

Preparation of Mussel Marinade

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A simple and cheap process for the preservation of mussel meat by marinading is described. The method involves blanching the mussel meat shucked from depurated live mussels in 3% boiling sodium chloride solution for 5 min followed by preserving it in a solution containing 3% acetic acid and 3% sodium chloride. The product stored in closed glass jars has a storage life of approximately 16 weeks at room temperature (23–30°C), after which the quality began to deteriorate. Texture of the meat is least affected and closely resembles that of the fresh meat.

Substantial quantities of green mussels (*Perna viridis*) are available over the submerged rock surfaces along the west coast of Kerala, especially from Calicut to Cannanore and they are collected and consumed by the people all along the coast.

Recently, artificial culture techniques have been perfected to rear mussels in different parts of the world. In India also, it has been established that mussels could be cultured profitably (Kuriakose, 1980). With the increase in production of mussels, processing and preservation of mussel meat is sure to gain importance. Processes have already been developed by the Central Institute of Fisheries Technology for the production of canned mussel meat in oil (Balachandran & Nair, 1975), lightly smoked and dried mussel meat (Muraleedharan *et al.*, 1979), ready-to-serve pickle incorporating mussel meat (Muraleedharan *et al.*, 1982) and dried mussel meat (Nair *et al.*, 1983).

Fish marinades are very popular in many countries. Methods of preparation of various types of fish marinades have been described by Meyer (1965), Zaitsev (1969) and Mc Lay & Pirie (1971). According to all these authors, fish marinades have very short shelf-life at room temperature (av.

10–12°C) and require refrigerated storage. The present communication describes a simple process for the preservation of mussel meat by marinading.

Materials and Methods

Live green mussels were collected from Mudadi, a fishing village north of Calicut. They were washed in clean seawater to remove the dirt and debris adhering to the shells and were depurated by the method described by Nair *et al.* (1983). Meat from the depurated live mussels was shucked and washed well in potable water. The washed and drained mussel meat was blanched in 3% boiling brine for 5 min. The blanched meat was cooled and preserved in pickles of varying concentrations of acetic acid and salt. Acetic acid and salt concentrations ranging from 1–5% were tried. Of these, a combination of 3% acetic acid and 3% salt was found to be the best for getting an excellent finished

Table 1. Proximate composition of fresh and marinated mussel meat

	Mussel meat	
	Fresh	Marinated
Moisture %	83.80	70.50
Protein %	8.50	14.95
Fat %	1.35	2.45
Glycogen %	3.69	6.54
Total ash %	2.42	4.46
Acid insoluble ash %	0.04	0.07

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Table 2. Changes in chemical, bacteriological and organoleptic characteristics of marinated mussel meat during storage

Storage period weeks	Brine	pH Meat	Acidity of brine (as % acetic acid)	TPC/g	Appearance	Organoleptic quality Texture	Flavour	Overall score
2	4.10	4.70	1.166	3.81×10^2	Good, light milky pickle	Naturally firm	Characteristic sweet flavour	8.0
4	4.15	4.80	1.160	Not done	„	„	„	—
6	4.15	4.90	1.165	1.597×10^3	„	Meat slightly soft	„	8.0
8	4.15	4.95	1.160	Not done	„	„	„	—
10	4.20	4.96	1.085	6.810×10^3	„	„	„	7.0
12	4.20	4.95	1.080	Not done	Meat on the surface layer brownish, no turbidity in pickle	Meat soft surface layer disintegrating easily	Characteristic smell slightly diminished, acid smell more prominent	—
14	4.20	5.00	1.068	1.8745×10^4	„	„	„	5.0
16	4.20	5.00	1.060	Not done	Not very attractive, meat colour tarnished, pickle slightly turbid	Meat softer than before	Flavour of meat reduced; prominent acid smell	—
18	4.25	5.00	1.044	3.030×10^4	Above characteristics intensified	„	„	3.0
20	4.25	5.00	1.040	1.138×10^4	„	„	„	—

Note: *Escherichia coli*, faecal streptococci, coagulase positive staphylococci and coliforms were absent.

product and hence was selected for detailed studies. The ratio of meat to the pickle used was 1:1 (w/v). Sample of marinated mussel meat prepared as above were kept in closed glass jars. Organoleptic observations and chemical and bacteriological analysis of the samples were carried out at periodic intervals to assess the shelf-life. Texture, flavour and other organoleptic qualities were assessed by a panel of experts consisting of five members and scores were assigned on a hedonic scale from 9 to 1, 4 being the border line of acceptability.

Moisture, total nitrogen, fat, ash and acid insolubles were determined according to the methods of AOAC (1980). Glycogen was estimated according to the method of Van de Kleiy (1951). pH of the pickle and meat were determined. Acidity of the brine was estimated by titration method, total plate count (TPC), *Escherichia coli*, coliforms, faecal *Streptococci* and coagulase positive *Staphylococci* were determined by the procedure described by Nair *et al.* (1983).

Results and Discussion

Table 1 gives the proximate composition of fresh mussel meat and that of a typical finished product.

Table 2 presents details of storage studies. From the shelf-life studies, it is evident that the product remains in acceptable condition upto about 16 weeks.

Escherichia coli, faecal *Streptococci*, coagulase positive *Staphylococci* and coliforms were not encountered at any stage. Total plate count remained within limits and did not show much variation during storage.

The shelf-life of approximately 16 weeks at room temperature is quite satisfactory as marinades fall into the category of semi-preserves. The fish marinades described by various authors invariably require refrigerated storage. The process described yields a product which is reasonably stable at temperatures prevailing in this region (23–33°C). Further, the characteristic texture and appear-

ance of the meat are preserved at low cost using simple technology. The marinated meat is suitable for preparation of curries or for frying in the usual manner.

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