

Improvement in Quality and Shelf-life of Whole Dried Prawns

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A simple and effective method is suggested to improve the quality and shelflife of commercial whole dried thelly prawns (*Metapenaeus dobsoni*). Treatment of whole prawns in 10% brine containing 0.1% citric acid for 20 min followed by drying in sun yield a product having good physical, chemical and organoleptic characteristics. Retardation of fungal incidence, reduction in total volatile nitrogen (TVBN) and improvement in flavour are some of the advantages of the treatment. The treated product has a shelflife around 30 weeks compared to 20 weeks for untreated control and 7 weeks for commercial sample.

Dry prawn pulp was a major item of export from India until mid fifties when it gave way to products processed employing modern technologies of freezing and canning. However, whole dried prawns, processed mostly out of small thelly (*Metapenaeus dobsoni*) remained a popular item of commerce, catering mainly to the interior markets within the country. The internal demand for the product is steadily increasing.

The commercial whole dry prawn is not of satisfactory quality. The relatively high moisture accelerates the deterioration in physical, chemical and organoleptic qualities during storage. Considering the volume of trade of this commodity and its steady increase it was felt necessary to work out a technique to improve its quality and shelf-life. The principle of lowering water activity by the use of humectants like sodium chloride and the subsequent retardation of quality deterioration are made use of in this method.

Materials and Methods

In the initial studies cleaned fresh thelly prawns (*M. dobsoni*) after treatment with salt solutions of different concentrations were dried in sun and compared its quality with control (untreated). Though the treated samples had better-shelf life and organoleptic qualities compared to those of the control its appearance was not appealing particularly because of bleaching of the natural

colour of dried prawns. Attempts were made to rectify this problem by incorporating permitted chemicals in the salt solution used for the treatment. Of several trials made, one with 10% sodium chloride and 0.1% citric acid in water was found more effective and this was employed in the subsequent studies.

Fresh thelly prawns (*M. dobsoni*) of average count 1200/kg procured from market were used for further studies. The material was repeatedly washed with potable water to remove the adhering dirt. It was divided into two portions. One portion was dipped in a solution containing 10% salt and 0.1% citric acid in the ratio 1:1 (w/v) in water for 20 min. The other portion was dipped in potable water for the same period. Both the samples were then drained and dried in sun separately spreading over cemented floor for a total period of 7 h. They were allowed to cool and packed separately in 200 gauge polythene bags and stored at ambient temperature. Samples were drawn at definite intervals and were analysed for physical, chemical and organoleptic characteristics after removing the head. A sample of commercial dry prawns of the same species and almost of the same size grade procured from market was also similarly stored and analysed for the above characteristics.

Moisture, ash and sodium chloride were determined according to AOAC (1975). Total volatile basic nitrogen (TVBN) was

determined by the method of Conway (1947). For assessing the organoleptic quality a 10 point hedonic scale, 10 being very good; 0 being bad and 4 being just unacceptable taking into consideration the changes in odour, texture and flavour of the samples fried in refined groundnut oil, was used (CIDA/FAO/CECAP, 1977).

Results and Discussion

Chemical characteristics of commercial as well as experimental samples during storage are given in Table 1, and their physical observations and organoleptic score are given in Table 2. The initial moisture content of the commercial sample was very high compared to that of experimental sample. During storage it increased gradually absorbing the atmospheric moisture. The TVBN content of commercial sample increased sharply during storage probably due to rapid deterioration of the sample because of high moisture content and the accompanied bacterial as well as enzymatic degradation. This was supported by the physical observations and organoleptic scores of the samples. The sample developed slight ammoniacal odour after 5 weeks' storage and intense ammoniacal odour and incidence of fungus after 7 weeks. Ash and sodium chloride contents of the commercial and untreated samples were more or less the same i.e. 12.4 & 11.17 and 1.72 & 1.63% (DWB) respectively while treatment increased these values to 16.35 and 5.59 (DWB).

The yields of whole dried prawns after 7 h drying were 26.5% in the case of untreated sample and 28% in the case of treated sample. The slight increase in the latter case was due to the gain in weight because of absorption of salt during the treatment. The moisture contents of both experimental samples were almost same after drying. During storage it increased gradually in both the cases just as in the case of commercial samples. After 15 weeks storage increase in moisture was very sharp in treated sample compared to that of untreated sample probably due to the hygroscopic nature of the absorbed salt. The TVBN content of the untreated sample was higher than that of treated sample initially. During storage it showed a gradual increase in both; but in the treated sample the rate was far less compared to that in untreated sample. The ash and sodium chloride contents of the treated samples were higher than those of untreated sample due to the presence of sodium chloride. The physical observation and organoleptic score of experimental sample fully supported their chemical changes during storage. After 15 weeks the untreated sample lost its original colour and texture due to fungal attack and increase in moisture. After 20 weeks the sample became organoleptically unacceptable as shown by its organoleptic score. On the other hand, the treated sample was in acceptable condition even after 25 weeks storage as indicated by its physical and organoleptic characteristics. The only problem noticed in this case was slight softening of its texture

Table 1. Changes in chemical characteristics of commercial and experimental samples

Storage period weeks	Moisture %			TVBN mg/100 g (DWB)		
	1	2	3	1	2	3
0	23.63	15.67	15.43	147	163	116
5	27.65	17.45	17.51	187	221	146
7	29.88	—	—	659	—	—
10	—	17.60	17.71	—	231	149
15	—	18.64	19.05	—	240	155
20	—	19.42	20.00	—	267	176
25	—	20.86	25.72	—	318	237
30	—	—	25.40	—	—	250

1 - commercial sample; 2 - untreated control; 3 - treated sample; DWB - Dry weight basis

Table 2. *Changes in physical characteristics and organoleptic score of commercial and experimental samples*

Storage period weeks	Physical characteristics			Organoleptic score		
	1	2	3	1	2	3
0	Brick red colour, slight soft texture	Brick red colour, firm texture	Brick red colour, firm texture	6	8	9
5	Reddish brown colour, soft texture, ammonical odour	"	"	5	7	8
7	Reddish brown colour, spongy texture, incidence of fungus and insects, very strong ammonical odour	"	"	2	—	—
10		Reddish brown colour, firm texture	Reddish brown colour, firm texture	—	6	8
15		Pale reddish brown colour, slight soft texture, incidence of fungus	Reddish brown colour, slight soft texture	—	5	7
20		"	Reddish brown colour, soft texture	—	4	6
25		Pale brown colour, spongy texture, off odour	Reddish brown colour very soft texture	—	3	5
30			Pale brown colour spongy texture	—	—	4.5

1 - commercial sample; 2 - untreated control; 3 - treated sample

due to increase in moisture but it was not reflected in its organoleptic characteristics. At the end of 30 weeks its quality was on the border line of acceptability as judged by its overall physical appearance and organoleptic score. In general the treatment improved the overall quality of whole dried prawns considerably in addition to extending its shelf-life. The post-process loss encountered in commercial whole dried prawns can be prevented to a great extent by this method.

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