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A Gateway to All Post Graduate Courses

Subject: Food Technology

Production of Courseware

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Paper No. : 08 Technology of Meat, Poultry, Fish and and Seafood

Module : 33 Value added fish and sea food products: Minced fish, surimi and retort processed fish curry

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Description of Module	
Subject Name	Food Technology
Paper Name	08 Technology Of Meat, Poultry, Fish And Seafood
Module Name/Title	Value added fish and sea food products: Minced fish, surimi and retort processed fish curry
Module Id	
Pre-requisites	
Objectives	
Keywords	

International trade in fish and fishery products has grown substantially over the last decades. Today, more than 30 percent of the fish caught for direct human consumption enters international trade. Developing countries account for approximately 50 percent of global fish exports. However, despite the availability of technology, many projects in value-adding in seafood resulted good export. Careful consideration was not given to the various facets of their feasibility, including quality assurance, marketing, distribution and trade barriers, before embarking on a value-adding fish process. Therefore, to get variable taste from seafood new value added seafood products are developed throughout the globe.

33.1 Minced Fish

Minced fish is a comminute flesh produced by separation from skin and bones. Separation is a mechanical process (for producing minced fish) whereby the skin and bone is removed from the flesh. Bone separators working on different principles are available commercially, but the separator most widely used for fish is of comparatively simple design.

Figure 33.1 A frozen block of minced fish

The total yield of flesh of low bone content is higher than with filleting alone; up to twice as much can be recovered by separating flesh directly from headless gutted fish. When the fish is first filleted, an additional 8-12 per cent flesh can be separated from the filleting waste. Some people do not like fatty fish such as herring and mackerel partly because of the large numbers of small bones remaining in the fillets. Mince made from these fishes is relatively free from bones and might therefore be more widely acceptable. Flesh from underexploited species, such as blue whiting, that are difficult to fillet efficiently (small size or awkward shape) can readily be removed in a bone separator.

Mincing can increase the risk of oxidation due to membrane disruption, contact with metals and air. Mince spoils faster than fillets, mainly because the structure of the flesh is destroyed during separation, and extra care has to be taken to maintain good quality. Minced fish is also more easily denatured during freezing. Thus, fish used for making mince has to be of very high initial quality, and processing has to be completed quickly, with emphasis on hygiene and low temperature.

33.1.1 Utilization of Fish Mince

When fish flesh is minced the texture, flavor and sometimes color are changed; hence minced fish, and the products derived from it, have at present only limited outlets. Small amounts are used in fish cakes and in less expensive grades of fish fingers and some are used to fill voids in frozen laminated blocks of fillets from which portions and fingers are cut. Mincing offers an opportunity to exercise greater control over flavor, appearance and keeping quality by the incorporation of additives. Rancidity in fatty fish, for example, can be controlled more easily in minced flesh by intimate mixing with permitted antioxidants, or minces of different fat content can be mixed together to give a more desirable result but also very valuable products.

However, the mince is very difficult raw material due to high diversity, therefore it is difficult to use mince for standardized products such as ready to eat products. The present market for mince is small compared with the amount of mince that could be made available from all suitable species. Fish mince can also be successfully used directly in various food systems and in physically or chemically altered form to produce an array of nutritional and functional products. Recently new applications for mince have emerged, as a material in protein products for fillet injection. By solving issues related to stability of the mince and perhaps by making it available in more varied formats with further processing (i.e. isolate production, dried, freeze dried), market potential could be increased.

33.2 Surimi

Washing fish mince with water, mixing with sugar and/or polyphosphate followed by freezing to produce surimi increases the stability of the fish proteins. Surimi originates from Japan where it has been a traditional food source for centuries.

The production of surimi follows several basic steps, while the degree of mechanization depends on the sophistication and scale of production. The general processing steps include treatment of raw material (chilling, heading and gutting), meat bone separation, leaching, dewatering, mixing with cryo-protective agents and freezing. The most important step of surimi processing to ensure maximum gelling, as well as colorless and odourless surimi, is 8 efficient washing. The leaching process involves mixing minced meat with cold water (5°C) and removing water by screening and dehydration a few times. Before the final dewatering, undesirable material particles, such as scales, and connective tissue, are removed by a refiner.

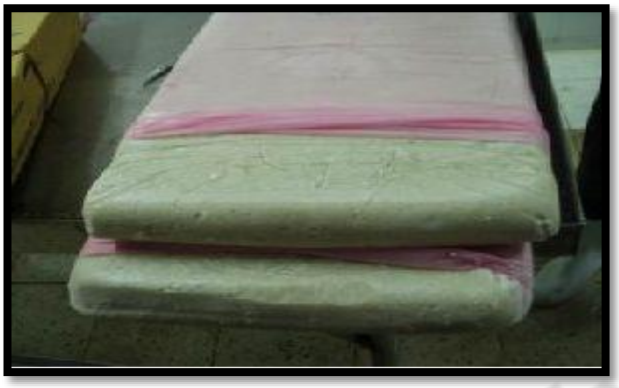

Figure 33.2. Two frozen blocks of surimi

The addition of cryo-protectants is important to ensure maximum functionality of frozen surimi because freezing results in protein denaturation and aggregation. Freezing equipment and frozen storage facilities are essential to maintain the quality of surimi. Research indicates that surimi could be converted to a dried form, surimi powder. In powdered form, surimi can be kept without frozen storage. The powdered surimi offers many advantages in commerce, such as ease of handling, lower distribution costs, more convenient storage and usefulness in dry mixes. The freeze-drying process does not damage the functionality of myofibrillar proteins. Therefore freeze-dried surimi presents a more versatile structure to increase its application possibilities. Freeze drying can on the other hand lead to increased cost.

33.2.1 Utilization of Surimi

Functional properties are important factors if fish proteins are to be incorporated into a food or dish as additives during preparation. The most important properties of surimi are its gelling ability as well as being a colorless and odorless stable protein mass. These features enable the application in various products i.e. crabs sticks. Surimi is a useful ingredient for producing various kinds of processed foods. It imitates the texture and taste of a more expensive product such as lobster tail, using a relatively low-cost material. Surimi is an inexpensive source of protein. In Asian cultures, surimi is eaten as a food in its own right and seldom used to imitate other foods. In Japan fish cakes (kamaboko) and fish sausages, as well as other extruded fish products, are commonly sold as cured surimi.

In the western countries, surimi products are usually imitation seafood products, such as crab, abalone, shrimp, calamari, and scallop. Several companies produce surimi sausages, luncheon meats, hams, and burgers. A patent was issued for the process of making even higher quality proteins from fish such as in the making of imitation steak from surimi. Surimi is also used to make kosher imitation shrimp and crabmeat, using only kosher fish such as Pollock.

Freeze-dried surimi is a commercial product in Japan. It is used as binder, dispersing agent and emulsifier in re-structured products made out of beef, pork and chicken meat. It is also used for formulation of exotic dishes.

33.3 Retort Processed Fish Curry

The thermally sterile processed fish curry do not require rehydration or cooking and can be consumed straight from the pouch with or without pre-warming, depending upon the requirement of the users and the weather conditions. These foods meet the specific needs of convenience, nutritional adequacy, shelf stability, storage, distribution to the centers and have become very popular. These are processed at 121°C at elevated temperatures for the complete destruction of microorganism and their spores. Retorting produces a shelf stable food product that does not require refrigeration. The retorting process involves sealing a low-acid food product in a hermetically sealed container and applying sufficient heat to render the product commercially sterile according to FDA or USDA regulations. Commercial sterility is defined as the destruction of all viable microorganisms of public health significance as well as those capable of reproducing under normal non-refrigerated conditions of storage and distribution. Retorts typically utilize pressurized steam as the heat source, though the actual heating medium may change. Due to their flexible nature and their potential for expansion during processing, retort pouches are placed in metal or plastic racks to maintain pouch thickness during the retort process. This is processed in either can or in pouches for the commercial production in the industries as below:

33.3.1 Manufacturing Process Fish Curry

- Cut the fish into medium-sized pieces.
- Heat the ghee in a frying pan and fry the fish pieces gently for 5 minutes. Drain the fish on absorbent kitchen paper and set aside.
- Chop one onion finely and grind the other one.
- Add the chopped onion to the ghee in the pan and fry until golden.
- Add all spices and cook stirring for 10 seconds.

- Now add the grinded onion, garlic, ginger and tomato puree.
- Add the water and salt. Bring the mixture to the boil. Add fried fish pieces.
- Retort the mix in flexi pouches (Restorable Pouches) at 240°F to inactivate *Clostridium botulinum* spores