

ICE STORAGE CHARACTERISTICS OF PERCH WITH SPECIAL REFERENCE TO ITS SUITABILITY FOR CANNING

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Perch (*Pagrus spinifer*), one of the most abundantly available fishes of Gujarat coast, was subjected to a detailed study for assessing its storage life in ice and amenability of the iced fish for canning. Changes in the salt soluble nitrogenous material and myosin content of the iced fish showed good correlation with the changes in the organoleptic and physical qualities. The fish was found to have a storage life of 9 days in ice and samples stored upto 7 days were suitable for canning.

INTRODUCTION

Perch (*Pagrus spinifer*) is one of the most abundantly available fishes of Gujarat coast. The landings of perch in India for the period 1970-1974 are given in Table I. At present it fetches only very poor returns. This is mainly due to the ignorance of the fish processors about the quality and processing characteristics of the fish. From the preliminary experiments carried out on the processing of the fish at this Research Centre it was observed that an excellent canned product could be obtained if properly handled fresh fish were utilized for the purpose.

Studies on the changes in the quality

of various commercially important species of fishes of India during storage in ice have been reported earlier (Venkataraman, Prabhu and Mankad, 1966; Govindan, 1962, 1964; Velankar, 1961). Suitability of ice stored mackerel and sardine for canning has been studied by Madhavan, Balachandran and Choudhuri (1970). But a similar study on the ice storage and amenability of ice stored material to canning has been attempted only for few species of the fishes available on the Gujarat coast (Venkataraman, Kandoran and Raje, 1970). This paper reports results of a study on ice storage of perch and suitability of the ice stored material for canning.

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TABLE I
*LANDINGS OF PERCH IN RELATION TO TOTAL LANDINGS IN INDIA

Year	Landing of perch (tonnes)	Total landing of fish (tonnes)
1970	13,913	10,85,607
1971	12,993	11,61,389
1972	14,480	9,74,456
1973	15,823	9,66,580
1974	34,614	10,96,366

*Source: Annual Reports for the year 1970-74.
Central Marine Fisheries Research Institute, India.

MATERIALS AND METHODS

Fresh perch (*Pagrus spinifer*) caught in trawl net operated off Veraval from the Institute's fishing vessels was iced at the fishing ground and brought to the laboratory in an insulated box. Immediately after reaching the laboratory, fish was washed in chilled water and stored in crushed ice in an insulated box with false bottom. Sufficient quantity of crushed ice was added every day to keep the fish under ice. Samples were drawn at regular intervals, analysed for organoleptic, physical, biochemical and bacteriological qualities and also canned in double refined groundnut oil.

Moisture, fat and salt were estimated according to A.O.A.C. (1960) methods. Trimethylamine nitrogen (TMAN) and total volatile bases (TVB) were estimated from a trichloro acetic acid extract by micro diffusion method of Conway (1947) and α - amino nitrogen by the method of Pope and Steven (1939). Nonprotein nitrogen (NPN) (on trichloro acetic acid extract)

and total nitrogen (TN) were estimated by the micro Kjeldahl method. Salt soluble nitrogen (SSN) and myosin were estimated according to the method of Dyer (1950). Total bacterial count (TC) was estimated using sea water agar media, faecal streptococci by K F. media containing TTC, (2, 3, 5 triphenyl tetrazolium chloride), coagulase positive staphylococci by Chapman stone media and *E. coli* by desoxycholate agar media.

Canning was carried out as follows: Filleted and cleaned fish was dipped for 30 minutes in 15% brine, packed (350-370 g.) in S. R. lacquered cans (301 x 307), pre-cooked at 0.85 kg./cm.² steam for 20 minutes, drained well, filled with hot (85°C) double refined groundnut oil, exhausted for 10 minutes, seamed and processed at 1.05 kg./cm.² for 45 minutes. The processed cans were immediately cooled in ice cold water.

Drip formed during pre-cooking was collected, measured and centrifuged. Aliquots of the clear drip were used to

TABLE II
CHEMICAL AND BACTERIOLOGICAL ANALYSES OF ICED PERCH

Period of ice storage days	Mois- ture %	TN %	NPN as % of TN	TMAN mg./ 100g.	TVN mg./ 100g.	α -amino N mg./ 100g.	SSN as% of TN	Myosin as % of TN	NPN as % of SSN	Total count/ g.	Faecal strepto- cocci/ g.	Coagulase positive staphylo- cocci/g.	<i>E. coli</i> /g.
1	74.46	3.370	8.245	0.958	9.534	8.828	58	25	12	2.31×10^5	Nil	Nil	Nil
4	75.25	3.310	6.372	1.127	10.700	8.385	48	25	12	3.22×10^5	Nil	Nil	Nil
7	75.93	3.022	7.602	1.413	11.270	7.752	47	25	14	5.14×10^5	Nil	Nil	Nil
9	77.39	3.076	8.478	1.846	12.470	7.784	46	10	16	8.35×10^5	Nil	Nil	Nil
11	78.70	2.937	13.42	2.235	12.930	6.572	38	10	40	2.33×10^6	Nil	Nil	Nil

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TABLE IV

BIOCHEMICAL, ORGANOLEPTIC AND PHYSICAL CHARACTERISTICS OF CANNED PERCH

Period of ice storage. days	Mois- ture %	TN %	WSN mg./ 100g.	NPN mg./ 100g.	Salt as NaCl %	Colour	Odour	Taste	Texture	Overall quality
1	70.17	3.222	898.1	266.5	3.140	Characteristic brownish white	Characteristic freshly cooked fish	Palatable and juicy	Firm	Very good
4	70.13	3.158	826.0	274.9	3.257	-do-	-do-	Palatable	-do-	Good
7	69.03	3.141	767.0	410.0	1.500	Very slightly brownish	Very slightly reduced characteristic smell	Palatable slightly less juicy	-do-	Very fair
9	69.10	3.107	620.3	284.6	1.355	Yellowish brown	Reduced characteristic smell	Very less juicy, bland	Slightly soft & rubbery	Fair, satisfactory
11	67.54	3.02	541.5	181.90	1.433	Deep yellowish brown discolouration	Slightly rancid odour	Very less juicy, metallic rusty after taste	-do-	Poor

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TABLE V

LOSS OF DRIP AND NITROGENOUS MATERIAL DURING PRE-COOKING
AND PROCESSING OF THE FISH

Period of icing days	Loss of drip during pre- cooking % (a)	Loss of drip during steriliza- tion % on fresh muscle (b)	Total drip loss % on muscle (a + b)	Pre-cook drip		Process drip	
				TN mg./ 100ml.	NPN mg./ 100ml.	TN mg./ 100ml.	NPN mg./ 100ml.
1	15.22	11.67	26.89	940.8	280.0	1506.0	188.1
4	21.20	7.18	28.38	952.8	376.0	1576.0	232.4
7	22.89	5.30	28.19	994.5	596.0	1251.0	239.4
9	22.42	7.03	29.47	1116.0	708.4	1506.0	287.0
11	21.82	6.44	29.26	1127.0	855.5	1563.0	245.8

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was a drastic change in their characteristic flavour, taste and juiciness. Texture was soft-rubbery and salt content was below normal. It could be inferred from the above observations that fish stored up to 7 days in ice was suitable for canning. Canning of the fish stored for extended periods in ice (beyond 7 days) gave products with a rancid odour, flat taste and brownish yellow discolouration.

Drip losses on pre-cooking and processing of the iced perch are given in Table V, along with analysis of the nitrogenous constituents. Drip on pre-cooking increased from 15% to 23% within a storage period of 11 days. Further drip loss on processing of the pre-cooked fish was found to decrease from 11% to 6% within the same period. In general the total drip loss increased from 27% to 29% within 11 days. There was a gradual increase in the content of nitrogenous materials particularly that of NPN in the pre-cook drip as the period of ice storage increased. It is inferred from all these observations that canning of the iced fish stored for a period up to four days gave the best quality product, whereas canning of the fish iced for a period upto 7 days gave satisfactory products with only marginal difference in quality. Fish kept in ice for more than 7 days was not found suitable for canning process, due to higher loss of nitrogenous materials and organoleptic qualities.

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