

On board handling of fish



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Introduction

- Fish - perishable commodity. Various changes takes place in the fish the moment it is taken out from water leading to spoilage.
- Spoilage - action of bacteria, enzymes as also due to autoxidation of the fat.
- The type of flora and the extent of contamination with the will depend on
 - The bacterial quality of the waters and also
 - The sanitary conditions under which it is handled and preserved onboard.

Need for hygienic handling

- Fish or any process product reach the consumer in highly acceptable condition. And it is more important if the fish is intended to further processing – the quality and acceptability of the end product depend on quality of raw material.

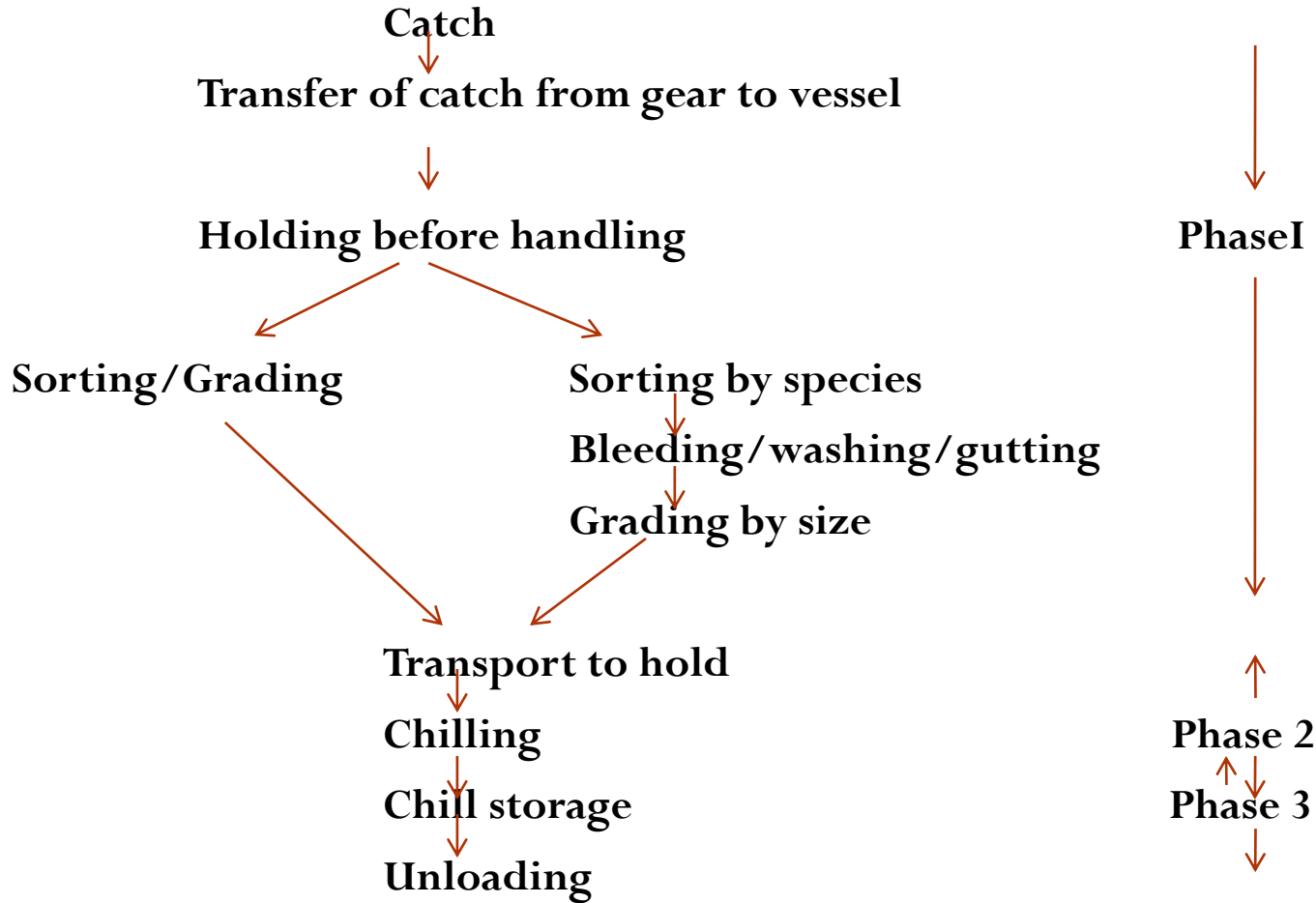
- In this case, the quality of the product reaching the end user will greatly depend on how the fish was handled **onboard the vessel**, how it was **preserved, packaged** and **transported** etc.
- Extreme care is needed in handling, preserving and storing fish onboard.

Handling of fish onboard

The main factors affecting the quality of fish onboard are-

- Cleanliness of the deck and fish holds
- Quality and quantity of water used
- Temperature at which fish is maintained
- The general handling practices adopted
- Cleanliness of the equipment and utensils use in handling, packaging and storage.
- Personal hygiene of the fish handlers.

Typical unit operation in Catch handling of fish



- Good handling practices at sea should ensure that the fish retains its natural freshness to the max. possible extent.

Washing

- Immediately after unloading the catch – washed well to remove the dirt and other extraneous matter.
- Sea water, when taken away from shore- sufficiently clean and low bacterial load – quite good for washing.
- Water from near shore – contaminated with bacteria, industrial effluents and even faecal matters.
- Even when taken from distant open sea, water may be chlorinated to 10 ppm available chlorine level to make it safe for use.
- Washing- cleanses the most of the surface bacteria – which can bring early spoilage of fish.

Sorting

- Depending on the gear employed.
- In pelagic catch consist mostly in the single species, but in trawl catch – several species and varying sizes, small to big.
- After washing, the fish must be sorted species wise as also size wise.
- Fish which are unfit for preservation and other damaged fish shall be separated and thrown back to sea or probable conversion into fish meal.
- High value fish are generally carefully sorted out and suitably preserved.
- Sorted species stored in a separate container size wise and species wise.

Evisceration and removal of gills

- Gills and viscera of the fish are removed before they are preserved and stored.
- Evisceration should be complete with no portion of it left out.
- During evisceration no cut or bruise should be inflicted in the belly.
- Retention of visceral parts can easily contaminate the soft belly or bruise can cause accelerate spoilage.
- Removal of viscera and gills and bleeding should be done separately without contaminating other fishes.
- After each operation – washed thoroughly.

Bleeding

- Desirable step before preservation
- If not thoroughly bleed , blood can clot and turn dark brown affecting the colour and appearance of meat.
- Bleeding is not possible for all the fishes – therefore restricted to only reasonably large fish like tuna, seer fish etc.
- Bleeding is done by slitting the throat of the fish followed by immersion in cold water for 30 minutes.
- Slitting the throat followed by hanging the fish by its tail also is practiced.

ICING

- The best method of preservation of fish onboard involves lowering its temperature.
- Effective and ideal cooling medium
- Large cooling capacity for a given weight or volume.
- Harmless, portable and cheap.
- Rapid cooling can be achieved through intimate contact between fish and small pieces of ice.
- Freezes below -1°C
- Ice keeps fish cool, moist and glossy and controls deterioration.

Effect of temperature on the rate of spoilage of fish

- The rate of spoils (fish) has been found very linearly in the temp. range - 1 to 2.5⁰C
- At 5.5⁰C it is twice as fast as at 0⁰C
- Should not be allowed to remain exposed to sun on the deck (long time) which facilitate rapid growth of micro organisms and accelerate enzymatic and bacterial spoilage.

Methods of icing fish Onboard

Commercial fishing vessels store the catch in ice. Some of the considerations in designing the fish holds are -

- Should be robust, hard and smooth surface so that it is easy to clean.
- Should not have crack or crevices.

- All fittings must be strong and corrosion resistant
- Materials used for construction should not be contaminate the fish
- Should be adequately insulated.

Different methods are employed for storing fish:

- Bulking
- Shelving
- Boxing
- Storage in insulated boxes

Bulking

- In the pound board a layer of ice is spread over the bottom of the pound followed by a layer of fish.
- Operation is repeated until the height of fish ice together is about 50 cm with 5 cm layer of ice on the top.
- Care should be taken that ice is spread evenly on fish and around the edges
- Increasing of height more than 50 cm is not recommended: excessive pressure in the bottom leading to quick spoilage
- Another pound: repeated till the pound is full.
- Pound board: placed horizontally
- Should be kept clean and out of contact with fish.

Shelving

- Fish holds is divided into sections like bulking, but usable removing shelves, fish is spread in layers over ice.
- Lowest shelf is covered with a layer of ice about 5 cm thick.
- Fish is arranged in rows on the ice in thin layers and covered with ice again.
- Only one layer is kept on each shelf.
- Shelving is not popular now a days because of higher space and labour requirements.

Boxing

- Number of designs and sizes of fish boxes (plastic and Aluminium alloys)
- A layer of 5 cm thick ice is spread over the bottom of the box followed by fish and repeated it until the box almost full.
- Ice should be in side and at the top.
- Box should not be overfilled or any ice should not be protruding over the rim of the box.
- Necessary to prevent the crushing of the fish.
- It is important that during above stated all the method, sufficient ice should placed in the bottom, sides and top.

Storage in insulated box

- Many vessels those engaged in coastal fishing are very small and do not have fish holds.
- Such vessels carry ice in insulated boxes to preserved the catches.
- The size of the boxes depend on – size of the vessel and amount of fish usually caught in a day's fishing.
- 10-15cm thick expanded polystyrene insulation is in commonly used.
- In a single day fishing (those vessels do not have fish holds) washed and sorted fish kept in a clean deck protracted from sun by covering a tarpaulin or similar material.
- Kept wet by frequently sprinkling of water over it.

Alternative chilling methods

- **Preservation in refrigerated sea water (RSW)**
- Sea water contain 3-4% sodium chloride and freezes at about -2°C .
- Fish stored in this water can be maintained at -1°C to -2°C .
- SW cooled by mechanical means (RSW) is circulated through tanks installed onboard the fishing vessel.
- Chilling fish RSW is faster than chilling in melting ice because of more intimate contact between the fish and cooling medium.
- Method has been found quite satisfactory for non fatty as well as big size fishes.
- Longer period than ice
- More fish can be packed per volume.

Disadvantages of RSW

- Excessive uptake of salt
- Loss of protein
- Bubbling Carbon-di-oxide gas through water
- Blackening during storage of some fishes (meat)
- Bacteriological problem
- Bleaching of gills and dulling of skin etc.
- Black spots- shrimp

Preservation in Chilled sea water

- Mixing ice with SW
- Ration of SW and Ice 1:1 to 1:2
- Temperature -1.5°C
- Ration of fish 4:1
- Adequate mixing by motion of the vessel.

Unloading

- Shelved fish are unloaded, using baskets or boxes
- Fish are trackled from the hold and emptied in a conveyor leading to the manual grading and weighing process.
- Boxes fish iced in 20 kg or 40 kg boxes at sea will normally be unloaded.
- Swedish boats use hydraulic deck mounted cranes.
- Unloading rate approximately 30 t/h.
- Danish coastal vessels, landing their pelagic catches daily use quay mounted P/V pumps for unloading their catches.
- P/V pumps introduced for unloading herring and mackeral.
- P/V- pumping rates will typically be around 40-50 t/h.

Hygiene in fish handling

- **Supply of clean water:** Water used should preferably be of potable grade having residual chlorine not more than 5 ppm
- Water for cleaning of premises, utensils etc. should have a high level of residual chlorine, 10-100 ppm.

Personal hygiene:

- Person handling of fish should maintain strict hygiene and be free from any communicable disease.
- Should wear clean uniform including headgear, water proof coats or aprons and gumboots.
- Before start handling wash hands using soap with chlorinated water.
- Repeat after each break of work.
- Spitting, chewing tobacco etc. should be prevented in the fish handling area.

Cleaning and disinfection

- Thorough cleaning and disinfection of the boxes, all handling equipment, utensils etc. are primary requirements.
- Should be slime free and clean using detergents.
- Should be done at the end of each working day.
- Chlorinated water is used – for metallic surfaces: 100 ppm
 - Wooden surfaces: up to 1000 ppm
- After a contact period of 15 minutes the disinfectant may be washed off using clean water.
- Improper cleaning will allow build up of slime and bacteria which in turn will contaminate the fish.



Thank You...