Canning of Edible Oyster Meat

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Results of experiments carried out on canning edible oyster *(Crassostrea madrasensis)* meat from farmed as well as wild specimens are discussed. The canning yield of meat was 15% higher from farmed oysters compared to wild specimens. The meat from wild oysters was highly slimy and therefore required an additional pre-treatment of washing in brine containing acetic acid to prevent formation of lumps of meat in the can causing problems for proper heat penetration while processing.

Of the several species of edible oysters *Crassostrea madrasensis* is available in substantial quantities in both the east and west coasts of India from their natural beds. Oyster meat is used for edible purposes in the local areas. The recent introduction of aquaculture for edible oyster by the Central Marine Fisheries Research Institute (Anon, 1979) has added a new source for its availability. Oyster meat is frequently eaten raw in some European countries. For this purpose the whole live oyster is subjected to cleansing process for 36 h in recirculated seawater and is treated with ultraviolet light or for 48 h in chlorinated seawater in static tanks with a change of water after 24 h (Stroud, Torry Advisory Note No. 84).

Canned oyster meat is a valued seafood in good demand in several overseas countries. Japan is a major producer and exporter of canned oyster meat (Tanikawa, 1971). With the increased availability of oyster in commercial quantities, India also can enter the field of processing and export of canned oyster meat. Attempts were made at the Central Institute of Fisheries Technology to work out the processing requirements for canning oyster meat obtained from both farmed and natural sources.

Materials and Methods

Wild oysters from their natural beds were collected from the Cochin Backwaters near the harbour mouth. The collected oysters were transported to the laboratory in moist gunny bags. After washing the surface free of mud and dirt by a water jet, the animals were subjected to a cleansing process by the method suggested by Balachandran & Nair (1974) for clams and mussels.

One year old oysters collected farm the farm of Central Marine Fisheries Research Institute at Tuticorin were packed in moist gunny bags and transported by road in an open trailer attached to a jeep to Cochin. During the journey of 12 h, performed during night, the bags were moistened with clean seawater twice enroute. The farmed oysters were used for canning without further cleansing.

Shucking of meat from live oysters is a labour intensive process. Therefore the cleaned live oysters were steamed at 100°C in a retort for 10–15 minutes (Tanikawa & Doha, 1965). During this process the shells open up and shucking becomes easy. The meat was washed well to free it from grit and dirt and was blanched in 3% boiling brine for 5 min. 128 g each of blanched meat was packed in sulphur resistant lacquered cans of dimensions 301 x 203 and canned using refined ground nut oil, 2% sodium chloride solution and tomato sauce (market sample diluted with water in the ratio 3:1 to get a proper fluid consistency) separately as the filling medium. The cans were heat processed in steam at 121°C for 15 min.

Meat shucked from whole steamed wild oysters was canned as in the other samples using refined groundnut oil and 2% sodium

chloride solution as filling media. For the improvement in the quality of the final product the shucked meat was subjected to pretreatments like washing in solutions of sodium chloride either alone or containing citric or acetic acid.

Yields of meat at different stages were calculated for both samples. Fresh shucked meat was analysed for the proximate composition. Moisture, crude protein, fat and ash contents were determined by the methods of AOAC (1975), alpha amino nitrogen by the method of Pope & Stevens (1939) and glycogen by the method of Kleiy (1951).

Results and Discussion

Proximate compositions of the meat of farmed and wild oysters are presented in Table 1.

Table 1. *Proximate composition of the edible oyster meat*

	Farm oyster	Wild oyster
Moisture, %	80.05	81.6
Crude protein, % (T.N. x 6.25)	12.26	11.74
Alpha amino nitrogen, mg/100g	86.82	146.62
Glycogen, %	2.66	3.4
Ash, % (DWB)	11.69	12.41

There is no significant difference in the proximate composition between the two samples except in free alpha amino nitrogen which shows a very high value for the meat of wild oyster. The composition is in general agreement with that reported by Stroud (Torry Advisiry Note No. 84) for European edible oyster.

The weight range and yield from both specimens of oysters are given in Table 2.

Table 2. *Weight range and yield of meat*

	Farmed meat	Wild meat
Weight per piece, g	120–160	80–200
Yield of fresh shucked meat, %	5	4.3
Yield on steaming and shucking, %	2.8	2.2
Yield on blanching, % (canning yield)	2.3	2.0

There is wide variation in the size and weight of individual wild oysters. This necessitates grading of the meat for uniformity of size before filling the cans. From a lot, four to five size grades are generally obtained. In the case of farm oysters the difference in the size grades is not so significant and the meat from a lot could be separated into two size grades. Though in general, the meat yield is poor in either cases, it is around 15% higher in farm oyster when compared to wild samples.

The cans after processing were opened to examine the contents. The observations made are summarised in Table 3.

Table 3. *Examination of processed can contents*

	Farm oyster			Wild oyster	
Medium of canning	Oil	Tomato sauce	Brine	Oil	Brine
Appearance of meat	Discrete pieces	Discrete pieces	Discrete pieces	Meat sticking, forming lumps	Discrete pieces
Flavour	Good	Good	Fair	Good	Fair
Texture	Firm and soft	Firm	Soft	Firm and soft	Soft

Farm oyster meat canned in different media remained as discrete pieces without sticking together or forming lumps. They had in general a good appearance. From an evaluation of the organoleptic quality, meat canned in refined groundnut oil was judged the best followed by that packed in tomato souce. The preference was rated as least among the three for brine packed meat. Whereas similar was the rating for wild oysters the meat packed in oil was found to be sticking together forming lumps. To a certain extent this occurred in brine pack also.

The meat of wild oyster was found highly slimy quite different from that of farm oyster. Therefore the meat was given a washing prior to blanching in solution of sodium chloride, either alone or containing citric or acetic acid. The meat was subsequently blanched and canned using oil and brine as filling media.

If heat processing is inadequate swelling due to thermophillic bacteria will occur in oyster meat (Tanikawa & Doha, 1965). Formation of lumps due to sticking together of individual pieces will offer greater resistance to proper heat penetration resulting in certain areas receiving less heat than required for destruction of the bacteria present. This will result in under sterility of the pack under conditions of processing which might have been sufficient to ensure sterility, had there been no sticking together of meat forming lumps in the can. There were few such observation when identical condition of processing resulted in sterility in packs which had no lump formation and under sterility causing swelling of the cans during storage when there occurred lump formation. The meat of wild oyster was highly slimy and therefore it was felt necessary to subject the meat to some pre-treatment to obviate the phenomenon of sticking the meat together in can. Of the different treatments tried, washing the meat in brine containing 0.1% acetic acid yielded good results. Sticking of meat could be prevented and the texture also could be improved. Balachandran & Madhavan (1976) have reported improvement in the texture of the meat of canned *Lactarius* by

Table 4. *Quality of canned wild oyster meat processed after different treatments*

		Washing for 10 *minutes in*		
Pre-treatment	Nil	5% brine	5% brine with 1% citric acid	5% brine with 0.1% acetic acid
Oil pack				
Appearance of meat	Forms lumps	No sticking	No sticking	No sticking
Texture of meat	Firm and soft	Soft	Less soft	Soft and firm
Brine pack				
Appearance of meat	Forms lumps	Meat sticking slightly	Meat sticking slightly	No sticking
Texture of meat	Soft	Soft	Less soft	Soft and firm
Nature of brine	Opalescent	Opalescent	Slight opalescence	Clear

pre-treatment with acetic acid. The opalescence observed when brine is used as the canning medium also could be completely overcome by this process.

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