

# PREPARATION AND STORAGE BEHAVIOUR OF FISH PROTEIN BISCUITS

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This paper deals with the investigations carried out on the preparation and storage characteristics of protein enriched biscuits (sweet and salt), incorporated with partially de-odourised fish protein concentrate. The product contains more than 20% protein and has storage life exceeding 6 months at room temperature (21°C to 32°C), in 400 gauge polythene bags.

## INTRODUCTION

The trawl catches in India comprise 60-70% uneconomic varieties of fish which does not find a ready market. 30-35% of the total marine catches in the country is made up of these varieties of fish. At present a considerable portion of this is salt cured and sun dried. The product is unsatisfactory from the appearance and hygienic points of view and is consumed mainly by low income groups. Remaining trash fish is used to prepare fish meal or is converted to fish manure. Many a time, when catch of such fish is high, fishermen, discouraged by very low market price, throw them back into the sea. Therefore proper utilization of these types of fish can result in better returns to the fishermen vis a vis fighting the problem of malnutrition.

Several attempts have been made on preparation of fish protein enriched food items like fish wafers (Moorjani, 1970; Venugopalan and Govindan, 1967), fish soup mix (Venugopalna and James, 1969), biscuits

incorporating prawn pulp meal (Venkataraman *et al.*, 1956), and beverage incorporating fish hydrolysates (Prabhu *et al.*, 1975). In the present work the author has studied preparation of biscuits incorporating partially de-odourised fish protein concentrate with emphasis on developing a product to suit the taste habits and traditions of the population. The process can be easily adopted for commercial production.

## MATERIALS AND METHODS

Mixed samples of trash fish comprising mostly of jew fish (*Otolithus* sp. and *Johnius* sp.) were used. These were collected from the catches of trawlers operated off Dwarka by the Fisheries Department, Government of Gujarat. Fish were kept iced till used for preparation of fish protein concentrate (FPC). After washing, the fish were dressed and cooked in water (1 : 2) for 30 minutes. After cooking, meat was separated by hand picking and FPC was prepared out of this picked meat according to the method described

TABLE I  
RECIPE FOR FISH PROTEIN BISCUITS (SWEET AND SALT)

Recipe	Weight %	
	Sweet	Salt
Fish Protein Concentrate (FPC)	14.68	14.92
Wheat flour	45.86	59.70
Vegetable oil	13.76	17.91
Baking powder	2.30	2.99
Sugar	22.94	—
Cardamom powder	0.46	—
Garlic powder	—	0.60
Cumin (Whole seeds)	—	1.49
Salt	—	2.39

by Sen and Rao (1966) followed by extraction with absolute ethyl alcohol twice (Moorjani, Balakrishnan Nair and Lihiry, 1968; Moorjani, 1970 and Moorjani and Lahiri, 1970), drying to a moisture level below 10%, pulverizing and sieving in a 100 mesh sieve. Moisture, protein, fat, ash, salt, calcium and phosphorus were determined by A.O.A.C. (1970) methods.

Two types of biscuits, sweet and salt, were prepared incorporating FPC.

Ingredients for the preparation of biscuits are given in Table I. For sweet biscuit FPC, wheat flour, baking powder and cardamom powder were mixed, hydrogenated vegetable oil was added to the mixture and the bulk mixed thoroughly. Sugar or salt, as the case may be, was dissolved in water and the solutions added to the mixture to prepare the dough.

Small quantities of dough were then

rolled into the desired thickness and pieces of various shapes and sizes were cut. They were then spread on aluminium trays and baked in an electric oven. The products were then cooled and packed in 400 gauge polythene bags and sealed.

#### RESULTS AND DISCUSSION

The sweet and salt biscuits were similar in colour to that of usual biscuits. Sweet biscuit had characteristic sweet flavour whereas salt biscuit had characteristic spicy flavour. Both types of biscuits were free from fish odour.

Chemical composition of the two groups of biscuits is presented in Table II. It can be seen that in both samples the fat content is fairly high, while the protein (TN $\times$ 6.25) is about 20%. The ash content is very low in sweet biscuit due to low salt percentage and in salt biscuit it is not too high. The products are rich in phosphorus and calcium.

TABLE II  
CHEMICAL COMPOSITION OF FISH PROTEIN BISCUITS (ON D. W. B)

Contents	Sweet biscuit <sup>1</sup>	Salt biscuit
Moisture %	4.12	4.39
Ash %	2.39	5.87
Protein (TN×6.25) %	21.00	21.87
Fat %	14.22	18.52
Salt %	0.18	2.51
Calcium %	198.00 mg.	200.00 mg.
Phosphorus as P <sub>2</sub> O <sub>5</sub> %	510.00 mg.	520.00 mg.

The shelf life studies of the biscuits were carried out by keeping the samples, sealed in 400 gauge polythene bags, at room temperature (21-32°C). The changes brought about in the products were recorded at intervals of 3 months. Colour changed from yellowish brown to brown after nine months and to dark brown after 12 months in salt biscuit. In the case of sweet biscuit the change in colour was not as significant as in the salt biscuit; the colour changing to brown only after 12 months' storage. There was gradual loss of the characteristic flavour after six months in both cases and off taste was recorded in both types at the end of 12 months' storage. Salt biscuits remained in very good condition for six months after which brown colour was noticed on the surface with loss of characteristic flavour. The texture was also good upto 6 months.

Equilibrium relative humidity studies were conducted as expounded by Iyengar and Sen (1965), Strolle and Cording (1965), and Venugopalan and Govindan

(1967). Figure 1 shows the curve obtained by plotting equilibrium moisture contents against relative humidity (R.H.). It could be suggested that the optimum R. H. at which the protein biscuits can be stored is about 65%. During storage there was mold growth in all the samples kept at R. H. 90% and above. Between 65% and 90% R. H., no mold growth was observed, however, the product softened.

Storage in sealed 400 gauge polythene

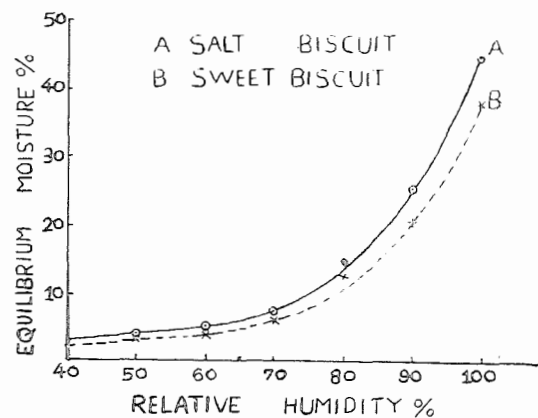


Fig. 1: Equilibrium Moisture vs Relative Humidity

bags does not allow much air or moisture vapour to come in contact with the products. Storage life can further be improved by packing in strictly moisture and air-proof containers.

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