried in sun to a moisture content of 11-12%. Biochemical, bacteriological and organoleptic evaluation revealed that the cakes were in very good acceptable form for 8 months. The cakes could be rehydrated by soaking in water at ambient temperature for half an hour and boiling in water for 10 minutes.

INTRODUCTION

Large quantities of fish are discarded at sea because it is currently uneconomic to preserve and bring them ashore. Fish occurring as bycatch during shrimp trawling is the best known example of such fish. Factors discouraging the landing of this bycatch are the low market value of the material, the size and species composition (requiring considerable sorting), the lack of suitable refrigerated storage space on board and the possible reduction in shrimping efficiency. Due to the recent interest in our country in intensive deep sea fishing in the EEZ, lot of deep sea fishes are expected to land which may not be immediately acceptable to the consumer due to unfamiliarity with their shape, size, colour and flavour . The rapid development of minced fish technology over the last two decades could make a major contribution to the increased exploitation. The world's consumption of fish could be very much increased if presently under utilized or unused resources are brought into the human food chain.

Several high technology dried mince products have been developed. These include the bland, solvent extracted FPC type A isolates, acid precipitated isolates and Suzuki's ''Marine beef''- a kneaded, ethanol precipitated fibrous isolate (Suzuki, 1979). Several dried salted mince products have been reported (Anderson and Mendelsohn, 1972 ; Bello and Piggot, 1978,1979; Bligh, 1977 ; Bligh and Regier, 1976 ; Hansen, 1979; Poulter and Disney, 1977 ; Zain, 1980 ; Nair and Gopakumar, 1986)

Surimi is the semi processed intermediate mince material used in the preparation of a wide range of finished products. The process involves beheading, gutting, bone separation, washing, dewatering and straining (Steinberg, 1980). The quality of the surimi is determined by its whiteness, rheological properties and gel forming ability. Presently an attempt has been made to develop a dried product using surimi prepared from minced meat of low cost marine fish using processing methods which could be applied at village level in the tropics.

MATERIAL AND METHODS

Fish mince was prepared from the fillets of the sciaenid fish (*Lutjanus* sp.) (about 100-150g each) using a manually operated laboratory mincer and used for preparation of surimi. Storage characteristics of the product were evaluated by chemical, bacteriological and

*Present Address : Central Institute of Fisheries Education, Versova, Bombay 400 061.

organoleptic analysis of the sample at regular intervals. Moisture, fat, total nitrogen, ash, peroxide value and free fatty acid (FFA) were determined following AOAC, (1980) and total volatile basic nitrogen (TVBN) by the micro diffusion method of Conway (1947). Total bacterial count was determined by standard pour plate method using tryptone glucose agar medium. Plates were incubated at 37°C and counts were taken after 48 hours. The cakes were soaked in water for half an hour and then boiled in 2% salt solution for 10 minutes. The cooked samples were then evaluated organoleptically for its acceptability by a panel of 5 judges on a 9 point hedonic scale, 9 being extremely good, 1 being extremely poor, 5 being neither good nor poor (limit of acceptability).

Dried surimi based fish cake was prepared as follows : Minced meat was washed with cold water (<10°C) three times. Each time meat was stirred for 2-3 minutes with two volumes of water and allowed to settle and water decanted from the top. Last washing was done with water containing 0.2% NaCl which facilitated removal of water from the muscle. After the third washing, the washed muscle was filtered and pressed hard through a piece of fine cloth to a moisture content around 80% and then ground with 2.5% NaCl and 3% tapioca starch for 3 minutes in dough mixer at 100 rpm. The mixed material was then shaped in the form of a cake approximately 10 cm x 10cm x 0.5cm in size. It was then left for one hour for the resulting gel to set. The cakes were then steamed at atmospheric pressure for 15 minutes, cooled to room temperature and cut into pieces of 1cm x 1cm x 0.5cm size. They were then either dried in an oven at 50°C or dried in the sun to a moisture content of 11-12%. The dried fish cakes were then stored in screw capped polythene jars at room temprature and their storage life studied.

RESULTS AND DISCUSSION

The development of this dried product depends upon the fact that myofibrillar protein in the muscle is solubilized into sol form when ground with 2.5% sodium chloride. This paste (sol) when left for some time sets into a slightly transparent gel. This gel is formed by hydrophobic and hydrogen bonds. Gel forming protein actomyosin and constituent aggregates change to a random coil during heating (Suzuki, 1981)

Table 1 shows the proximate composition of dried fish cake. Protein concentration was as high as 65% and fat concentration was only 1.2%. During washing of the minced meat for the preparation of surimi (which was used for the preparation of fish cake) most of the fat has been removed resulting in a very low fat concentration in the finished product. Table 2 depicts the results of analysis of different parameters during storage. There was a little fluctuation in moisture, probably due to the fact that the whole experimental sample were stored in a screw cap bottle and during each sampling the product were exposed to the atmosphere, resulting in slight fluctuation in moisture content. The extent of fat degradation in the sample was depicted by the values of PV and FFA. Both the values increased gradually with storage time. As the fat content of the product was only 1.2%, the increase in the values of PV and FFA did not affect the quality of product till 8 months of storage. Bacterial count increased gradually with storage period which was well reflected in the gradual increase in TVBN values, showing the extent of protein degradation during storage. Organoleptic evaluation supported by chemical and bacteriological data reveals that the product was acceptable upto 8 months (Table 2).

Table 1 : *Proximate composition of Surimi based dried fish cake.*

Moisture	...	11.40%
Protein	...	65.64%
Fat	...	1.20%
Ash	...	14.46%
Carbohydrate	...	7.30%

Table 2 : *Storage characteristics of surimi based dried fish cakes.*

Months in storage	Moisture %	TVBN mg%	P.V. m. mole of 0_2/kg fat.	FFA oleic acid %	Total Bacterial count/g.	Acceptability
0	11.34	15.21	2.12	3.15	1.6x103	9.0
1	11.80	19.57	3.75	4.21	2.1x103	8.7
2	11.63	24.81	4.13	6.72	3.2x103	8.5
3	10.74	27.36	6.52	6.62	3.9x103	8.1
4	10.65	31.53	5.95	9.35	6.2x103	7.7
5	10.42	32.62	7.19	11.37	7.7x103	7.2
6	11.23	34.90	8.20	12.72	3.2x104	6.7
7	11.92	37.50	8.85	13.17	7.3x104	5.6
8	12.18	40.72	9.20	14.97	3.5x105	5.1
9	11.84	52.78	15.27	32.54	9.7x106	4.4

Earlier Basu *et al.*(1985) prepared fish cubes using raw fish meat. The cubes were tough in texture after rehydration. In the present work the meat was washed three times to prepare surimi to remove water soluble sarcoplasmic protein responsible for hardness. Heat setting and drying the product using 2.5% NaCl only without the use of tapioca starch led to a product which gave tough elastic texture after rehydration. After several trials with different quantities of different starches it was found that 3% tapioca starch gave the acceptable texture. The cakes could be rehydrated by soaking in water at ambient temperature for half an hour and boiling in water for 10 minutes. Removal of water from washed meat posed a problem as the muscle swelled during washing. However last washing with 0.2% salt solution facilitated the removal of maximum water from the washed muscle (Suzuki, 1981).

ACKNOWLEDGEMENTS

The author thanks Dr. C. C. Panduranga Rao, Scientist-in-charge, Research Centre of the C.I.F.T., Kakinada for his encouragement and for facilities provided, and the Director, CIFT, Cochin for facilities provided and for permission to publish the paper.

REFERENCES

Anderson, M.L. and Mendelsohn, J.M. 1972. A rapid salt curing technique. *J. Food. Sci.*, **37** : 627 - 628.

AOAC. 1980. *Official Methods of Analysis* (Horowitz. H.,Ed), 13th Edn. Washington.

Basu, S., Das K.P., Chattoraj, D.K. and Bose, A.N. 1985. Preparation of fish cube. *J.Fd. Sci.Technol.*, **22**(3): 216.

Bello, R.A. and Piggot, G.M. 1978. A nutritious dried fish product suitable for use in Venezuela. p125 In : *Abstracts of the Fifth International Congress of Food Science and Technology*, Kyoto, Japan, 17-22 September, 1978. IUFOST.

Bello, R.A. and Piggot, G.M. 1979. A new approach to utilising minced fish flesh in dried products. *J.Food. Sci.*, **44** (2): 335-338.

Bligh, E.G. and Regier, L.W. 1976. A potential and limitations of minced fish. p73-77. In: J. N. Key (ed) *Proceedings of the Conference on the Production and Utilization of Mechanically Recovered Fish Flesh (Minced Fish),* MAFF, Torry Research Station, Aberdeen.

Bligh, E.G. 1977. A note on salt mince fish. p291-292. In: P. Suteliffe and J. Disney (ed). *Proceedings of the Conference on the*

Handling, Processing and Marketing of Tropical Fish. Tropical Products Institute, London.

Conway, E.J. 1947. *Microdiffusion Analysis,* Revised Edn., d.Van Nostrant Co. Inc. New York: 1018pp.

Hansen, P. 1979. Fish protein from under utilized species. In : Chiba, H.(ed) Proceedings of the Fifth International Congress of Food Science and Technology, Amsterdam, *Development in Food Science.,* 2:58-65.

Nair, P.R. and Gopakumar, K. 1986. Development and storage characteristics of dehydrated salt mince from low priced fish. *Fish. Technol.,* **23** : 100 - 105.

Poulter, R.G. and Disney, J.G. 1977. Development of novel products from tropical fish species. p93. In : Young, R.H.(ed) *Proceedings of the Second Annual Tropical and Sub-tropical Fisheries Technological Conference of the Americans,* April 17-20, 1977, Biloni, Mississippi College Station, Texas. Texas A&M University Sea grant Programme.

Steinberg, M.A. 1980. Past, Present and Future methods and utilization 34-84. In : Conell, J.J.(ed) *Advances in Fish Science and Technology.* Papers presented at the Jubilee Conference of the Torry Research Station. Aberdeen, Scotland, 23-27 July 1979, Fishing News Books Ltd. Farnham, Surrey.

Suzuki, T. 1979. A newly developed processing method of fish proteins, "Marine Beef." *Reito.,* **54** (615) : 19-28.

Suzuki, T. 1981. *Fish and Krill Protein Processing Technology.* Applied Science Publication Limited, London., 1981 ; 70pp

Zain, A.M. 1980. Spice minced fish from tilapia. p223-226. In : Connell, J.J.(ed) *Advances in Fish Science and Technology.* Papers presented at the Jubilee conference of the Torry Research Station, Aberdeen, Scotland, 23-27 July 1979. Fishing News Books Ltd., Farnham, Surrey.