

PREPARATION, PROCESSING AND UTILISATION OF FISH PRODUCTS

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1.0 Introduction

Fish is one of the protein foods that needs careful handling. This is because fish spoils easily after capture due to the high tropical temperature which accelerates the activities of bacteria, enzymes and chemical oxidation of fat in the fish . Due to poor handling, about 30–50% of fish harvested are wasted in Nigeria. These losses could be minimized by the application of proper handling, processing and preservation techniques.

2.0 PROCESSING OF FISH

2.1 Handling

The traditional method of handling fish encourages fish spoilage right from catching site. Immediately after catching, fish are put inside canoe containing dirty water. They are gutted (intestines removed) immediately and this encourage bacteria and germ to set in fast. The time lag between catching, transportation and landing encourages fish flesh quality deterioration and short shelf-life for such fish . This could be prevented by observing the following rules:

- i. Kill the fish immediately after been caught by piercing the head with a needle or any sharp object, this prolong the period the fish will stiffen.
- ii. Cut the fish immediately and remove the gills and cut off the head.
- iii. Wash with clean running water.
- iv. Put the fish on Ice in insulated boxes. In the absence of ice, the fish should be kept in the shade in clean containers away from intense sunlight.
- v. Get the fish as fast as possible to the landing area for further preservation and sales.

2.2 Scaling Fish

For a whole flat fish, wash and cut off the head. Holding the fish by the tail and using a sharp knife, Scale it by scrapping toward the head. Scrap until all the scales are removed. Turn the fish and scale the other side. (Fig. 1a and 1b).

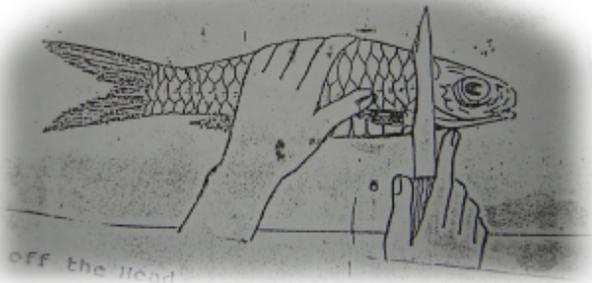


Figure 1a Cut off the head

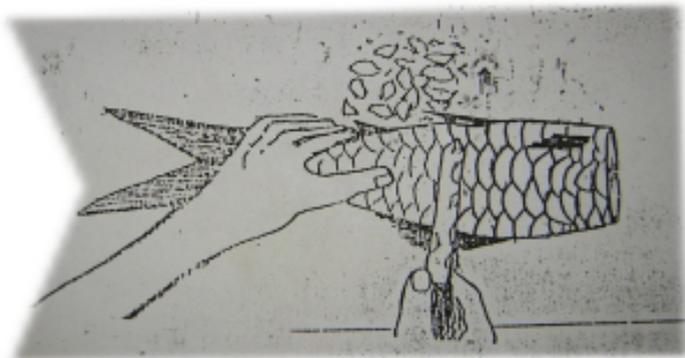


Figure 1b Scrap to remove scales

2.3 **Cutting**

Cutting the removal of the guts (intestines) of the fish. Gutting should be carried out on fish no matter what method of preservation is going to be applied. After gutting, the fish should be washed thoroughly with clean running water. Gutting and washing of the fish helps to prevent bacterial attack before and during processing, preservation and storage (Fig 2)



Figure 2 Gutting a fresh fish

2.4 **Salting and Sundrying**

Salting is done to reduce the population of blow flies (Dermestes) This could be done in two ways.

1. Dry salting:- In this method, the fish is filleted and salt granules are rubbed into the surface of the fillets. The fish is then hung to dry. (Figure 3)
2. Improved salting: This is done on small sardines (clupeids). The process involves soaking the clupeids in salt solutions after washing for about 30 – 60 minutes. The salt solution should be in the ratio of 5 (water) to (salt). After soaking in the salt solution, the clupeids should be sundried on raised Wire mesh rack covered

with muslin cloth for about 2 -3 days. It is very important to leave the clupeids to dry completely before storage. The dried clupeids should be stored in air tight containers and kept in a dry place.



Figure 3 Salting and Sundrying

2.5 **Smoking**

Fish smoking still remains the main method of fish preservation in tNigeria Traditionally, before smoking, large fish are cut into small pieces while the medium sized ones are curled round in such a way that their tail reaches the head and are skewed into a pointed stick. In some cases, the tail is fixed in the fish pectoral spine. The fish are laid on chicken wire trays in the traditional smoking kiln.

Fish smoked by traditional methods are neither gutted nor salted . Smoking is done in the open. This attract oviposition of Blow flies and maggot development inside the flesh, if heat penetration is delayed. Smoked fish quality can be improved by cleaning, scaling, gutting and washing before smoking in a traditional or improved kiln.

2.6 Filleting Fish: Filleting is the proces of separating fish flesh from the bones. Procedures are:-

1. Lay the fish flat on a board with its tail nearest you
2. Using a shape knife outline the backbones
3. Cut through the line of the backbone and remove the left fillet.
4. Work from head to tail keeping the knife flat against the bone to avoid cutting the fish.
5. Turn the fish with its head nearest you, remove the second fillet, wash and dry.



Figure 4: Filleting Fish

3.0 PRESERVATION AND STORAGE

3.1 Icing:

This is one of the best methods of reducing spoilage in fish especially during catching before reaching the landing site and during transportation. The quality of ice required to fish is one part ice to three part fish. (e.g. 1 kg to 3 kg fish). This should be kept in a well-insulated container.

The proper way to store the fish is to alternate a layout of fish and ice with the ice at the bottom and on top of the container. This will ensure that fish is completely immersed in ice. Provision should be made in the box for the escape of melted water. Wooden ice box made from plywood with the dimension of 60cm x 40cm x 20cm developed at National Institute for Freshwater Fisheries Research, New Bussa, Nigeria have been found suitable in transporting fresh fish. Fish stored in this box can still be edible up to 23 – 30 days for Tilapia and Catfish. If the fish are wrapped before storage, it gives better result.

The Ice Box is a box prepared especially for storing fish for a short period or for transportation. The box is lined inside so as to hold ice cubes for a long period of time before thawing. The fish is stored in between layers of ice cubes.

3.2 Freezing: This is a process of reducing the temperature of fish using the deep freezer. It is done to such a level that the activities of the spoilage agents are reduced to facilitate extended shelf-life of the fish. Freezing allows frozen fish product quality to be smaller with that of fresh fish. To achieve this:

- a. Avoid overloading the Deep freezer. This results in slow freezing of product.
- b. Avoid frequent opening of freezer or leaving the door open longer than necessary. This will cause temperature to rise.

3.3 Storing smoked or dry fish: The store area is a suitable place for insect infestation and mites attack on dried fish. To avoid this, the store area should be kept very clean. Use suitable disinfectants to destroy hidden insects in the area before putting the fish. The fish should be handled carefully during stacking and storage as they are easily broken if handled roughly.

The dried Fish should be stored inside wooden boxes that are well sealed. Cardboard boxes, jute bags, baskets, sacks and cartons may be used for storage and transportation, even though they are not adequate. (Fig. 5). If old containers are to be used, they should be disinfected before use as they may carry high loads of micro-organisms.

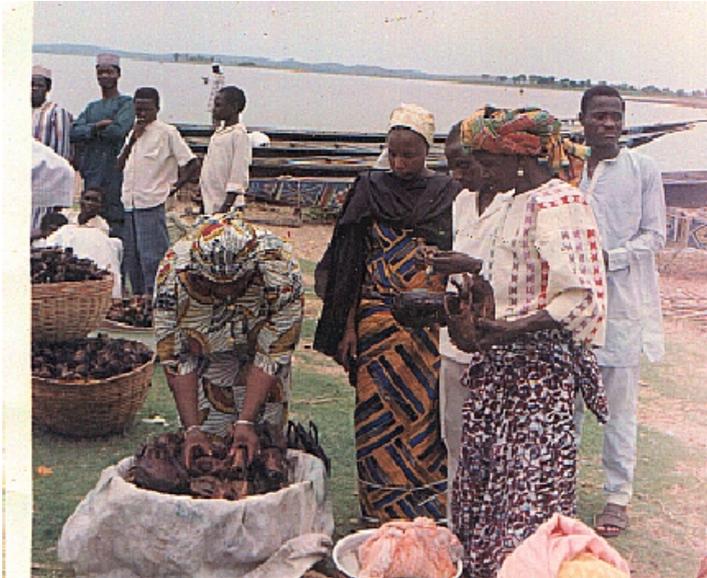


Figure 5 Fish stored in baskets and jute sacks for marketing

4.0 FISH UTILIZATION RECIPES

Fish can be processed directly for human consumption, it can also be used as fermented fish or as supplements in animal feeds.

Below are few recipes to increase variety in menu.

4.1 Fish meal: This is a supplementary animal feed that is very nutritious and economical because it is the fish ovals (bones, guts and gills) that is used.

Ingredients: Fish ovals, salt to taste, water

Procedures:

1. Wash fish offals thoroughly
2. Put inside the pot with little water and salt, then boil for about 10—15 minutes
3. Drain the liquid and sun dry until it is properly dried
4. Grind or pound to power
5. Add to animal feed

4.2 Banga Soup

Ingredients:

- 3 Mudu of fresh palm oil fruits
- 2 fresh fish
- Some dry pepper
- “Beletete” spice
- “Egidiye” specie
- “Emepke” spice
- 1 cup cray fish
- Some periwinkles

Procedures:

1. Boil the palm fruits for about 30 minutes or until fruits are soft and cooked

2. Pound or squeeze the fruits
3. Wash with clean water twice to remove the oil
4. Filter through a medium size sieve into a cooking pot
5. Put pot on fire and allow to boil
6. Add ground pepper, spices and cray fish, then allow to boil for about 10-20 minutes.
7. Gut the fish, wash and cut into small pieces, salt lightly
8. Add the fish and washed periwinkle
9. Continue to boil until the fish is cooked
10. Add salt and maggi cubes to taste
11. Serve with starch of “Eba”

4.3 “Shimbe” Fresh fish soup (fig 6)

Ingredients:

- *1 1/2 bunch “shimber” leaves
- *3 medium size fresh fish
- *2 maggi cubes
- *2 table spoon ground pepper
- *1 1/2 table spoon ground potash
- *2-3 table spoon of palm oil
- *1 onion (chopped)
- *Salt to taste

Procedures:

1. Gut fish, wash and cut into pieces
2. Wash and cut, “shimper” leaves and put into the pot
3. Arrange fish on top of leaves
4. Add all ground ingredients with one cup of water
5. Add maggi, chopped onions and salt to taste
6. Add palm oil and cook for 30 minutes or until fish is cooked
7. Serve with any type of food e.g. boiled rice, “tuwo” “eba” etc.

Note Dish is served in Taraba State during wedding or naming ceremony.



Figure 6 Preparing “Shimbe”

4.4 Smoked Fish Pepper Soup

Ingredient:

- *4 medium size smoked fish
- *2 red pepper (attarodo)
- *2 onion (chopped)
- *Palm oil (optional)
- *Salt to taste

Procedures:

1. Prepare fish by removing bones and wash well with hot water
2. Put fish inside pot and add one cup of water
3. Add ground pepper (attarodo), maggi, chipped onions and salt to taste
4. Add palm oil (optional)
5. Cook for 30 minutes or until smoked fish is well cooked
6. Serve hot or cold

Note: This soup is mostly served to nursing mothers.

4.5 Species Roasted Fresh Fish

Ingredients:

*4 medium size fish or catfish

*2 “attarugu” (chopped)

*1 onion

*2 maggi cubes

*Ground local spices (leaves, cloves, ginger etc.)

*Groundnut oil (just enough for roasting)

Procedures:

1. Remove scales and gut fish. Wash properly
2. Crush maggi cubes and mix with ground local spices and salt. Rub on the fish inside out
3. Chop onion and attarugu and spread on the fish
4. Cover the fish for about 30 minutes. This is to allow the spicy ingredients to penetrate into the fish
5. Sprinkle oil on fish and roast for 10-20 minutes. Sprinkle more oil if necessary during roasting.

4.6 “Ezowa” (Beans Soup)

Ingredients

*2 cups beans

* $\frac{1}{2}$ cup palm oil

*1 medium onion (chopped)

*2 tablespoon ground pepper

*2 table spoon ground daddawa”

*2 maggi cubes

*Salt to taste

Procedures:

- Soak beans with warm water and wash to remove the seed coat
- Put water on fire, when it is about to boil, add washed beans and cook for 10 minutes
- Clean fish accordingly
- Add the other ingredients and fish, cook beans is well cooked
- Mash with spoon and serve

4.7 “Epa” Soup (Cooked dried yam) Fig 7**Ingredients:**

- *3 cups cooked dried yam (crushed coarse)
- *1 Large fish (smoked)
- *½ cup palm oil
- *2 table spoon ground pepper
- *2 large tomatoes
- *2 large “tattase”
- *1 medium size onion
- *2 maggi cubes
- *2 table spoon ground “daddawa”
- *Salt to taste

Procedures:

1. Using warm water, wash and debone fish
2. Put water on fire and add fish
3. Wash and grind with tomatoes, “tattase” and onions
4. Add the ground ingredient plus pepper, “daddawa.” Maggi cubes, salt and palm oil
5. Add crushed dried yam and cover, lower heat and simmer for about 10-15 minutes
6. Serve



Figure 7 Preparing “Egusi” soup

4.8. “Efo Riro” (Local vegetable soup (Fig 8)

Ingredients

- *3 cups of cut spinach
- *1 Large fish (smoked)
- *2 large tomatoes
- *2 large “tatase”
- *2 tbsp ground “daddawa”
- *1 tbsp medium onion
- * $\frac{1}{2}$ cup palm oil
- *2 maggi cubes
- *Salt to taste

Procedures:

1. Wash spinach and cut into halves
2. Put water to boil and blanch spinach
3. Using warm water wash fish thoroughly and debone
4. Put fish inside pot and boil for about 10 minutes

5. Wash and grind tomatoes, “tattase” and onion
6. Heat palm oil and fry the ground ingredients
7. Add boiled fish, maggi cubes, “daddawa” and salt. Then cook for about 10 minutes
8. Add blanched spinach and simmer for 4 -5 minutes
9. Serve with “eba” “amala” tuwo etc.
10. *Note: This soup is prepared as an emergency one when the house wife is in a hurry and ingredients at home are not enough to prepare proper soup*



Figure 8 Preparing “Efo Riro

4.9 Stock fish coco-yam soup (Fig. 9)

Ingredients

- *2 stockfish
- *8 pieces of meat (optional)
- *1 cup flaked dried fish
- *3 bulbs of coco-yam
- *1 cup chopped telferia (ugu) or “okasi”
- *3-4 cups water
- *2 tbsp palm oil
- *1 onion (chopped)
- *1-2 tbsp ground pepper
- *2 maggi cubes
- *Salt to taste
- * $\frac{1}{2}$ cup ground cray fish.

Procedures:

1. Wash and cut stock fish and meat into desired pieces
2. Put in pot and add 3 cups water, bring to boil, add palm oil
3. Grate or pound cocoyam and add to boiling mixture
4. Add all other ingredients and one cup water (if necessary) boil for 5 minutes
5. Add the chopped telferia and okasi and simmer for another 5 minutes
6. Serve with pounded yam, “eba” “amala” etc.



Figure. 9 Preparing coco-yam soup

4.10 “Nsala” Soup

Ingredients

- *4 large smoked fish
- *2 table spoon pepper
- *2 table spoon ground crayfish
- *2 table spoon “Uzizza and “oda”
- *Small quantity of “Uzizza” leaves
- *A piece of yam
- *Salt to taste

Procedures:

1. Using warm water, wash and remove bones from fish
2. Boil fish in small quantity of water
3. Pound or grate yam
4. Add yam, pepper, “uzziza” “uda” and crayfish, boil for 5 minutes
5. Add “uzziza” leaves and salt and simmer for another 3 minutes
6. Serve hot with pounded yam.

4.11 **Fish Cake (fig 10)**

Ingredients:

- *2 large fresh or smoked fish
- *8 cups boiled yam or potatoes
- *3 eggs
- *1-2 cups bread crumbs
- *½ cup flour
- *1 small onion (chopped)
- *2 tsbp ground pepper
- *Salt to taste
- *Oil for frying

Procedures:

1. If using fresh fish, degut,, cut and wash. If using smoked fish, use warm water and wash thoroughly. Remove bones
2. Using a little chopped onion and salt, boil the fish until it is cooked and soft
3. Remove the back and bones of the boiled fish and flake finely or chop
4. Mix with one beaten egg
5. Mash boiled yam or potatoes and add to fish mixture with pepper on a flat surface or tray, mix lightly, spread mixture to cool
6. Roll out the mixture lightly and cut into desired shapes
7. Coat with beaten eggs and bread crumbs
8. Fry in hot oil until golden brown
9. Serve garnish with boiled “ugu” or lettuce leaves



Fig 10 Fish cake preparation

4.12 “Dambun Kifi (Fig 11)

Ingredients

- *2 Large fresh fish
- *3 medium pepper (chopped)
- *2 large onion (chopped)
- *1 tsp curry powder
- *3 maggi cubes
- *1 tsp ground pepper
- * $\frac{1}{2}$ cup water
- *Salt to taste
- * $\frac{1}{2}$ bottle groundnut oil

Procedures:

1. Degut, cut and wash fish
2. Boil fish with $\frac{1}{2}$ cup water, a little chopped onion, and salt for about 10 minutes
3. Remove bones from boiled fish and mash
4. Add chopped pepper, and onion, ground pepper, curry powder, crushed maggi and salt, mix well
5. Fry in hot oil stirring continuously until gold brown

Note: *This dish is considered to be the food for the noble ones. It can also be served during wedding ceremonies or on sallah days.*



Figure 11. Dambun Kifi Product

4.13 “Taushe” (Smoked fish vegetable soup)

Ingredients:

- *5 medium sized smoked fish
- *1 large onion (chopped)
- *3 medium pepper (chopped)
- *6 large tomatoes (chopped)
- *1 small size pumpkin
- *2 maggi cubes
- *2 table spoon ground “daddawa”
- *½ cup palm oil
- *1 cup water
- *Salt to taste
- *2-3 bunches of spinach

Procedures:

1. Using warm water wash and remove bones from fish
2. Cut pumpkin into small pieces and wash. Boil for 10 minutes and mash
3. Heat oil and lightly fry chopped ingredients
4. Add fish, water, pumpkin, “daddawa”, maggi and salt, cook for about 20 minutes
5. Wash and cut spinach. Add to soup and simmer for 5 minutes
6. Serve with “tuwo” rice, “waina”, pounded yam etc.

4.14 Fresh Fish Pepper Soup

Ingredients

- *2-3 large fresh fish
- *1 tatase
- *2 attarudu
- *1 tomato
- *1 onion
- *2 table spoon ground local spices (ginger cloves etc.)
- *2 maggi cubes
- *1 tablespoon groundnut oil
- *Salt to taste

Procedures:

1. Degut fish, cut and wash properly
2. Wash and chop or grind tattase, attarudu, onion and tomatoes
3. Heat oil and lightly fry chopped or ground ingredients
4. Add 2 cups of water, salt, maggi, local spices and fish. Simmer for 20-25 minutes or until fish is cooked and tender
5. Serve as an appetizer, with boiled rice or alone for special occasion.



Figure 12 Preparing freshfish pepper soup

4.15 Ikokore

Ingredients:

- *3 medium water yam
- *4 tsb ground pepper (dried)
- *1 large onions (chopped)
- *6 pieces of shawa/shrimps
- *4 maggi cubes
- *½ cup palm oil
- *Salt to taste

Procedures:

1. Peel, wash and grate water yam
2. Add salt and mix properly
3. Using warm water wash and remove bones from smoked fish
4. Remove skin and bones from shawa or scales from shrimps
5. Put 6 cups of water on fire, add ground pepper, shawa and chopped onions. Allow to cook for 20 minutes
6. Add shrimps and smoked fish and cook for another 10 minutes

7. Add salt and maggi
8. Remove all fish from pot, add $\frac{1}{4}$ cup water and add to soup. Add the already cooked fish and palm oil
9. Simmer for 10 minutes
10. Serve with “eba” amala etc.

4.16 Fish Pie

Ingredients

- *16 cups (1 tiya)
- *Wheat flour
- *4 tins margarine
- *4-5 cups water
- *2 tsp baking powder

For filling

- *2 large fresh fish
- *8 Irish potatoes
- *2-3 eggs
- *1 large onions (chopped)
- *Seasonings (pepper, ginger, thyme, curry)
- *2 maggi
- *Salt to taste

Procedures:

1. Sieve flour, salt and baking powder in a bowl
2. Add margarine to sieve ingredients and rub until the mixture resembles socked gari
3. Add water to mix, little at a time and mix into a very soft, pliable dough
4. Degut, cut and wash fish. Boil with salt. Remove bones after boiling
5. Peel and cut potatoes into small pieces; wash and boil

6. Heat oil and lightly fry chopped onions, add potatoes, deboned fish. Add seasonings, maggi, and salt. Simmer until the ingredient are cooked. Spread to cool
7. Roll out dough into flat thin dough and cut to desired sizes and shapes
8. Add fish mixture and close up. Press the sides with fork
9. Brush with beaten eggs and bake in local or modern oven until golden brown.

CONCLUSION

Attempts have been made in this bulletin to introduce readers to various fish products and recipes that can be produced. Readers should follow the methods outlined and get the required materials for the recipes. Fish recipes are nutritionally relishing and their intake, no doubt will contribute to fish protein requirement in diets.

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