

Frozen Storage Studies of Composite Fish Mince From Dhoma (*Sciaenid* sp.) and Lactarius (*Lactarius lactarius*)

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Fish minces from Dhoma and Lactarius were mixed in the ratio of 40:60 respectively, and quick frozen along with individual minces at -40°C and stored at -20°C . Shelf-life was evaluated by following biochemical, physical and organoleptic changes occurred during storage upto 44 weeks. Rapid decreases were noted in water soluble nitrogen and salt soluble nitrogen fractions during the initial period of 16 weeks. A good correlation was observed between changes in salt-soluble nitrogen and organoleptic evaluation. The minces were in good and acceptable condition up to 32 weeks of storage.

A large number of fish species caught in Indian trawlers as bycatch are sold as trash fish. No fish is intrinsically trash and that poor infrastructure for handling, storage, distribution and processing limits utilization of a portion of landed catch for direct human consumption (Menon & Samuel, 1975; Sripathy, 1977) and so the surplus catch goes for industrial reduction. Silver bellies, ribbon fish, cat fish, sciaenids, lactarius, shark, rays, soles etc. constitute the list of fishes that are generally considered as low priced fish in various parts of the country. Diversification is the only alternative to create a market for these low priced fish which compare favourably with table fish as far as nutritional aspects are concerned. There are several ways by which these low cost, under-utilized fish could be made use of as food rather than as feed. One such method 'Meat picking' to obtain boneless fish mince offer several advantages such as better yield, incorporation of stabilizers, flexibility in product presentation, low cost and possibility of blending. In tropical regions where trawler catches are of mixed composition and varied palatability, it is of interest to determine whether mixing minces from two different fishes yields an acceptable and stable product and whether such a blending can improve physical and organoleptic characters of a less palatable fish. Although in India, a lot of work has been done on the production of mince meat

and preparation of various products from it, (Menon & Samuel, 1975; Perigreen *et al.* 1979; Nair *et al.* 1982; Joseph & Perigreen 1983) reports on the possibilities and effects of mixing the minces from various fish are limited. The present paper is a report on the mixing minces from low priced dhoma and lactarius and their frozen storage characteristics.

Materials and Methods

Fresh dhoma and lactarius were procured from the local fish landing centre and immediately brought to the laboratory, washed thoroughly, iced and kept over night in

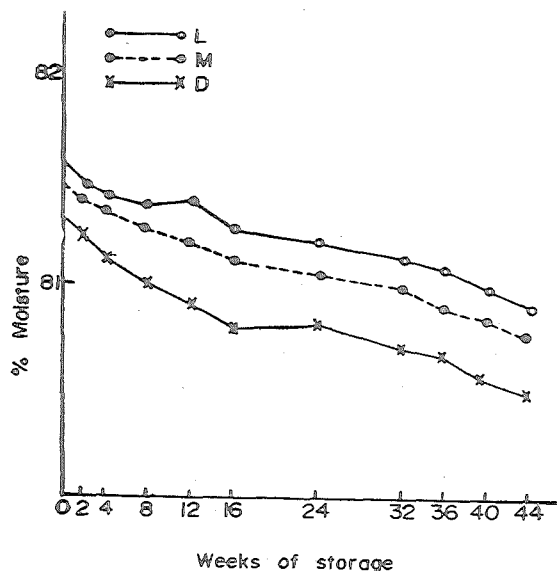


Fig. 1. Changes in moisture content during frozen storage at -20°C .

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Table 1. *Changes in physical characteristics of thawed minces during the course of frozen storage*

Storage period in weeks		Dhoma	Lactarius	Mix
Initial	Colour	Pinkish white	whitish grey	greyish white
	Texture	firm, very good	firm, very good	with pinkish tinge
	Odour	very good	very good	firm, very good
2	Colour	Pinkish white	whitish grey	very good
				Greyish white
				with pinkish tinge
	Texture	firm, very good	firm, very good	firm, very good
	Odour	good	very good	very good
4	Colour	pinkish white	whitish grey	greyish white
				with pinkish tinge
	Texture	firm, good	firm good	firm, good
	Odour	good	very good	very good
8	Colour	pinkish white	whitish grey	greyish white
				with pinkish tinge
	Texture	firm	firm, good	firm, good
	Odour	good	good	good
12	Colour	slight pinkish white	whitish grey	greyish white
	Texture	good to fair	firm, good	firm, good
		firm		
	Odour	good	good	good
16	Colour	dull pinkish	whitish grey	greyish white
	Texture	fair	firm	firm, good to fair
	Odour	fair	good	good
24	Colour	dull pinkish	dull whitish grey	dull greyish white
	Texture	slight soft	good	fair
	Odour	acceptable	good	fair
32	Colour	dull pale pinkish	dull whitish grey	dull whitish
	Texture	spongy, very soft	fair, slight spongy	slight spongy
	Odour	unpleasant	fair	fair, acceptable
		unacceptable	acceptable	
36	Colour	dull	dull greyish	dull greyish
	Texture	spongy, soft	spongy, soft	spongy, soft
	Odour	unpleasant	unacceptable	unpleasant
		off odour		unacceptable off
				odour
40	Colour	„	dull	„
	Texture	„	spongy	„
			unpleasant	
	Odour	„	unacceptable	„

insulated boxes. Next day the fish were beheaded and eviscerated and dhoma were split open from the ventral side to expose maximum surface area, and the fish were thoroughly washed again. Minced meat was prepared by feeding both fish separately into a Baader-694 deboning machine. Minces from dhoma and lactarius were thoroughly mixed manually in the ratio of 40:60 respectively. Individual and mixed minces were spread evenly in freezing trays, lined

with 300 gauge LDPE sheets in which spacers were placed to get blocks of 500 g each. Trays were then covered with 300 gauge LDPE sheets and quick frozen in a plate freezer at -40°C. After freezing, the blocks were glazed, packed individually in 200 LDPE sheets, placed in master cartons and stored at -20°C. Fish minces were analysed for its changes in biochemical, physical and organoleptic parameters, just before and immediately after freezing and

then periodically up to 44 weeks. Physical and bio-chemical analysis of frozen samples were carried out on thawed meat. Frozen blocks were sealed in polythene bags and thawed in running water for 60 min and then drained for 20 min.

Moisture was determined by AOAC methods (1975), total nitrogen (TN) and water soluble nitrogen (WSN) by microkjeldahl method, salt soluble nitrogen (SSN) by the method of Dyer (1950). For organoleptic studies the frozen blocks were cut into 4.0 x 1.5 x 1.5 cm sizes approximately and dipped in whole egg batter with 4% salt (w/w), rolled in rice samoline containing 2% salt and deep fried in ground nut oil to a golden brown colour. Organoleptic quality of the fried samples were rated by a taste panel.

Results and Discussions

The yield of minced meat from dhoma and lactarius were 50% and 65% respectively of the whole fish. Mince meat from dhoma had a attractive pinkish white colour where as lactarius mince had a whitish grey colour while mixed mince had a greyish white colour with a pink tinge.

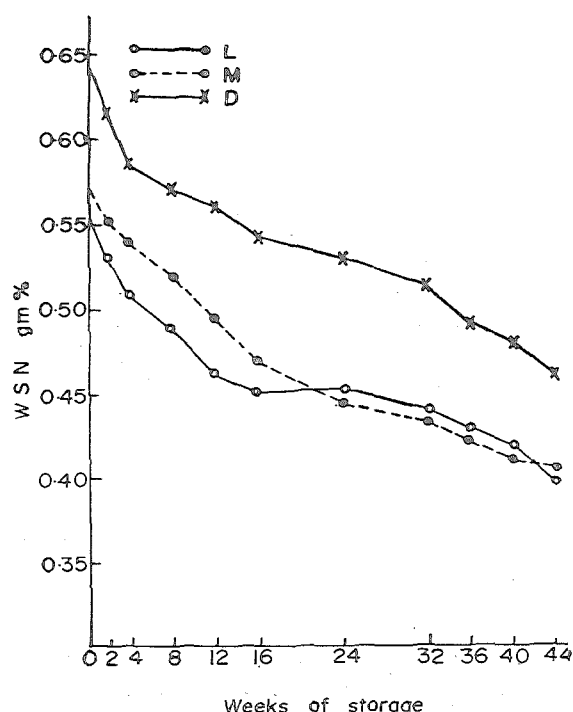


Fig. 2. Changes in water soluble nitrogen during frozen storage at -20°C .

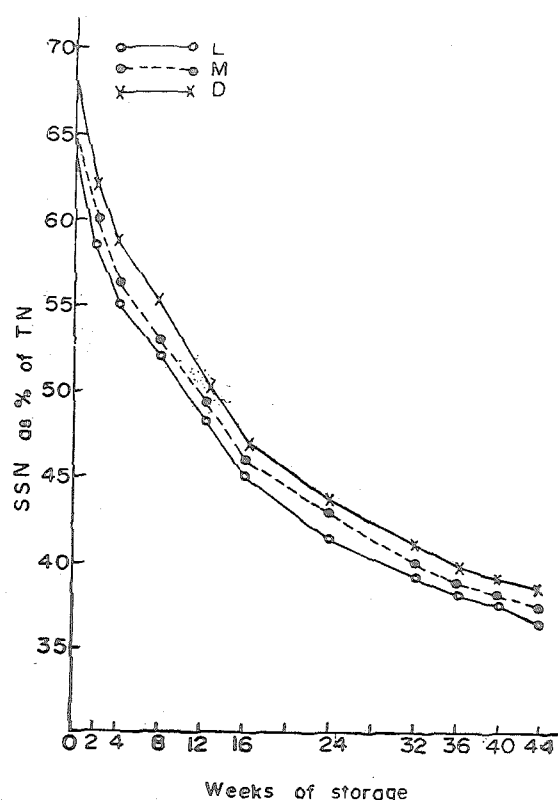


Fig. 3. Changes in salt soluble nitrogen during frozen storage at -20°C .

The changes in physical characteristics of thawed meat during the course of frozen storage are given in Table 1. It is observed that in physical characteristics mixed mince is at par with that of lactarius and rated higher than dhoma throughout the storage period.

Changes in moisture content of the minces during frozen storage are given in Fig. 1. A slight decrease in the moisture content throughout the storage period was observed in all the minces. The relatively low moisture loss can be attributed to the effective packing of the frozen mince blocks, by glazing, wrapping in polythene sheets and storing in master cartons. Changes in WSN fractions of the minces during the frozen storage are shown in Fig. 2. Dhoma mince had a higher initial WSN content and this difference continued throughout the storage period. A decreasing trend in WSN was observed in all the three minces with higher rate of decrease during the first 24 weeks of storage. Subsequent rate of decrease though much less pronounced was higher for dhoma than for lactarius and mixed. Fig. 3 represents the changes

Table 2. *Changes in organoleptic characteristics of fried fish fingers prepared from frozen stored fish mince*

Storage period, weeks	Characters	Dhomas	Lactarius	Mix
Initial	Texture	very firm	excellent firm	very firm
	Flavour	characteristics	characteristics	excellent
	Taste	excellent	excellent	excellent
2	Texture	very firm	very firm	very firm
	Flavour	very good	characteristics	very good
	Taste	very good	very good	very good
4	Texture	firm	very firm	firm
	Flavour	very good	very good	very good
	Taste	good	very good	very good
8	Texture	firm	firm	firm
	Flavour	good	very good	very good
	Taste	good	very good	good
12	Texture	moderately firm	firm	firm
	Flavour	good to fair	good	good
	Taste	good	good	good
16	Texture	fairly firm	firm	moderately firm
	Flavour	fair	good to fair	good to fair
	Taste	fair	good	good to fair
24	Texture	slightly soft	moderately firm	firm to soft
	Flavour	blend, acceptable	fair	fair
	Taste	fair, acceptable	good to fair	fair
32	Texture	soft, spongy	slightly soft	slight soft
	Flavour	off, unacceptable	acceptable	acceptable
	Taste	unacceptable	fair	acceptable
36	Texture	soft, spongy	soft, spongy	soft, spongy
	Flavour	strong, unpleasant	slight off	strong, unpleasant
	Taste	poor, unacceptable	unacceptable	unacceptable
40	Texture	"	"	"
	Flavour	"	"	"
	Taste	"	"	"

in SSN fractions of the minces during frozen storage. Dhoma mince had a higher initial salt solubility than lactarius and mixed mince which was maintained throughout the storage period. Initial decreases in SSN were fairly rapid up to 16 weeks of storage, followed a gradual decrease in the subsequent period up to 32 weeks. After this period the solubility losses were very low and reached almost to a constant level. Similar decreasing trends were observed in frozen storage of threadfin bream mince (Joseph & Perigreen, 1983).

The results of sensory evaluation are presented in Table 2. Lactarius mince received consistently higher ratings followed by mixed and dhoma. Organoleptic qualities were found to decrease rather rapidly in the

first 16 weeks followed by a marginal reduction in the quality up to 32 weeks of storage. A second reduction in quality was noted after this period. Such a decrease in organoleptic quality at a later stage in frozen storage could be due to the textural changes in the minces which have been shown to occur in frozen fish mince long after their salt solubilities have reached a constant level (Rodger *et al.* 1979). A good correlation was observed between organoleptic quality and changes in salt solubilities of minces.

The shelf life of Dhoma mince as shown by the physical and organoleptic evaluation, was in good condition up to 16 weeks and in fair and acceptable condition up to 24 weeks of storage, while the lactarius mince

and mixed mince were found to be in good condition up to 16 weeks and in fair and acceptable condition up to 32 weeks of storage.

It is observed from Tables 1 and 2, that the mixed mince in physical and organoleptic character is closer to that of lactarius than dhoma and definitely got higher ratings over dhoma mince. Thus blending of dhoma mince with that of lactarius not only yields a stable product but also to a certain extent, improve the physical and organoleptic character of dhoma.

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References

- AOAC (1975) *Official Methods of Analysis*, 12th edn. Association of Official Analytical Chemists, Washington D.C.
- Dyer, W. J., French, H. V., & Snow, J. M. (1950) *J. Fish. Res. Bd. Can.* 7, 585
- Joseph, J. & Perigreen, P. A. (1983) *Fish. Technol.* 20, 13
- Menon, M. D. & Samuel, G. E. (1975) *Sea Fd Export J.* 7, 15
- Nair, P. R., Thankamma, R. & Gopakumar K. (1982) *Fish. Technol.* 19, 19
- Perigreen, P. A., Lakshmy Nair, A. & Prabhu P. V. (1979) *Fish. Technol.* 16, 43
- Rodger, G., Weddle, R. B. & Craig, P. (1979) in *Advances in Fish Sciences and Technology* (J. J. Conwell Ed.) Fishing News Books Ltd., England, p. 199
- Sripathy, N. V. (1977) *Sea Fd Export J.* 9, 9