

21. PREPARATION OF VALUEADDED PRODUCTS FROM FISH

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Introduction

Value addition is defined as any additional activity that in one way or another changes the nature of a product thus adding to its value at the time of sale. Value-added food products are raw or pre-processed commodities whose value has been increased through the addition of ingredients or processes that make them more attractive to the buyer and/or more readily usable by the consumer. It is a production/marketing strategy driven by customer needs and perceptions. ICAR-CIFT has developed different types of value added fish products like coated products, pickles, wafers and ready to eat and cook products. A coated product is one which is coated with another food stuff. Coating provides a crispy texture and appealing colour/flavor, enhances the nutritional quality; the coatings can be fortified with necessary nutrients; acts as a moisture barrier minimising moisture losses during frozen storage/microwave reheating and acts as food sealant by preventing natural juices from flowing out. Value addition increases the bulk of the substrate thus reducing the cost element of the finished product and also provides structural reinforcement to the substrate.

Apart from coated products, people like spicy adjuncts to make the food palatable and relishing. Pickles are good appetizers and digestive agents. There are several varieties of pickles which are consumed throughout the year. In this context, pickle, a spicy preparation, has gained importance in Indian menu. Preparation of pickles is an old art and a variety of these products are made in Indian homes. The basic principle of pickling is curing of fish and fruits by salting, acidifying, addition of vinegar and/or oil and spices. Consumer demand is a dynamic process that changes based on several factors. Recent changes include a gradual disappearance of conventionally processed products and their emergence in new forms and styles; processed products in ready-to-consume forms in consumer packs and products which can be made for the table with minimum preparation (ready-to-cook).

1. Fish cutlets

Value addition is the best method for better utilization of the under-utilized fishes. Value addition also helps to convert the by-catch into diversified and sophisticated fish products. Fish cutlet is one of such products and it is specifically refers to cooked fish meat stuffing that is fried with battered and breaded.

Ingredients

Cooked fish meat	:	1 kg
Salt (3%) (for brine solution)	:	36 gm
Potable water (lit) (for brine solution)	:	1.2 lit
Salt (to taste)	:	25 gm
Green chilly	:	20 gm
Ginger	:	25 gm
Onion (chopped)	:	250 gm
Potato (cooked)	:	500 gm
Curry leaves	:	10 gm
Mint leaves	:	10 gm
Pepper (powder)	:	3 gm
Clove (powder)	:	2 gm
Cinnamon (powder) (to taste)	:	2 gm
Turmeric	:	2 gm
Maida (for batter)	:	165 gm
Bengal gram flour (for batter)	:	17 gm
Corn flour (for batter)	:	17 gm
Salt (for batter)	:	2.5 gm
Guar gum (for batter)	:	0.5 gm
Turmeric powder (for batter)	:	0.5 gm
Water (for batter)	:	400 ml
Refined vegetable oil	:	125 ml
Bread crumbs	:	300 gm

Method of Preparation

- Clean and dress whole fish.
- Cook dressed fish in 3% brine solution for 15 minutes and drain off the water.
- Remove skin, scales and bones and separate the meat.
- In case of Fish mince, cook it in boiling water for 10 minutes and drain off the water.
- Add salt and turmeric to the cooked meat and mix well.
- Clean and cook the potato.
- Fry chopped onions in oil till brown. Fry chilly and ginger separately. Mix these with the
- cooked meat.
- Add smashed potato and spices and mix well with meat.
- Shape 40g each of this in oval or round form, dip in batter mix, roll in bread crumbs, freeze
- and store at -18⁰C.
- Thaw and fry in oil before use.

Preparation of Brine Solution

- Take 1.2 litre of potable water; add 36 gm (3%) salt and 1.2 gm to the water. Mix the solution properly to get brine solution.

Method of Batter Preparation

- Ingredients serially numbered from 15 to 21 are required for batter mix.
- The ingredients like maida, corn flour, bengal gram, salt, guar gum and turmeric powder
- should mix well to get dry batter mix.
- Add potable water to the dry batter mix in the 1:2 (dry batter : water) ratio to get batter mix.

2. Fish fingers

Fish fingers are processed fish product prepared using fish meat, which has been battered and breaded. Fish fingers are regular sized portions cut from rectangular frozen blocks of fish fillet or fish mince.

Ingredients

Fish meat	:	1 kg
Maida(for batter)	:	165 gm
Bengal gram flour (for batter)	:	17 gm
Corn flour (for batter)	:	17 gm
Salt (for batter)	:	2.5 gm
Guar gum (for batter)	:	0.5 gm
Turmeric powder (for batter)	:	0.5 gm
Water (for batter)	:	400 ml
Salt (to taste)	:	30 gm
Bread crumbs	:	300 gm
Oil	:	125 m

Method of Preparation

Pre-processing of fish

- Evisceration or remove gut, behead, descale, cut fins and belly flaps.
- Skin fillets.
- Keep the fillets in chilled condition till processing.

Method of Batter Preparation

- Ingredients serially numbered from 2 to 8 are required for batter mix.
- The ingredients like maida, corn flour, bengal gram, salt, guar gum and turmeric powder should mix well.
- Add potable water to the dry batter mix in the 1:2 ratio to get batter mix.

Processing of Fish Fingers

- Fish fingers are prepared from the skinless fillets of fish.
- The fillets are cut to uniform sized pieces (fingers) of 8×2×3/4 cm and then the fingers are cold blanched in 3% salt solution for 10-15 minutes and drained.
- The fingers are pre-dusted with an adhesive type quick setting batter.

- The pre-dusted fingers are then coated in liquid batter (one part of dry batter was mixed with two parts of potable water to get the required consistency of the batter) and coated with bread crumbs.
- The coated fingers are then flash fried for 30 seconds, then freeze in IQF machine and store in frozen condition (-18°C) until used by the consumer.

Note: If fish mince is used the procedure is slightly different

- Mix fish mince with salt (0.6 % of mince weight) and potable water to get consistent mix.
- This mix is then spread in aluminium trays of ¾ c.m thick and freezes it.
- The frozen mix is then cut into uniform sized pieces (fingers) of 8×2×¾ cm and keeps in the freezer.
- The fingers are pre-dusted with an adhesive type quick setting batter.
- The pre-dusted fingers are then coated in liquid batter (one part of dry batter was mixed with two parts of potable water to get the required consistency of the batter) and coated with bread crumbs using a bamboo stick.
- The coated fingers are then flash fried for 30 seconds, then freeze in IQF machine and store in frozen condition (-18°C) until used by the consumer.

3. Fish balls

There are several varieties of fish which do not command a ready market as fresh fish, but are comparable to many table fish in nutritive value and other attributes. One of the ways of ensuring effective utilization of such fish is to process ready-to-serve or ready-to-cook value added 'convenience' products, for which there already exists great demand from within the country as also from abroad. Fish ball is one such product prepared using fish mince and starch that can be processed as a coated product or as a heat-processed product in a suitable fluid medium.

Ingredients

Fish mince	:	1 kg
Salt (to taste)	:	10 gm
Corn starch	:	50 gm

Garlic	:	20 gm
Ginger	:	20 gm
Pepper	:	2 gm
Maida (for batter)	:	165 gm
Bengal gram flour (for batter)	:	17 gm
Corn flour (for batter)	:	17 gm
Salt (for batter)	:	2.5 gm
Guar gum (for batter)	:	0.5 gm
Turmeric powder (for batter)	:	0.5 gm
Water (for batter)	:	400 ml
Bread crumbs	:	300 gm

Method of Preparation

- Dress the fish after heading , gutting and washing thoroughly.
- Prepare fish mince either manually or using a mechanical meat bone separator.
- Mix mince with 1% salt and 5% corn starch (if required, spices like garlic, ginger etc. can be added).
- Prepare balls, 2-3 cm in diameter, from the resultant mass and cook in boiling 1% brine for 5-10 minutes.
- After cooling pre-dust with batter powder and dip in batter solution using a bamboo stick and then roll in bread crumbs and fry in oil.
- Pack the balls preferably in thermoformed trays as such or after flash frying in hot oil.
- Preserve by freezing and store at -18°C

Method of Batter Preparation

- Ingredients serially numbered from 7 to 13 are required for batter mix.
- The ingredients like maida, corn flour, bengal gram, salt, guar gum and turmeric powder
- should mix well to get dry batter mix.
- Add potable water to the dry batter mix in the 1:2 ratio (dry batter : water) to get batter mix.

Note: Though mince from different species of fish can be used for processing fish balls, threadfin bream (*Nemipterus japonicus*), Pallikora (*Otolithus argenteus*) and Barracuda (*Sphyraena* spp.) are found to yield satisfactory products. Mince from freshwater fishes such as Rohu (*Labeo rohita*) and Catla (*Catla catla*) also can be used. However, in such cases, the mince needs to be refined by passing through a mechanical strainer to get rid of the interstitial spines.

4. Fish pickle

Fish pickle is the preserved food item through either anaerobic fermentation in brine or immersion in vinegar. The pH of fish pickle should be 4.6 or lower to reduce the microbial activity. Traditionally, spicy, pungent pickle made of vegetables like lime, gooseberry, ginger, garlic etc. were used as an important side dish along with meals and used to be considered an appetizer. Though such pickles made of fish or meat was practically unknown in the past, such products have now become very popular and products under several brand names are now available in the market.

Ingredients

Fish (dressed and cut into small pieces)	:	1 kg
Mustard	:	10 gm
Green chilly (cut into pieces)	:	50 gm
Garlic (peeled)	:	200 gm
Ginger (peeled and chopped)	:	200 gm
Chilly powder	:	35 gm
Turmeric powder	:	3 gm
Gingelly oil	:	200 ml
Vinegar (acetic acid 1.5%)	:	400 ml
Salt (to taste)	:	60 gm
Pepper (powdered)(optional)	:	2.5 gm
Sugar (optional)	:	10 gm
Cardamom (powdered)(optional)	:	0.5 gm
Clove (powdered) (optional)	:	0.5 gm

Cinnamon (powdered) (optional) : 0.5 gm

Method of Preparation

- Mix the cut fish thoroughly with 3% of its weight of salt and keep for two hours for partial drying.
- Fry the fish in minimum quantity of oil. Set apart the fried fish.
- Fry the ingredients like Mustard, Green chilly, Garlic and Ginger separately.
- Combine these ingredients and then add chilly powder, pepper and turmeric powder and mix well over low flames for a few minutes.
- Remove from fire, add fried fish and mix well.
- Allow to cool and then add vinegar, powdered cardamom, clove, cinnamon, sugar and remaining salt and mix thoroughly.
- Transfer to clean, sterile glass bottles and seal with acid proof caps.
- Take care to see that there is a layer of oil over the contents in the bottle.
- Flexible pouches made of 12 μ polyester laminated with 118 μ LD-HD co-extruded film can also be used for packing pickle.

Preparation of Vinegar

- Take 1 litre of water. Boil it and allow to cool.
- Add 15 ml of acetic acid to 1 litre of boiled and cooled water to get optimum concentrated vinegar solution.
- Take 400 ml of vinegar solution for 1KG cut fish.

Note: Vinegar solution can be upscaled based on the quantity of cut fish meat being used for the pickle.

5. Fish wafers

Dried, ready-to-fry-and-serve wafers, employing carbohydrate as main base and incorporating salt and several other ingredients with or without spices are very popular. Such products are known by different names in different languages as 'Kondattam' in Malayalam. 'Vathal' in Tamil.

'Sandings' in Kanarese, 'Odiyalu' in Telugu and 'Tikaya' in Bengali. Recipe for such a product enriched with fish protein.

Ingredients

Cooked fish meat	:	1 kg
Corn flour	:	500 gm
Tapioca starch	:	1 kg
Salt	:	25 gm
Water	:	1.75 litres

Method of Preparation

- Homogenize the processed fish meat with 1 litre of water for 10 minutes in a mechanical grinding machine.
- Add the cornflour, tapioca starch and salt and rest of water and blend the whole mass for one hour.
- Spread the homogenized mass uniformly in aluminum trays in a thin layer of 1-2 mm thickness and cook in steam for 3-5 minutes.
- Cool to room temperature.
- Cut the cooked material into desired shapes and dry under sun or preferably in artificial dryer (at 45°C to 50°C) to a moisture content below 10%.
- Pack suitable lots of the dried product in sealed polythene bags or glass bottles and store in cool and dry place till marketing.

Note: The product can be stored in good condition for two years. Permitted colours can be incorporated, if needed, at the time of mixing the other ingredients with the processed fish meat in order to get desired colour. Generally, this type of product is used as side dish after frying in oil.

6. Fish soup powder

Fish soup is a liquid food prepared from fishes of low economic value by adding required vegetables and other ingredients. Fish soup is rich in dietary constituents like protein, vitamin,

fat and minerals. Fish soup is an alternative to other soups prepared from different materials like vegetables, meat, egg, chicken etc. by considering health benefits.

Ingredients

Cooked fish meat	:	1 kg
Salt	:	226 gm
Fat	:	167 gm
Onion	:	1 kg
Coriander	:	16 gm
Starch	:	333 gm
Milk powder	:	134 gm
Sugar	:	40 gm
Pepper (powder)	:	20 gm
Ascorbic acid	:	2 gm
Carboxy methyl cellulose	:	4 gm
Monosodium glutamate	:	13 gm

Method of Preparation

- Clean and dress whole fish. Cook dressed fish for 15 minutes and drain off the water.
- Remove skin, scales and bones and separate the meat.
- Disperse the processed fish meat in about 200 ml of water and blend the material in a waring blender.
- Cut the onion into small pieces separately and fry it in vegetable fat oil till gets light brown.
- Add powdered coriander and pepper to brown fired onion and stir it.
- Remove it from the fire.
- Add the fried onion and all other ingredients other than milk powder to the blended fish.
- Again blend the mix till it becomes a thick fine paste.

Drying

- Pour the whole mass in thin layer in aluminium trays and dry in artificial dryer at about 70⁰C.

- Powder the dried mass and then add the skimmed milk powder.
- Then powder it well to get a homogeneous product.
- Pack the soup powder in airtight, polythene lined, aluminium foil bags or in cans .
- Thus the fish soup powder will have a storage life of one year.

Preparation of Soup for Consumption

Add soup powder to 20 times more amount of water and boil it for 5 minutes. For example, boil 5 gm of soup powder in 100 ml water for 5 minutes. The soup is now ready for use.

7. Fish noodles

Fish noodles is an extruded fish product. Asian countries have undergone significant evolution and migration on account of its increased globalization. Upgradations in the fish noodle formulations and their processing techniques by the Chinese together with the sophisticated technology developed by the Japanese have made Asian noodles an international food product. The properties of instant fish noodles like taste, nutrition, convenience, safety, longer shelf life and reasonable price have given them global acceptance and admirations by all generations.

Ingredients

Fish mince	:	1 kg
Wheat flour	:	522 gm
Maida	:	522 gm
Potato starch	:	178 gm
Salt	:	44 gm
Guar gum	:	4 gm
Sodium tripolyphosphate	:	2 gm

Method of Preparation

- Clean, wash and dress the fish.
- Remove bone and skin either manually or mechanically.
- Mince the meat using a mincer

- Mix the minced fish meat with wheat flour, maida, potato starch, salt, guar gum and sodium tripolyphosphate in a silent cutter for 1 minute to distribute the ingredients uniformly.
- Condition the noodle flour mixture for 40 minutes at 25 °C for relaxation.
- After this, cold extrude the noodle flour mixture through a die of 1.0 mm diameter in noodle making machine to get a smooth dough strand with continuous and uniform gluten matrix.
- Steam the extruded raw noodle strands for 5 minutes for protein denaturation and gelatinisation of the starch.
- Then dry the steamed noodles in hot air drier at a temperature of 70–80 °C for 2 hours.
- Pack the noodles in polyethylene bags and store in room temperature.

Note: The amount of water was optimized to around 36%, and as fish meat mince was incorporated for noodle preparation, only extra amount of water was added after considering the moisture present in fish mince.

8. Fish burger

Fish burgers are more or less similar to fish cutlets but less spicy. White meat mince from lean fish is generally used for burger preparation. Cooked mince is mixed with salt, cooked potato, fried onion, flour, spice mixture and formed into the preferred shape. Generally, the starch content is to be kept below 15% and the meat content not be less than 30% for ensuring a meaty flavour.

Ingredients

Cooked fish mince	:	1 kg
Onion	:	250 gm
Carrot	:	300 gm
Garlic	:	10 gm
Milk powder	:	10 gm
Pepper powder	:	3 gm
Egg white	:	2 nos
Corn flour	:	50 gm
Salt (to taste)	:	25 gm

Sugar	:	5 gm
Maida(for batter)	:	165 gm
Bengal gram flour (for batter)	:	17 gm
Corn flour (for batter)	:	17 gm
Salt (for batter)	:	2.5 gm
Guar gum (for batter)	:	0.5 gm
Turmeric powder (for batter)	:	0.5 gm
Water (for batter)	:	400 ml
Refined oil	:	125 gm
Bread crumbs	:	300 gm

Method of Preparation

- Dress the fish after heading , gutting and washing thoroughly.
- Prepare fish mince either manually or using a mechanical meat bone separator.
- Cook the fish mince.
- Chop carrot, onion and garlic separately.
- Mix all other ingredients and vegetables to the cooked mince meat.
- Make a paste of all the ingredients and spread uniformly over steel trays.
- Freeze for 30 minutes.
- Cut the frozen block into flat round shape of about 5 cm diameter using mold.
- Dip in batter mix.
- Roll over bread crumbs.
- Flash fry for 30 seconds at 180 °C (optional).
- Place vegetables like sliced tomato, sliced cucumber, sliced capsicum, cabbage, mayonnaise and lettuce along with the patties in the sandwiched buns

Method of Batter Preparation

- Ingredients serially numbered from 11 to 17 are required for batter mix.
- The ingredients like maida, corn flour, bengal gram, salt, guar gum and turmeric powder should mix well to get dry batter mix.
- Add potable water to the dry batter mix in the 1:2 ratio (dry batter: water) to get batter mix.

Packaging

- Burgers are packed in polyester polyethylene laminates or high impact polypropylene trays. They can be subjected to *sous vide* technology and stored at 2 °C for few weeks or frozen at -40 °C and stored at -18 °C for longer duration.
- Burgers are fried in oil and eaten sandwiched with fresh vegetables and plain buns. They can be consumed as such with sauce.

9. Fish papads

Though there is an increasing demand for papads in India, about 95% of the production of papad in the country is still at household or low scale level. The high demand for traditional food within and outside country has widened the scope for introduction of varieties of papads prepared from cost effective and nutrient rich raw ingredients. In this scenario, fish finds application as an ideal raw material for meeting these requirements.

Ingredients

Cooked fish is used for preparing fish papad. Upto 50% can be incorporated, if lean fishes are used in order to develop flavor in papads. Other ingredients used include black gram, sodium bi-carbonate and salt. Different spice combinations can be used based on taste requirement.

Ingredients	:	(g/100g)
Cooked Fish	:	20-50
Urad Dal	:	50-80
Soda Powder	:	1.0
Salt	:	0.6
Asafoetida	:	0.5
Jeera	:	1.0
Black Pepper	:	0.5

Method of Preparation

- Ingredients blended using a blender.
- Dough allowed to set for ten minutes
- Sheeting to get thin round papads. Corn flour preferable for dusting during sheeting to prevent stickiness.
- Papads dried in hot air oven at a temperature of 50°C for 15 min.
- Pack suitable lots of the dried product in sealed polythene bags and store in cool and dry place till marketing.
- Normally fish papads have a shelf life of up to one week at room temperature and one month under chilled conditions (4°C). Moreover the stability may vary based on the quantity and type of fish used.
