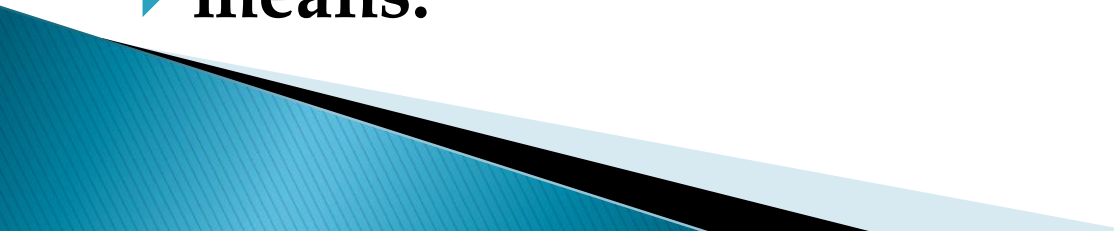



Processing of fish by traditional methods – salting, sun drying, smoking, marinading and fermentation

Hauzoukim

INTRODUCTION :

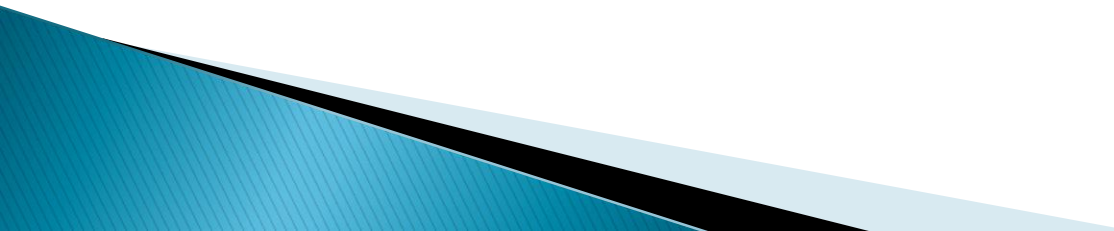
- ▶ In some islands, more fish is caught at times than can be consumed.
 - ▶ Methods are used in keeping the surplus fish in good condition for later consumption.
 - ▶ Fishermen sometimes cannot return to their villages promptly with fresh fish they have caught, and it will be of value to them to know how to preserve their catch by simple means.
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FISH PRESERVATION:

- ▶ Word 'preserve' means to keep safe, retain quality.
 - ▶ Since fish is very perishable, it is necessary to preserve fish if not consumed or disposed immediately.
 - ▶ Fish preservation is the method of extending the shelf life of fish and other fishery products by applying the principles of chemistry, engineering and other branches of science in order to improve the quality of the products.
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- ***Important reasons of preserving fish:***

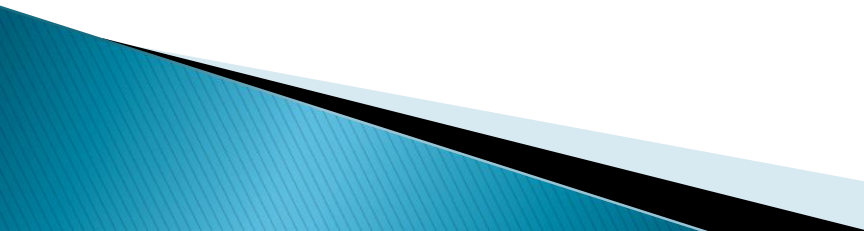
- ▶ **To take care excess produce when more fish caught than can be consumed.**
- ▶ **Fishermen unable to return with fresh catch.**
- ▶ **Prevent spoilage as fish is perishable.**
- ▶ **Extending shelf life of fish & fishery products.**
- ▶ **Surplus fish cannot be taken to markets immediately due to lack of good transport facilities & packing material etc.**
- ▶ **Keeping surplus fish in good condition during off season.**

- ▶ **Need simple means to preserve the catch.**
 - ▶ **Improve quality of fish on storage.**
 - ▶ **Reach areas where food item is not available.**
 - ▶ **Make transportation & storage of food easier.**
 - ▶ **Preserving food at home.**
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■ PROPER STEPS IN HANDLING FRESH FISH

- 1. Avoid exposing the fish to sunlight. Keep them in a shaded area.
- 2. Ice the fish immediately after they are caught to lower their temperature.
- 3. Remove the gills and internal organs.
- 4. Avoid soaking the fish too long in the water after death as this easily spoils the fish.
- 5. Use mechanical refrigeration if there are facilities.

- ▶ Many processing techniques used to preserve fish quality and to increase their shelf life.--
- ▶ i) Drying & Dehydration
- ▶ ii) Lowering of temperature – icing, freezing
- ▶ iii) Increasing temperature – canning, irradiation
- ▶ iv) Using preservatives – marinating
- ▶ **Techniques based on control of a_w :**
- ▶ A_w measures availability of water in fish flesh
- ▶ Ratio of water vapour pressure of fish to vapour pressure of pure water at same temp.

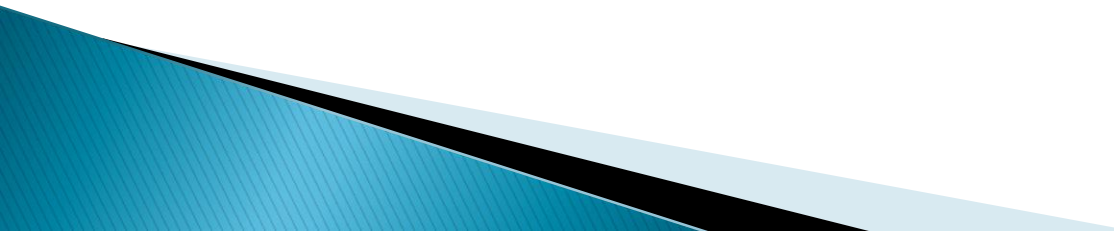
- ▶ **Aw varies from 0 to 1.**
 - ▶ **These include :**
 - ▶ **drying, salting, smoking, freeze-drying, use of water binding humectants and a combination of these.**
 - ▶ **Technique used to remove water & reduce a_w necessary for microbial and enzymatic reaction**
 - ▶ **These can be implemented very simply,**
 - ▶ **e.g. by salting, solar drying, or using fully automated equipment with temperature control, relative humidity, etc.**
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Temperature control :


- ▶ Lowering of temperature – icing, chilling, freezing & frozen storage etc.
 - ▶ Controlling microbial growth and activity.
 - ▶ Arresting enzymatic activity by reducing temperature.
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- ▶ **Physical control of microbial loads, its chemical and enzymatic activity:**
- ▶ **Use heat (cooking, blanching, pasteurizing, sterilizing), ionizing irradiation or microwave heating.**
- ▶ **Cooking & pasteurization – incomplete inactivation.**
- ▶ **Thus need refrigeration in combination to preserve & increase shelf life.**
- ▶ **Need sterilization of the product.**
- ▶ **Sterilized products need packaging in metal cans or retort pouch before heat treatment**



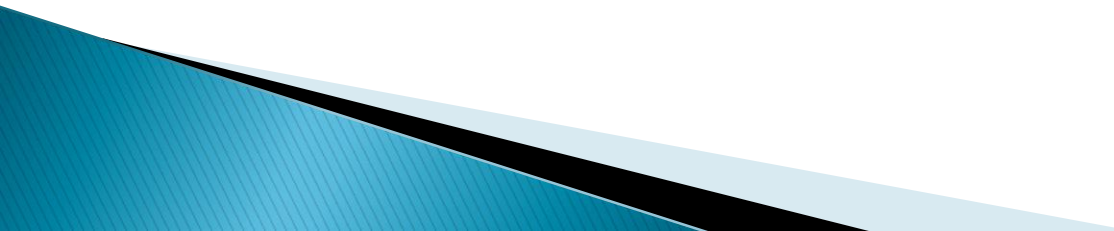
- ▶ **Chemical control of microbial activity and loads**
 - ▶ Addition of anti-microbial agents or decreasing fish muscle pH to levels that are inhibitory to microbial growth and proliferation.
 - ▶ Most bacteria stop multiplying at pH 4.5.
 - ▶ The decrease of pH is obtained by fermentation, marinades (vinegar, lemon, wine etc.) or by adding acids (acetic, citric, lactic acids etc.) to fish products.
 - ▶ In addition, fish fermenting lactic bacteria added.
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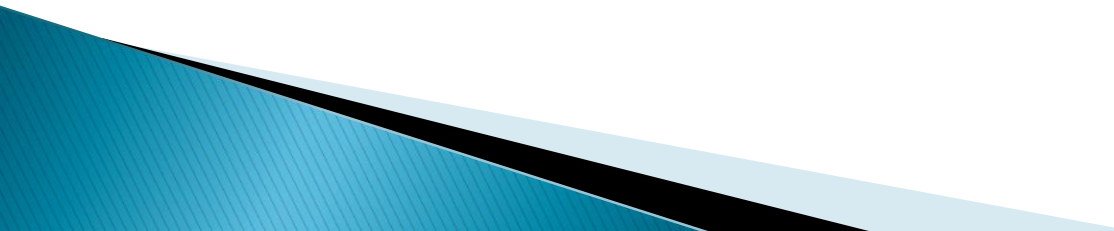
- ▶ Produce anti-microbial compounds such as nisin, which improve preservation.
- ▶ Bio-preservation using lactic acid bacteria, addition of preservatives eg. Nitrites, sulphites, benzoates etc.



- Pickling
- Pickling is an easy method of preserving fish. Pickled fish must be stored in the refrigerator at no higher than 40° F (refrigerator temperature), and for best flavor must be used within four to six weeks.
- Only a few species of fish are preserved commercially by pickling, but almost any type of fish may be pickled at home.
- **Refrigerate the fish during all stages of the pickling process.**
- Ingredients for Pickled Fish, Fish – Use only fresh, high quality fish.
- Water – Avoid hard water, as it causes off color and flavors.
- Vinegar – Use distilled, white vinegar with an acetic acid content of at least 5 percent (50 grains means the same thing). This percentage of acetic acid is needed to stop bacterial growth.
- Salt – Use high grade, pure canning or pickling salt. It does not contain calcium or magnesium compounds which may cause off color and flavors in pickled fish.



- ▶ **Control of the oxydo-reduction potential :**
 - ▶ Some spoilage bacteria and lipid oxidation require oxygen.
 - ▶ Reducing the oxygen around fish will increase its shelf life. Eg. vacuum packaging modifying the atmosphere (ratio of CO₂, O₂ & N₂)
 - ▶ This often combined with refrigeration for fish preservation.
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- ▶ **Combination of several preservation techniques :**
 - ▶ **To improve preservation.**
 - ▶ **pasteurization-refrigeration, CA (or MA)-refrigeration, salting-drying, salting-smoking, drying-smoking and salting-marinating.
multiple hurdle theory.**
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▶ **FISH PROCESSING :**

▶ **Methods of processing :**

- ▶ **i) Icing**
- ▶ **ii) Freezing**
- ▶ **iii) Curing**
- ▶ **iv) Canning**
- ▶ **v) Use of additives or chemicals**

- ▶ **Curing is preserving fish by means of salting, drying, smoking & pickling etc.**
- ▶ **A) Salting :** salt used as preservative.
- ▶ **Dry-salting: 1:7 (fish : salt)**

- ▶ **Kench salting** : used mainly for sardine, mackerel etc.
- ▶ **Brine salting** : mainly herring & anchovy.
- ▶ **B) Drying & dehydration:**
 - ▶ Removal of moisture by exposing to natural air
 - ▶ Is drying.
 - ▶ Dehydration is moisture removed by mechanical device.
 - ▶ Simple drying
 - ▶ Salt drying
- ▶ **C) Smoking**: preservation by smoke produced by burning fuel.

- ▶ Applying smoke to fish with the aid of salting, drying & heat treatment
 - ▶ Hot smoking
 - ▶ Cold smoking
 - ▶ Smoking & roasting
 - ▶ **D) Pickling :**
 - ▶ For making appetizer.
 - ▶ Semi-preservation as shelf life is short.
 - ▶ Used for home consumption.
 - ▶ **Canning :** heat treatment of fish in sealed container until product is fully sterilized.
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- ▶ **Fermentation : making of fish paste & fish sauce.**
- ▶ **The canned food fish is also prevented from**
- ▶ **contamination by pathogenic organisms by**
- ▶ **storing them in a virtually airtight package.**

