



Unit III - Topic 9
Canning

CANNING

Definition: Canning means, the preservation of food in permanent, hermetically sealed containers (of metal, glass, thermostable plastic, or a multilayered flexible pouch) through agency of heat. Heating is the principle factor to destroy the microorganisms and the permanent sealing is to prevent re-infection.

Containers for canned foods:

The container plays a vital role in food canning, it must be:

- 1-) Capable of being hermetically sealed to prevent entry of microorganisms.
- 2-) Impermeable to liquids and gases, including water vapour
- 3-) Maintain the state of biological stability (i.e, commercial sterility) that was induced by the thermal process alone or in combination with other chemical and physical processes.
- 4-) Physically protect the contents against damage during transportation, storage and distribution.

Can materials: Wide varieties of materials are used now for manufacture of cans for meat and poultry preservation. Yet metal containers remain the most frequent used package for canning foods. (a) Steel: Tinplate, tin-free steel, and nickel-plated steel coated with a very thin film of tin are the materials used to manufacture metal food cans. The amount of tin used being only about 1.5% of the can's weight and should not contain more than 1% lead. It is used to prevent rusting .

(I)Canning operation:

(A) Preparatory process

(1)Receiving and storage of raw materials:

(2) Preparation procedures (i)Thawing (ii) Boning, cutting and trimming On the trimming table where the inedible parts (such as bones, cartilages blood clots, skins and tendons together with the increased fat are removed. In fish,head,fins,scals and viscera also are removed

(B) Production processes

(i)Blanching: (parboiling) This is a heat treatment given to many foods prior to canning in hot water (100°C) for 1½-5 minutes, it may extend to 9-11 minutes in some types of fruit and vegetable. Blanching is significance to : Inactivates enzymes reaction, which may occur during preparation periods. Aids in cleaning. Expels internal gases. Aids in filling of containers by shrinkage or softening of the food. Assure adequate can vacuum. Destroys many vegetative microbial cells. Steam blanching is preferable than hot water.

(ii) Grinding:

Meat cuts of variable size and shape and with a variable fat content are ground to form uniform particles of fat and lean. Proper mixing of these particles is extremely important to obtain a uniform blend.

(iii) Mixing with addition of suitable ingredients:

Particles of fat and lean obtained by grinding are tumbled in a mixer to give a uniform distribution of fat and lean particles, and with suitable additions of required ingredients as salt, sodium nitrite, sugar, spices.



(iv) Filling of cans

The mix is then transferred to automatic piston-type filters and packed into the appropriate cans on the fill line with required weights. The head space volume or depth should be checked due to its critical factor in the attainment of an appropriate vacuum closure. Such process should be carefully controlled due to: a-) economic aspect b-) Efficiency of exhausting procedure. c) Rate of heat penetration.

(v) Exhausting and sealing:

Exhaustion or removal of air from the can before it is sealed, is necessary for the following reasons:

- 1-) To prevent expansion of the contents during processing which may force the seam.
- 2-) To produce concave can ends so that any internal pressure may be readily detected and the can rejected.
- 3-) To lower the amount of oxygen in the can and prevent discolouration of the food surface.
- 4-) To reduce chemical action between the food and container and hydrogen swells.
- 5-) To prevent internal corrosion of the cans.

Exhausting methods a) Thermal exhausting (Steam vacuum) (b) Mechanical exhausting: (machine vacuum)

(vi) Washing

After the cans are closed, they pass through a detergent spray washer to remove grease and other material. The washing should consist of hot water (66°C) then by suitable pre-rinse, detergent spray wash. Followed by a fresh warm water rinse (66°C).

(vii) Thermal processing: The cans must be processed (heat treated) immediately after closing (hermetic sealed) at suitable time and temperature. Food to be canned is threatened on the one hand by bacterial spoilage (if under processed) and on the other by danger of lower the nutritive quality by over heating. vegetative bacteria are killed at 80C/30min. Spore formers at a temp. 110C/30min. For destroying the spores 121C/3min. The total time required to sterilize canned food is largely depends on:

- a) Size of can.
- b) Processing temperature
- c) Rate of heat penetration at the center of the can.
- d) pH of the food
- e) The type and number of organisms present.

During processing, heat penetrates to the centre of the can by “conduction” and by “convection” currents. In solid meat packs, the heat diffuses by conduction and the process is therefore, slow, the convection current in loosely packed foodstuffs transfer heat faster

(viii) Cooling

Immediately after processing, the cans are cooled in water to a temperature of 36°C to 42°C. to avoid thermophilic spoilage or can rust. If the cans are cooled much below 36°C, they may not dry thoroughly and rusting well result. If the cans are cooled at temperatures much over 42°C, thermophilic spoilage may occur. only potable water, as defined in International Standards of Drinking Water (WHO) should be used in food handling or as an ingredient.

(ix) Container washing

Cans that have just been cooled are dirty and greasy on the outside, and are therefore washed in a bath with detergent and then rinsed to facilitate subsequent handling. (x) Container drying: Cooled cans should be immediately dried as the externally dry seams and closures are almost free from microbial infection. One method that has been found to be quite efficient is the heated bed drier, which rolls cans over a surface heated by steam to 127-130°C covered by an absorbent cloth. Contaminating bacteria are rapidly killed at these temperatures.



(xi) Outside lacquering

Commercial lacquer or enamel is a coloured varnish containing vegetable or synthetic resin. Lacquer may be applied to the outside of the can to prevent external corrosion. (xii) Testing of post-processed container
Processed cans should be incubated at, for example, 30°C for 14 days and/or 37°C for 10-14 days. In addition, if the product is intended to be distributed in areas of the world with tropical climate or is to be maintained at elevated temperatures containers should also be incubated at higher temperatures (5 days at 55°C). Since thermophiles may die during such incubation period, it is advisable to examine containers periodically for the evidence of gas production before the end of incubation

(xiii) Labeling and casing

a) Labeling: The role of a label is to inform. The information can be grouped as follow: Product identification (corned beef, beef stew, luncheon) and grade (fancy, choice, standard). Brand name, a distinctive name protected by trademark Net contents by weight or volume. List of ingredients including additives as per the appropriate regulation. Nutritional information. Country of origin if the product was not processed in the country in which it will be offered for sale. Production date and the shelf life should be clarified.