J. mar. biol. Ass. India, 1990, **32** (1 & 2) : 198-200

PROTEIN CONCENTRATE FROM TINY PRAWNS

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ABSTRACT

Protein concentrate which can be used as a flavouring agent has been prepared from tiny prawns without using any chemical treatment. The product is bacteriologically safe and can be used to impart prawn flavour to various dishes. It can be stored in sealed metalised polyester/LDPE pouches at ambient temperature for two years without any deterioration of quality.

INTRODUCTION

THE CHIEF method of utilization of tiny prawn *viz. Metapenaeus dobsoni* Miers (Thelli Chemeen) and *Acetes* sp. (Jawala prawn) is sun drying. The commercial samples are usually poor in quality due to improper and unhygienic way of drying (Valsan *et al.*, 1985). Garg *et al.* (1977) have reported a method of separation of precipitated protein from *Acetes* sp. Preparation and properties of an edible powder from jawala prawns have been described by Mulbagal *et al.* (1980). An improved method of drying non-penaeid prawns has been developed by Garg *et al.* (1987) and Damle *et al.* (1987) has developed a simple technology for preparation of an exotic product similar to 'Kropuk Udhang' using non-penaeid prawn. The present paper describes a simple method developed for the separation of protein from tiny prawns and its usefulness as a food flavourant.

The authors express their sincere thanks to Shri M. R. Nair, Director, Central Institute of Fisheries Technology, Cochin for permission to present this paper. They are grateful to Dr. Nirmala Thampuran for the microbiological analyses of the samples.

MATERIALS AND METHODS

Fresh prawns *Metapenaeus dobsoni* and *Acetes* sp. purchased from the local market or collected from the departmental boats were used in the study. The prawns were washed well in running water, dirt and extraneous matter were removed, allowed to drain for 15 min. on perforated trays, blended with water (1 : 1) and the slurry obtained was passed through a U.S. Sieve No. 35 to remove the shell. The aqueous slurry was warmed on a water bath at 60-70°C for 10 min. and the whole mass was blended. The homogenised slurry was spray dried in a Nero laboratory model spray dryer, with inlet temperature 200°C and outlet temperature 100-105°C. Alternately the shrimp muscle was separated by passing the prawns through a hand operated expeller or by passing it through a meat bone separator and the resultant extract was freeze dried, dried in a vacuum oven at 40-45°C under a vacuum of 750 mm of mercury or spray-dried after mixing it with 25% water and heating at 60-70°C for 10 min.

Moisture, fat, protein and ash were determined in the raw material and the product by the methods of AOAC (1975). Chitin nitrogen

was estimated after removal of protein by alkali extraction, digestion of the fibre with concentrated sulphuric acid and digestion mixture and estimation of nitrogen in the digested sample by the micro-Kjeldahl method (AOAC, 1975). Microbiological analysis was carried out using methods described by APHA (1966).

For organoleptic evaluation, the product was added in small amounts to vegetable curries and the preparations were subjected to taste panel studies.

The product was packed in sealed metalised polyester/LDPE pouches in 100 g lots and stored at ambient temperature. The samples were analysed after two years and the final quality was assessed.

Results and Discussion

Proximate composition of the raw materials used for the preparation of protein concentrate is given in Table 1. Both species contained

Table 1. *Proximate composition of tiny prawn (whole) used for isolation of protein*

Characteristics	*Metapenaeus dobsoni*	*Acetes* sp.
Moisture (%)	78.74 ± 0.44	78.58 ± 0.65
Fat (%)*	3.72 ± 0.36	4.25 ± 0.54
Ash (%)*	15.79 ± 0.47	17.11 ± 1.34
Total nitrogen (%)*	11.45 ± 0.27	11.44 ± 0.47
Chitin nitrogen (%)*	1.01 ± 0.03	0.72 ± 0.09
Protein (%)*	65.25 ± 1.51	66.98 ± 2.39

* Dry weight basis.

between 65 to 70% protein on dry weight basis. The yield of protein concentrate varied from 7.0 to 8.9% of the weight of wet raw material in the case of *M. dobsoni* and from 6.5 to 7.8% for *Acetes* sp.

Characteristics of the protein concentrate prepared by different methods of drying are presented in Table 2. There was no significant

Table 2. *Characteristics of protein concentrate prepared by different methods of drying*

Characteristics	Spray dried	Freeze dried	Vacuum dried
Moisture (%)	4.17	4.58	3.98
Fat (%)*	4.80	4.30	4.64
Ash (%)*	9.43	8.42	8.18
Protein (%)*	77.48	77.47	77.80
Colour and appearance	Pink powder	Reddish brown powder	Reddish brown powder
Flavour	Very good	Good	Good

* Dry weight basis.

differences in the proximate composition of the three samples. The products had appealing reddish brown to pink colour and dry prawn flavour. However the colour, appearance and flavour of spray dried product was better than the other two.

Chemical composition of the protein concentrate and shell residue from *M. dobsoni* is shown in Table 3. It may be seen that the

Table 3. *Proximate composition of protein concentrate and shell residue from* M. dobsoni

Characteristics	Protein concentrate	Shell residue
Moisute (%)	3.50 ± 0.73	70.40 ± 1.36
Fat (%)*	5.08 ± 0.85	1.61 ± 0.23
Ash (%)*	9.08 ± 0.96	27.88 ± 6.56
Total nitrogen (%)*	12.54 ± 0.06	3.65 ± 0.14
Chitin nitrogen (%)*	0.08 ± 0.01	1.13 ± 0.15
Protein (%)* (TN-CN) × 6.25	77.89 ± 0.38	16.29 ± 0.71

* Dry weight basis.

protein concentrate is almost free from chitin nitrogen and the protein content is very high.

The shell residue is a good source for the preparation of chitin.

Microbiological analysis of the protein concentrate showed that pathogenic organisms, namely *E. coli*, faecal streptococci and coagulase positive staphylococci were absent.

Results of the sensory evaluation showed that incorporation of protein concentrate to vegetable dishes imparted good prawn flavour and overall acceptability was good (Table 4).

TABLE 4. *Sensory evaluation of protein concentrate*

Sample No.	Flavour	Overall acceptability
Dish 1	Characteristic prawn flavour	4.5
Dish 2	Characteristic prawn flavour	4.5
Dish 3	Slight prawn flavour	4.0
Acceptability :	Like extremely	5
	Like moderately	4
	Like slightly	3
	Neither like nor dislike	2
	Dislike	1

Effect of two year's storage of the prawn concentrate in sealed metalised polyester/LDPE pouches is shown in Table 5. Although there was an increase in moisture content and deepening of the colour, the product was still in powder form and acceptability as a food flavourant was good.

TABLE 5. *Changes in protein concentrate during storage*

	Initial	After two years storage
Moisture %	4.17	10.82
Fat %	4.80	4.30
Ash %	9.43	8.60
Protein %	77.48	72.27
Colour and appearance	Pink fluffy powder	Pinkish red powder
Flavour	Very good	Good-Fair

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