The processing of crab meat for canning — Part I

Canned fish products are important components of the export trade in several of the countries in the INFOFISH region and canned shellfish products are particularly so. In this article, the author focuses on the catching and handling of crabs, with particular emphasis on cooking and picking of crab meat. In the next issue, the author takes us to a cannery to observe processing techniques plus some quality control aspects in the canning of crabmeat.

by P Howgate

J H Nierentz and Kheriah Arif, writing in the Advance Issue of INFOFISH Marketing Digest, estimated that the Asia/Pacific region is responsible for about half the world production of canned shellfish. The scope for expansion in this area looks good. For example, van der Erden in surveying the markets for canned fish in the Netherlands and in the UK (INFOFISH Marketing Digest: Advance Issue, October 1981 and Issue No 2, March 1982) considered that there was potential for increased penetration of canned shellfish products from the INFOFISH region in those countries. Presumably, this is true for other countries with similar food consumption patterns. Canned crab meat from the region has a considerable price advantage over that from many countries, including North America, the other big supplier to the market. The product has also proved to be of acceptable quality. Some countries, Malaysia and Thailand, for example, already have well-established canning industries taking advantage of these markets though increases in production could be limited by raw resources — and there could be room for further development in other countries.

This article describes the production of canned crab meat with an emphasis on handling and processing before canning. The description is based on procedures already adopted, or would be suitable for adoption, in the INFOFISH region. The process of canning crab meat is not essentially different from that of canning other fish, or indeed food products generally, and need not be described in detail here.*

Processing

Two parts of the total process of canning crab meat, the cooking and picking of the meat, can be carried out at the "cottage industry" level, and are well suited to countries with artisanal fisheries. Cooking and picking of crabs do not require much in the way of equipment and is not capital intensive. It is labour intensive, but there is often a surplus of labour, particularly female labour, in fishing villages which can be employed in the task. Indeed the nimble fingers of women make them adept at picking crab meat. There are social as well as economic advantages in carrying out some processing at the village level. It gives women an opportunity to be involved in the cash economy and it means that families, and the community as a whole, benefit from the added value of a partially processed product over production of a raw material alone. This makes village communities more viable and reduces the incentive for people to drift to cities.

Processing at the village level, of course, leads to considerable technological and quality control problems. Processing crab meat is not unique in this respect but, given sufficient will and dedication on the part of the villagers, merchants and canning companies, these problems can be overcome. Methods described here are oriented towards village-level processing and discusses the problems of quality control under these conditions.

* A general description on fish canning can be found in INFOFISH Marketing Digest No 3/84.
Catching and handling the crabs

The crabs caught in the waters of the INFOFISH region are mostly swimming crabs of the family Portunidae. Of the many species making up this family, two of commercial significance for the canning industry are the mangrove crab (Scylla serrata) and the blue swimming crab (Portunus pelagicus). Both make excellent canned products but the mangrove crab, because it is able to stay alive out of water for a long time, is usually marketed live to retail and catering outlets. It usually fetches a higher price at markets than the blue swimming crab and the latter, and similar species, are used for canning.

The swimming crabs live in shallow coastal waters and can be caught in pots and in fixed or free nets. Fishing for swimming crabs can be carried out by small day boats and hence is suited to an artisanal fishery. Catching by day boats is also to be recommended on technological grounds because it ensures that the crabs can be landed and processed in very fresh condition. Crabs are caught by trawlers but, as these bigger boats may stay at sea for several days, much of the catch is not suitable for canned crab processing.

Crabs should be carefully handled on board the fishing vessel and precautions should be taken to keep them alive and fresh. On a day boat, which will only have one or two of the crew using a drift net, it is usually not possible to disentangle the crabs from the net while at sea, this is done at the landing site. The crabs should be kept wet with sea water and shaded from the sun. The vessel should return to the landing site as soon as the catch is aboard and a start should be made on recovering the crabs immediately.

Cooking

Crab meat deteriorates rapidly after the death of the animal predominantly because of the action of enzymes in the white flesh and in the hepato-pancreas, the brown meat. While the crab is alive, the enzymes are under natural biochemical control but, on the death of the crab, they work indiscriminately to degrade the quality of the meat. Digestive enzymes break down the flesh, reducing yield and imparting off-flavours to it. Other enzymes in the flesh break down the compounds which impart the sweet, creamy flavours typical of fresh crab meat, resulting in a lack of flavour.

These enzymes are inactivated by heating, and the best flavoured meat of the highest yield is obtained from crabs which have been cooked alive or very soon after death. Hence, crabs should be boiled as soon as possible after they have been recovered from the catching vessel. If there is likely to be a delay between catching and delivering the picked meat to the canning factory, the crabs should still be cooked as soon as possible. The cooked crabs should then be stored, whole, in clean ice and picked just prior to the time of collection. Where crabs are caught by boats which are not returning to land immediately, the crabs should be boiled on board the vessel – clean sea water can be used – and the cooked crabs stowed in ice for butchering and picking ashore. The extra effort involved is compensated for by a higher yield of better quality meat compared with landing raw, but stale, crabs.

Crabs can be cooked very simply by dropping them into a pot of boiling water. The pot should not be overloaded and the crabs should be fully immersed in the water when added. The pot should be covered with a lid and heated strongly to bring the water back to the boil quickly. The crabs should be cooked for at least five minutes after the water has returned to the boil. The crabs should not be undercooked, otherwise the meat will be more difficult to pick from the shell. An integrated processing and canning factory might use a continuous cooker. These cookers, using boiling water or steam, are more fuel efficient and give greater control over processing time than batch cookers but are clearly too expensive for small-scale use.

After they are cooked, the crabs should be cooled by dropping them into clean water or by spreading them on a surface to cool by radiation and evaporation of water.

Butchering before picking

Butchering, i.e. the operation of evisceration of the crab and separation of the bodies into pieces suitable for picking, should be carried out just before picking of the meats and as a separate operation. Crabs should not be butchered and picked in the same operation. Butchering is an important step in processing and must be carried out carefully, cleanly and hygienically so as to achieve a high quality product free of contamination. Butchering should be carried out in a clean area and strenuous steps must be taken to keep this area free of dirt and insects. The subject of contamination is discussed in the next section. Receptacles for butchered sections must be made from metal or plastics and not from natural fibres. Natural materials cannot be cleaned properly, while woven materials harbour dirt and insects. Obviously, containers must be scrupulously cleaned before use.

The cooked crabs should first be washed to remove sand, mud and protein scum. The claws and legs are detached and put in a container. The back shell, the carapace, is pulled off the body and the viscera completely and carefully removed. The coral, the gonads, can be separated out from the viscera to be used in the home or sold to restaurants. The cleaned-out body is broken into two pieces down the mid line of the shell and small pieces of shell re-
moved. It is important that all the small appendages around the mouth are completely detached as well. If left on, there is the danger of the small hair-like setae with which they are covered getting into the meat at the picking stage. The body sections should then be washed in clean, potable water and inspected to ensure they are free from shell particles and foreign matter. The cleaned and inspected sections are put in clean containers, separate from the claws and legs. The containers should be covered to keep their contents free from insects and dirt.

**Picking the meats**

Picking is the operation of extracting meat from the body sections, claws and legs. The extracted meats are vulnerable to contamination and great care must be taken to keep the meats free from dirt and insects during picking and on subsequent storage. Picking must be carried out under clean and sanitary conditions and, though ideal conditions for exclusion of contamination are difficult to achieve in a village industry, there are simple precautions which can be taken to reduce its incidence.

Containers of butchered crab and the receptacles for holding the picked meats should be raised off the floor on a table or bench. The outsides of the containers should be wiped clean before they are put on the table. The legs of the table should be stood in containers of oil to prevent crawling insects from getting onto the working surface. In addition, the containers for the picked meat, small basins or plastic bags, should be stood in a tray of water as a further barrier to crawling insects. Containers of butchered pieces and the containers of picked meats should be covered by cloth as far as possible consistent with carrying out the job. Butchering and picking should be carried out in areas as free from flies as possible, i.e. in areas which are clear of rubbish.

Meat can be picked from body sections by fingers only, but many workers often find it easier to use a small, narrow-bladed knife. The most valuable meat, referred to as lump meat or shoulder meat, is found within chambers around the edge of the shell corresponding to the points where the legs join the body. The sections can be carefully broken at these chambers and the pieces picked out intact. More white body meat can be extracted from elsewhere in the shell.

Meat is extracted from the separate segments of the legs, and claws. If fingers are being used for picking, the segments are carefully broken by striking with a piece of wood or by bending until they crack and the meat extracted. The aim is to remove the meat as a single piece but this is not always easy if the segments have to be broken. It is somewhat easier if a knife is used. The segment is cut near a joint exposing the end of the piece of meat. This is carefully pulled out in one piece. Leg and claw meat is mottled brown on the surface and must be kept separate from the white meat.

The yield of meat from blue swimming crab is about 30% of the uncooked weight when carefully picked. Canners pay the highest price for lump meat and least for small pieces of leg meat. The various grades must not be mixed. It is best if the meat is put directly into separate containers for each grade. Plastic bags are very convenient, otherwise basins can be used. The containers should rest on a clean surface and be protected from insects and dirt. Waste material should be disposed of into a container away from the surface where the picked meats are laid out. For example, if the containers of meats are on a table, the rubbish should be thrown into a basket under it.

When picking is finished, the bags of meat should be closed or the basins covered and stored in a cool place. If possible, the containers should be packed in ice.

**Code of Practice**

- Crabs should be alive or only just dead when they are cooked.
- Crabs should be cooked for at least five minutes in boiling water.
- Crabs should be butchered and the meats picked straight away after cooking or, if there must be a delay, stored in ice.
- At the butchering stage, all the viscera and all the mouth parts should be removed and the butchered sections well washed.
- The meats should be picked in clean, sanitary premises and protected from contamination by flies and any other foreign materials.
- Picked meats should be packed to prevent contamination, chilled quickly and, if not picked in the canning factory, kept chilled during distribution.

Mr Peter Howgate is Principal Fisheries Officer with the Torry Research Station, Aberdeen, Scotland, UK, since 1965. He is involved largely in research and the practical application of quality control for fish products in both developed and developing fisheries. This article is Crown Copyright, 1984