BHARATHIDASAN UNIVERSITY

Tiruchirappalli- 620024,

Tamil Nadu, India

Programme : M.Sc., Marine Science

Course Title : FISHERIES SCIENCE AND STATISTICS

Course Code : 22MSCC05

Unit-IV

Methods of Fish Preservation

Dr. R. RAJARAM

Professor

Dept. of Marine Science

SPOILAGE OF FISH

Spoilage is the deterioration of fish which make its taste and smell bad and makes it a carrier of disease germs. There are 3 different kinds of spoilage.

1. Autolytic spoilage: caused by enzymes
2. Microbial spoilage: caused by bacteria
3. Fat oxidation

HOW LONG CAN WE KEEP THE FISH

Fresh fish will spoil very quickly. Once the fish has been caught, spoilage progresses rapidly. In the area of high temperature, fish will spoil within 12 hours which make them unconsumable.

FRESHNESS OF THE FISH

- The skin colour of the fish is bright, not opaque
- Scales are intact or adhere well
- Body is stiff and little slimy
- Fish sinks if placed in water
- Flesh is firm and elastic
- Has seaweedy odor rather that fishy odor
- Eyes are bright, gills are red

PRESERVATION OF FISH

Preservation is the processing of fish so that they can be stored for a longer time.

Preserved food is not healthy as fresh food because it decreases the nutritional value of the fish.

Before preservation, fishes are processed and washed with clean water to remove the mucus and other materials which can cause problem in preservation.

METHODS OF FISH PRESERVATION

1. Canning
2. Freezing and
3. Chilling

1. CANNING

- **Canning is defind as packaging of fish in hermetically sealed container and obtaining commercial sterility through the use of heat processing**

- **Commercial sterility is the degree of sterility necessary to destroy all the harmful bacteria without changes in food quality**

- **Canning is the long-term preservation method so storage range from 1-10 years with maintaining more or less same quality**

- **Canned fish are fish which have been processed, sealed in an airtight container such as a sealed tin can, and subjected to heat.**

STEPS OF FISH CANNING

1. Selection of raw materials
2. Treatment before canning
   - Nabbing
   - Washing and de-scaling
   - Brining
3. Packing / filling the can
4. Closing the can
5. Washing
6. Heat processing
7. Cooling
8. Labelling and boxing

SELECTION OF RAW MATERIALS

Mature, pre-spwaning fish and medium fatty fish are better for canning. The following are the characteristic are used for canning.

- Excess bone
- Taste less
- High fishy odour
- Fish with hard muscle
- Eg. Sardine, Hilsa, Tuna, Salmon

TREATMENT BEFORE CANNING

NOBBBING: In the case of large fish, head and gut are removed before canning is called nobbing.

WASING AND DE-SCALING: Removal of scales and fins from the raw materials. Nobbing cause release of blood. Hence washing removes the blood, surface slime and dirty.

BRINING:

- The fishes are immersed in concentrated solution of common salt. The is absorbed by the flesh (2% is acceptable).

- The brined fishes are filled in the can and leave the small space in the top of the can. It is used to fill the inert gas.

- Necessary additives like salt, tomato, starch, sugar etc may be used to develop flavour and quality

Packing/ filling the can

CLOSING THE CAN

All the cans are closed by double-seaming methods. Proper sealing is needed to avoid contamination through air / water.

Washing of can is done by the hot water spray to remove adhering materials

HEAT PROCESSING

- It is the most important step during the whole canning procedure.
- Heat the can for 32 minutes at 110 ^{0}C / 2.5 min at 121 ^{0}C
- Heat processing is done by the instrument is called retort and the processing is called retorting.

COOLING

Cooling is done as quickly as possible after retorting. Otherwise off flavour may produce because considerable changes may take place during heat processing.

LABELLING AND BOXING

After cooling labelling can be done by manual or machinery


GLENRYCK
QUALITY CANNED FISH FOR
– OVER 50 YEARS –
HIGH IN
OMEGA 3
SOUTH ATLANTIC
PILCHARDS
IN TOMATO SAUCE
425g
PRINCES
MEDIUM
RED
SALMON
canned from fresh
PRINCES
sardines
SUCCULENT & DELICIOUS
PRINCES
JOHN WEST
TUNA CHUNKS
In Sunflower Oil

2. FREEZING

Freezing is the simplest and most natural way of preserving fishes. It is very easy and safe to do.

Freezing consists of removing heat from a substance until it attains sub zero temperatures.

The followings are the simple steps followed in freezing

- **If the fish is small, wash and freeze directly.**
- **If the fishes are big, remove the scale, fins and gut and wash before freeze.**
- **Wrap the fish in plastic or in container packed tightly to eliminate the air.**
- **Labelling the container with name and date than freeze it quickly**

The following are 10 factors affect freezing time of products.

1) Freezer type
2) Freezer operating temperature
3) Refrigeration system and operating condition
4) Air speed in an air blast freezer
5) Product temperature
6) Product thickness
7) Product shape
8) Product contact area and density
9) Product packing
10) Species of fish

Types of Freezers:

Air Blast Freezers :

Blowing a continuous stream of cold air over the fish.

- Continuous air blast freezers and Batch air blast freezers

Plate Freezers :

Direct contact between the fish and a refrigerated surface

- Horizontal plate freezers
- Vertical plate freezers

Immersion or Spray Freezers:

Immersion in or spraying with a refrigerated liquid.

One type is **brine freezing** by immersing fish such as tuna in a tank of re-circulating cold sodium chloride brine at -150 C in a **brine immersion freezer** that may take about 3 days to freeze a large tuna completely

Benefits of Blast Freezing

- Fast and efficient
- High-quality product
- Safer
- Healthier
- Easy transport
- Ultra-low temperatures
- Minimize waste

3. CHILLING

Chilling is the reduction of temperature below -2 to -4^{0}C for superchilling or between 0 to 5^{0}C freezing point of water in fish muscle.

Chilling does not stop the spoilage but it reduces.

METHODS OF CHILLING

1) Wet iceing

- It is the most common and useful way of chilling the fish
- It is effected by the direct contact between the melted ice and the fish
- Sufficient ice must be used to maintain the temperature at 0^0 C. For longer trips more ice than fish is needed
- Ice and fish should be placed alternatively to avoid localised heating.
- When packing big fish must be placed in botton and small fish at top
- Gutted fish must be filled with ice and gut must be face down.

2) Chilled by Ice Slurry or CSW

This is also known as "Slush ice" which is a mixture of seawater and crushed ice used for chilling of fish

Advantages of CSW (Chilled Sea Water)

- **CSW chills fish much faster than wet ice**
- **Fish in CSW do not suffer from physical damage**
- **Fish in CSW are washed in the slurry**

3) Refrigerated air

Air chilling is commonly used in big commercial production. Chilled air is circulated around the room using fan. This is also called as air blowers

4) Gel Ice Mat

Gel ice made by freezing a water based gel. The advantages of gel ice is that all water is bound and with no chance of water leakage. This method is suitable for air transport of fishes

TYPES OF ICE

The most common types of ice used in fish preservation are as follows

Block ice

1) **It is made by freezing water in forms of cans/blocks of desired size.**

2) **Block ice are rarely used because of its ice and weight. They must be crushed into small pieces before use.**

3) **It melts slowly and easy to transport**

Crushed Ice

Crushed ice usually comes from block ice broken down through mechanical crushers or manually

Crushed ice are irregular in size with sharp edges.

THANK YOU