

Battered and breaded or enrobed products are the highly demanded product among the group of value added products. An enrobed/coated product is one, where a food material is coated with another food stuff. Coating the food product with a batter and breading before cooking is an established age old domestic practice. However, changing food habits of consumers has created the need for an increased market supply of ready to cook or ready to serve products which include the most prominent coated fishery products. Breading and battering of food products enhance characteristic such as appearance, flavour and texture. Battered and breaded products offer a convenient food valued widely by the consumer. Many products are coated and immediately frozen, or they may be pre-fried, and then frozen for distribution and sales to consumers and food service establishments. They can be quickly reconstituted by conventional heating methods. As far as fish processing industry is concerned, value addition is one of the possible approaches to raise profitability, since this industry is becoming highly competitive and increasingly expensive.

The production of battered and breaded fish products involves several stages; they are portioning/forming, pre-dusting, battering, breading, flash frying, freezing and cold storage.

a. Portioning/forming

In this process, the boneless/skinless fish is cut into desired shape (fingers or nuggets). Frozen block of minced fish can also be used as raw material for making different styles.

b. Pre-dusting

Before dipping into batter, the fish portion is given a pre-dusting in a fine raw flour type material. Batter mix itself can be used for pre dusting. Pre-dusting is given to enable uniform absorption of batter.

c. Coating with batter

A batter can be defined as a liquid mixture composed of water, flour, seasonings into which food products are dipped before cooking. Batter enhances the nutritive value of fish products. Also, it minimizes the moisture loss from the product during storage and increases the bulkiness of the product, thus reducing the cost of product. Composition of a typical adhesive batter is given below.

Batter mix composition

Ingredient	Amount
Maida	1000g
Corn flour	100g
Bengal gram powder	100g
Salt	12g
Sodium tri polyphosphate	5g
Turmeric powder	5g
Hydrocolloids (Guar gum)	5g

d. Breading

The breading is normally a bread based crumb. The batter coated portions are further coated with bread crumbs. Generally medium sized porous crumbs with relatively large granulations are used. Breading can be done manually or mechanically. The bread crumbs are uniformly applied over the product and excess crumbs are removed using an air blower. In general, a pick up ratio of 30-35 % is advised.

e. Pre-frying

Pre-frying is required if the product is intended for frozen storage. The purpose of pre-frying is primarily to set the coating on the fish portion. The temperature of frying oil and the time of frying are critical. The normal frying temperature is between 180-200°C and the time is 20-30 seconds. The term pre frying is used because the final product frying is completed by the consumer for a duration of 4-6 minutes depending on the portion size and thickness.

Coated Fish Products

Fish fingers

Fish fingers are regular sized portions cut from rectangular frozen block of fish fillet or fish mince. It is very important to select the raw material for fish fingers. A typical British coated fish finger weighs about 28 g of which up to 50% is contributed by batter and bread crumbs. Fingers of size 7-10 cm weighing 10-15g are cut from the fillet. The cut pieces are given a coating of pre-dust, batter and breading as in the case of fish



fingers. It has been observed that sensory quality of fish finger developed from fish fillet is superior to that developed from mince block.

Procedure

1. Cut finger portions from fish fillet
2. Dip in 3% brine at chilled temperature for 15 min
3. Drain and pre dust the finger with dry batter flour
4. Dip in batter and fry

Fish balls

Preparation of fish ball is the best option to utilize the fish meat completely. Fish mince is directly collected from fishes of low commercial value like pangasius, tilapia etc. A hand operated fish mincer or belt drum model fish debonner can be used to collect fish mince from eviscerated fish. If fresh water fishes are used, mince need to be refined by passing through a mechanical strainer to remove the intramuscular bones. Fish meat collected from fillet frame or head waste of high commercial value fishes can also be used as the raw material for making fish ball.



Procedure

1. Mix the fish mince with 1% salt, 5% corn starch and 5% ginger-garlic paste.
2. Mould the mix into ball of 2-3 cm diameter
3. Cook the ball in 3% boiling brine for 5-10 min
4. Cool the cooked balls, pre dust with dry batter, dip in batter, coat with breadcrumbs and fry.

Coated fish fillet

Fried coated fish fillet can be a delicious fish product for domestic and export marketing. Table sized fishes with a minimum pin bone are suitable for making this product. Fresh water fishes like Pangasius,



tilapia, paccu etc. are suitable for making coated fish fillets. Skinless fillets are given a cold blanching treatment to improve the color and texture of the fillet. The frozen coated fillets are immediately packed in thermoformed containers or pouches. A specified number of such consumer packs are then packed in master cartons and is stored at -20°C.

Procedure

1. Prepare table size skinless fillet
2. Dip in 3% brine at chilled temperature for 10-15 min
3. Drain off and pre dust with dry batter
4. Give coating of batter and bread crumbs and fry

Fish cutlet

Fish cutlet is a moulded fish product of high commercial importance. Fish cutlet has become a popular snack at celebrations, household functions, tea times etc. The basic raw material required for preparation of this product is cooked fish meat generally from less costly fresh water fish or cooked meat from skeletal frame obtained after filleting of fresh water fish. Rohu, mrigal, catla etc are ideal for



this product. A common problem noticed in fresh water fish is the presence of fin bones and an undesirable muddy odour. Fin bones to a great extent can be removed by passing the fish mince through a fish meat strainer. Muddy odour can be masked by the use of mint leaves along with other spices. Cooked fish mince is mixed with cooked potato, fried onion, spices and other ingredients. This mass is then formed into the desired shape, each weighing 30 g. The formed cutlets are battered and breaded.

Ingredients

Cooked fish meat	:1000 g
Salt	:25g
Oil	:125 ml
Green chilli	:15g
Ginger	:25g
Onion	:250g
Potato (cooked)	:500g
Pepper (powder)	:3g
Clove (powdered)	:3g
Cinnamon	:2g
Turmeric	:2g

Procedure

1. Cook the fish under steam/water for 20 min and collect the meat
2. Add salt and turmeric to the cooked meat and fry the meat under low time for 5 min to remove the moisture content
3. Fry chopped onion in oil till brown. Fry chilli and ginger. Mix these with the cooked meat
4. Add mashed potato and spices and mix well with the meat
5. Shape 40 g each of this in oval or round form, dip in batter and bread crumbs and fry

Quality requirements for battered and breaded fishery products:

Batter means liquid preparation from ground cereals, spices, salt, sugar and other ingredients and/or additives for coating. Breading means dry breadcrumbs or other dry preparations mainly from cereals with colourants and other ingredients used for the final coating of fishery products.

Generally, the battered and breaded fishery products are partially cooked by the processor for culinary purposes (e.g., setting the batter or breading, or stabilizing the product shape), and are customarily fully cooked by the consumer or end user. Although the exterior of these products may appear cooked, the interior fish protein is not coagulated, and the products are not ready-to-eat. Quality specifications have been laid by the Food Safety and Standards Authority of India (FSSAI, 2017) for battered and breaded fishery products which covers mainly the microbiological requirements vis-à-vis hygiene indicator organisms and safety indicator organisms.

i) FSSAI Microbiological Requirements for battered and breaded fishery products:

a) Hygiene Indicator Organisms

Aerobic Plate Count				Coagulase positive Staphylococci				Yeast & mold count				Action in case of Unsatisfactory results
Sampling Plan		Limits (cfu/g)		Sampling Plan		Limits (cfu/g)		Sampling Plan		Limits (cfu/g)		
n	c	m	M	n	c	m	M	n	c	m	M	
5	2	1 x 10 ⁵	1 x 10 ⁷	5	1	100	1000	5	0	100		Improvement in hygiene; Time-Temperature Control

b) Safety Indicator Organisms

<i>Escherichia coli</i>				<i>Salmonella</i>				<i>Vibrio cholerae</i> (O1 and O139)				<i>Listeria monocytogenes</i>			
Sampling Plan		Limits (MPN/g)		Sampling Plan		Limits		Sampling Plan		Limits		Sampling Plan		Limits	
n	c	m	M	n	c	m	M	n	c	m	M	n	c	m	M
5	2	11	500	5	0	Absent/25g		5	0	Absent/25g		5	0	Absent/25g	

Where,

n = Number of units comprising a sample.

c = Maximum allowable number of units having microbiological counts above m.

m = Microbiological limit that may be exceeded number of units c.

M = Microbiological limit that no sample unit may exceed.

Factors influencing quality of breaded or battered fishery products:

Raw Material	Fish/shrimp used for preparing the battered and breaded product shall be of a quality equal to that of fish/shrimp sold fresh for human consumption.
Coating material	All the ingredients used for coating shall be of food grade quality and conform to all applicable Codex standards
Frying fat (oil)	Oil used in the cooking operation shall be suitable for human consumption and for the desired final product characteristic.
Food additives	Antioxidants, humectants, acidity regulators, thickeners colours, emulsifiers, flavour enhancers, raising agents, and used in accordance the <i>General Standard for Food Additives</i> (CODEX STAN 192-1995)

The final product shall be free from microorganisms or substances originating from microorganisms in amounts which may present a hazard to health in accordance with standards established by the Codex Alimentarius Commission; shall not contain histamine that exceeds 20 mg/100 g (applies only to marine species of *Clupeidae*, *Scomberidae*, *Scombresocidae*, *Pomatomidae* and *Coryphaenidae* families); shall not contain any other substance in amounts which may present a hazard to health in accordance with standards established by the Codex Alimentarius Commission.