

Chapter 15

Value Added product development

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Battering and breading enhances the consumer satisfaction by improving the nutritional value, organoleptic characteristics and appearance of the products and makes them popular among other consumer items. The soft and moist interior with porous outer crispy crust increases the palatability and makes these products an integral part of human foods. Consumers are looking for better alternative for conventional fresh food that offers time-saving preparation. Hence there exists an increased global demand for ready-to-heat frozen foods, especially breaded and battered products with high standards of quality. The most important advantage of coating is value addition as it increases the bulk of the product. Also this paves way for better utilisation of low cost or underutilised fishes. Coating is referred as the batter and/or breading adhering to a food product. Each ingredient in coating offers unique role in development of functionality and characteristics of the product. Polysaccharides, proteins, fat, seasonings and water are the commonly used ingredients. The method of product development differs with the type of product. Mostly this includes seven major steps.

1)Portioning / forming

A perfectly portioned product is the right starting point. Mechanically deboned fish meat is formed to different shapes and sizes after mixing with ingredients, if needed. The product should keep its consistency with proper weight and shape. The key factor in this production step is speed and accuracy of processing the frozen fish block at minimum costs without any compromise to the product quality.

2)Predusting

Predusting is usually done with very fine raw flour type material or dry batter itself, sprinkled on the surface of food substrate before coating. This helps to reduce the moisture on the surface of the product so that the batter can adhere uniformly. Flavourings such as salt and spices can be added in minimum amounts.

3) Battering

Batter is defined as the liquid mixture composed of water, flour, starch, and seasonings into which the fish products are dipped prior to breading. Two types of batter are there- adhesive batter and tempura batter. The adhesive batter is a fluid, consisting of flour and water. Tempura batter is the puff-type batter containing raising/leavening agents. This forms a crisp, continuous, uniform layer over the food. The predusted portions are applied with wet batter and excess batter can be blown off by a current of air. The batter mix helps in governing the amount of bread to be picked up and it contributes to flavour of the final product. Specific ingredients are used to aid viscosity, texture and adhesion.

3.1) Ingredients of batter mix

- a) Flour- Wheat flour provides structure to the product through gelatinisation of starch as well as through formation of gluten protein matrix. Higher protein levels in flour increases viscosity of batter and produce darker crispy coatings. Corn flour can be added to produce yellow colour and to enhance browning during frying.
- b) Water- The ratio of water to dry batter mix is 1.8:1. Formation of gelatinised starch phase, hydration of flow proteins, batter viscosity etc. depends on the purity of water used.
- c) Starch- Corn starch is added mainly to control batter viscosity and thus increasing the batter pickup and breading retention.
- d) Flavour and flavour enhancers- salt, sugar, spices etc. can be added to improve the organoleptic characteristics of the products.
- e) Sodium tripolyphosphate- This lowers the water activity of the product and has bactericidal property. It increases the hydration of proteins and reduces protein denaturation.

4)Breading

Breading was defined as the application of a dry mixture of flour starch, seasonings having a coarse composition to battered food products prior to cooking. Normally the battered fish portions are dropped in to dried bread crumbs and are turned over to ensure complete coating with bread crumbs. A fine layer or coarse layer of bread crumbs will contribute to structure and tastiness of the product. For soft products the crump depth should be fine so as to avoid the product damage on further processing.

5)Pre-frying/ flash frying

Pre-frying is the process of giving a shallow fry so as to coagulate batter over the product and lock the flavour and juices to the product. The time of frying and temperature of oil are crucial factors. This could be done at 180-200°C for 40-60 sec, thus restricting the actual heat transfer to the surface of the product. The term pre-frying is used as frying will be completed only when the consumers fry the product for 4-6 minutes depending on the product size.

6)Freezing

The fish portions are air cooled before freezing. This helps the coating temperature to drop while the batter can stabilise itself and recover from the frying shock. Freezing is done at a temperature of -10°C to -20°C in order to preserve freshness and quality of the product over longer storage periods.

7) Packaging and storage

Proper packaging and storage is essential to prevent/retard desiccation, discolouration and rancidity in coated products. Packaging in thermoformed containers and storage at -20°C are most commonly used for breaded and battered products. The developments in value added product industry demands the packaging that can withstand the higher temperatures of microwave reheating.

Advantages of coated products

- Enhanced nutritional quality
- Moisture barrier during frozen storage and reheating
- Crispy texture and appealing colour and flavour
- Structural reinforcement of the substrate
- Prevents loss of natural juices
- Increased bulk of the substrate and reduced product cost
- Improved overall acceptability of the product

Battering and breading have contributed significantly to the value addition of fishes, shell fishes and molluscs. The first commercially successful coated fish item was fish fingers. Later several other products like fish cutlets, fish balls, fish nuggets, etc. came into the market. Coated butterfly shrimp, squid rings, stuffed squid rings etc. are among the fancy items that cater to the luxury markets. Sophisticated equipments like meat bone separator, meat strainer, portioning and forming equipment, preduster, battering and breading machine, fryer, freezer and packaging machineries are in the market for preparation of a wide variety of coated products.



Battered and Breaded Fish Products



Battering and breading machine

Preparation of Fish Fingers

I. Fish Fingers from Fillet

Ingredients

Fish fillet	1 kg
Salt	3%

Procedure

Fillet the fish and cut into small pieces (about 10 cm in size) and blanch in 3% salt solution for 10-15 minutes. Drain off and pre-dust with batter powder and coat with batter and breadcrumbs and fry.

II. Fish Fingers from Mince

Ingredients

Fish fillet	1 kg
Tri-sodium polyphosphate	0.1 %
Salt	0.6 %

Procedure

Dress and fillet the fish and mince in a meat mincer. Add 0.1 % tri-sodium polyphosphate, 0.6% salt, mix, spread the mince in a tray uniformly and freeze. Cut into small pieces (about 10 cm in size) in the frozen condition itself. Pre-dust the finger with batter powder and coat with batter and breadcrumbs using a bamboo stick and fry in oil.

Preparation of Fish Balls

Ingredients

Fish mince	1 kg
Corn starch	5%
Salt	1%
Garlic	2%
Ginger	2%
Pepper	0.2%

Procedure

Dress the fish and take fillet. Mince the fillet. Make a paste of garlic and ginger. Mix with the other ingredients and make a paste. Prepare balls about 10 g and cook in 1% salt solution for 10 minutes. After cooling pre-dust with batter powder and dip in batter solution using a bamboo stick and then roll in breadcrumbs and fry in oil. (Batter ratio 1:2)

Preparation of Fish Nuggets

Ingredients

Fish mince	1 kg
Corn starch	5%

Salt	1%
Garlic	2%
Ginger	2%
Pepper	0.2%
Lemon juice	2 tbsp

Procedure

Dress the fish and take fillet. Mince the fillet. Make a paste of garlic and ginger. Mix with the other ingredients and make a paste. Spread evenly on a tray. Use heart-shaped mould to prepare bite-sized pieces (nuggets) and freeze. After freezing pre-dust with batter powder and dip in batter solution and then roll in breadcrumbs and fry in oil. (Batter ratio 1:2)

Preparation of Fish Cutlets

Ingredients

Cooked Fish Meat	1 kg
Cooked potato	500 g
Chopped onion	250 g
Green chilly	20 g
Ginger	25 g
Curry leaves	10 g
Mint leaves	10 g
Pepper powder	3 g
Clove powder	2 g
Cinnamon powder	2 g
Turmeric powder	2 g
Refined vegetable oil	QS
Salt	To taste

Procedure

Cook the dressed fish in 3% brine for 15 minutes and drain. Remove skin and bones and separate the meat. Add salt and turmeric to the cooked meat and mix well. Fry chopped onion in oil till brown, add curry leaves, mint leaves, green chilly and ginger in chopped form. Mix these with the cooked meat. Add mashed potato and spices and mix well. Adjust salt content to taste. Shape 25 g each of the mix in round or oval form. Coat with batter and breadcrumbs and fry in oil. Batter ratio 1:2.

Preparation of Fish Cheese Balls

Ingredients

Cooked Fish Meat	1 kg
Cooked potato	500 g
Chopped onion	250 g

Green chilly	20 g
Ginger	25 g
Curry leaves	10 g
Mint leaves	10 g
Pepper powder	3 g
Clove powder	2 g
Cinnamon powder	2 g
Turmeric powder	2 g
Cheese Cubes	1 pkt
Refined vegetable oil	QS
Salt	To taste

Procedure

Cook the dressed fish in 3% brine for 15 minutes and drain. Remove skin, scales, and bones and separate the meat. Add salt and turmeric to the cooked meat and mix well. Fry chopped onion in oil till brown, add curry leaves, mint leaves, green chilly and ginger in chopped form. Mix these with the cooked meat. Add mashed potato and spices and mix well. Adjust salt content to taste. Shape 25 g each of the mix in round form. Make a dip in centre of the ball with thumb. Put one cheese cube at the centre, gather the edges and pinch it into the centre to seal it properly. Shape it into ball form. Coat with batter and breadcrumbs and fry in oil. Batter ratio 1:2.

Preparation of Batter

Maida	2 kg
Corn Starch	200 g
Bengal gram	200 g
Salt	30 g
Tri-sodium polyphosphate	10 g
Turmeric powder	10 g
Guar gum	10g

Preparation of batter mix: Mix batter powder and water in the ratio 1:1

Preparation of Bread Crumbs

- Remove the outer brown layer of bread
- Grind in mixer grinder
- Spread over aluminium tray
- Keep for drying for 2 ½ hrs at 70°C in dryer (smoker)
- Store in appropriate packages