

CANNING

- **MODULE 1**

- **INTRODUCTION**



CANNING

- ✓ **Canning** is a method of preserving food by first sealing it in air-tight jars, cans or pouches, and then heating it to a temperature that destroys contaminating microorganisms that can either be of health or spoilage concern because of the danger posed by several spore-forming thermo-resistant microorganisms, such as *Clostridium botulinum* (the causative agent of botulism).



The process of canning is sometimes called **sterilization** because the heat treatment of the food eliminates all microorganisms that can spoil the food and those that are harmful to humans, including directly pathogenic bacteria and those that produce lethal toxins .



HOW CANNING PRESERVES FOODS

- **Fresh foods spoil or lose their quality for several reasons:**
 - ✓ growth of undesirable microorganisms-bacteria, molds, and yeasts,
 - ✓ activity of food enzymes,
 - ✓ reactions with oxygen,
 - ✓ moisture loss



HOW CANNING PRESERVES FOODS

- Proper canning practices include:
 - ✓ carefully selecting and washing fresh food,
 - ✓ peeling some fresh foods,
 - ✓ hot packing many foods,



HOW CANNING PRESERVES FOODS

- Proper canning practices include:
 - ✓ adding acids to some foods,
 - ✓ using acceptable jars and self-sealing lids,
 - ✓ processing jars in a boiling-water or pressure canner for the correct period of time.



HOW CANNING PRESERVES FOODS

CANNING=PRESERVATION BY HEAT

- ✓ Destroys microorganisms
- ✓ Inactivates enzymes
- ✓ Seals container to prevent recontamination



A can of preserved food



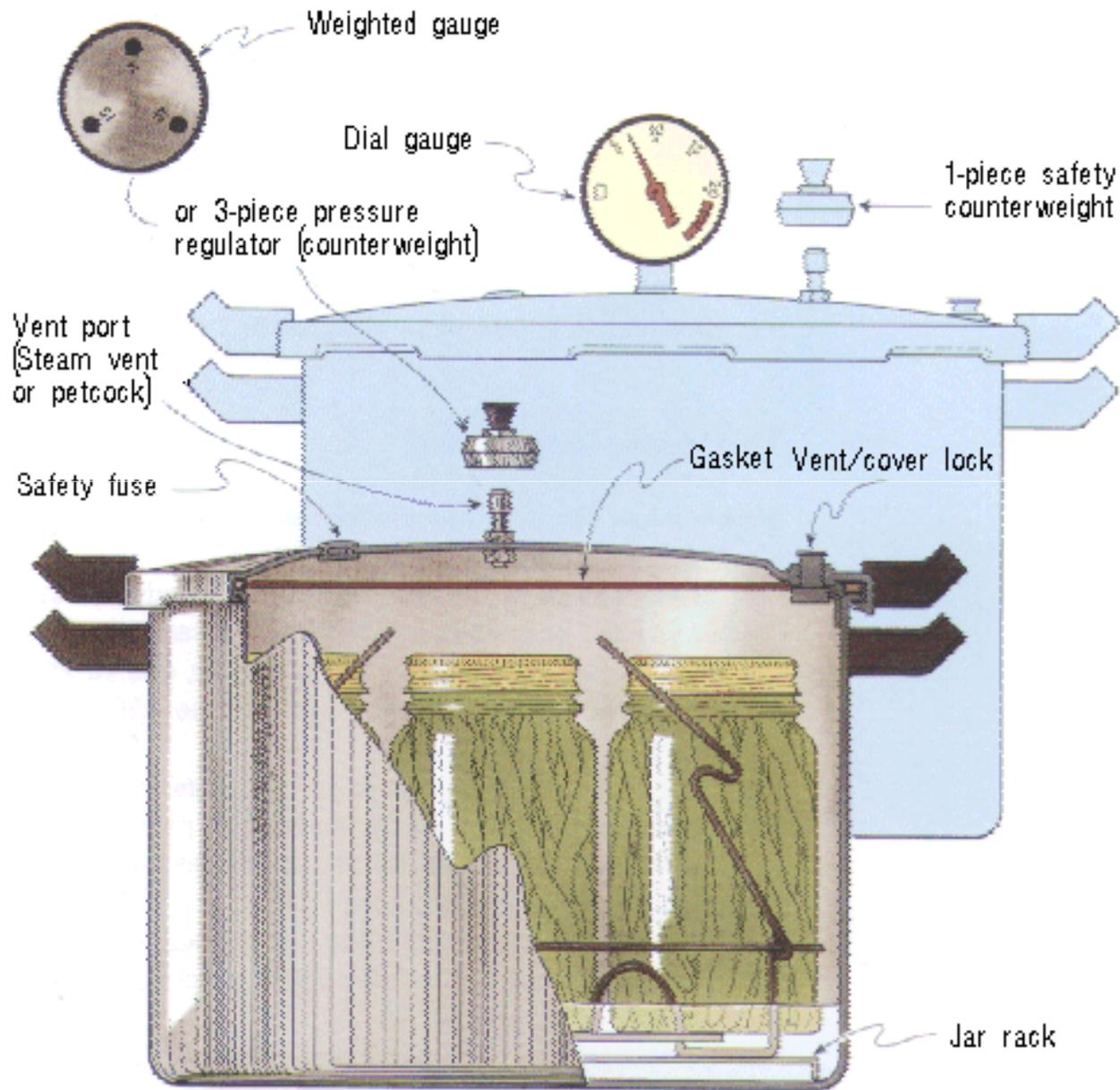
CANNING TYPES

PRESSURE CANNING

Foods with low acidity need sterilization by canning under conditions of both high temperature (116-130°C) and pressure.



PRESSURE CANNER



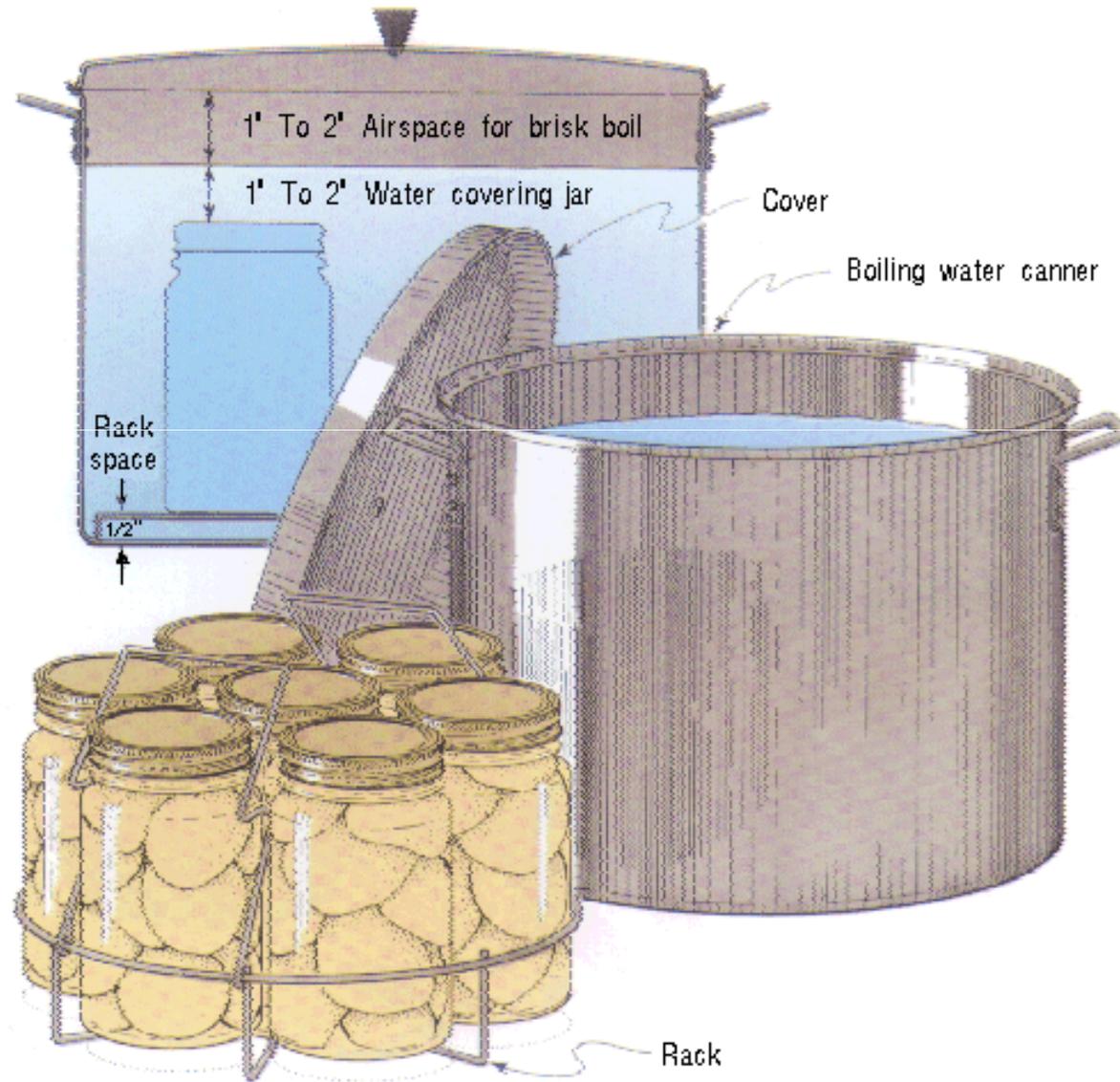
CANNING TYPES

WATER BATH CANNING

The only foods that may be safely canned in a boiling water bath (without high pressure) are highly acidic foods with a pH below 4.6



BOILING WATER BATH CANNER



ACID FOODS PH < 4.6

→ Fruits, pickled vegetables, or other foods to which acid has been added.

✓ Apples

✓ Oranges

✓ Peaches

✓ Strawberries

✓ Pears

✓ Sauerkraut, Pickles

✓ Blueberries

✓ Tomatoes



LOW ACID FOODS PH > 4.6

→ Include vegetables, meats, seafood, poultry, and dairy products.

✓ **Meat, fish**

✓ **Carrots**

✓ **Green beans**

✓ **Potatoes**

✓ **Peas**

✓ **Cabbage**

✓ **Corn**



CANNING TIME&TEMPERATURE DEPENDS ON;

- ✓ The physical state of the food
Acid, salt, sugar, starch, fat
- ✓ **Size of Pieces**
- ✓ **Consistency**
 - Convection heating in liquids
 - Conduction heating in solids
 - Combination of both



CANNING TIME & TEMPERATURE DEPENDS ON;

- ✓ **Fullness of pack**
- ✓ **Container size and material**
- ✓ **Initial temperature of food**
- ✓ **The heat resistance of microorganisms or enzymes likely to be present in the food**



EFFECTS OF CANNING ON FOODS

COLOUR

- The time–temperature combinations used in canning have effect on naturally occurring pigments in foods.
- In fruits and vegetables, chlorophyll is converted to pheophytin, carotenoids are isomerised from 5, 6-epoxides to less intensely coloured 5, 8-epoxides, and anthocyanins are degraded to brown pigments.
- Discolouration of canned foods during storage occurs, for example, when iron or tin react with anthocyanins to form a purple pigment, or when colourless leucoanthocyanins form pink anthocyanin complexes in some varieties of pears and quinces.



EFFECTS OF CANNING ON FOODS

FLAVOUR AND AROMA

- In canned meats there are complex changes, for example pyrolysis, deamination and decarboxylation of amino acids, degradation.
- In fruits and vegetables, changes are due to complex reactions which involve the degradation, recombination and volatilisation of aldehydes, ketones, sugars, lactones, amino acids and organic acids.



EFFECTS OF CANNING ON FOODS

TEXTURE OR VISCOSITY

- In canned meats, changes in texture are caused by coagulation and a loss of waterholding capacity of proteins, which produces shrinkage and stiffening of muscle tissues.
- The texture of solid fruit and vegetable pieces is softer than the unprocessed food due to solubilisation of pectic materials and a loss of cell turgor but is considerably firmer than canned products.



EFFECTS OF CANNING ON FOODS

NUTRITIONAL VALUE

- Canning causes the hydrolysis of carbohydrates and lipids, but these nutrients remain available and the nutritional value of the food is not affected.
- Proteins are coagulated and, in canned meats, losses of amino acids are 10–20%.
- Reductions in lysine content are proportional to the severity of heating but rarely exceed 25%.



EFFECTS OF CANNING ON FOODS

NUTRITIONAL VALUE

- The loss of tryptophan and, to a lesser extent, methionine, reduces the biological value of the proteins by 6–9%.
- Vitamin losses (Table 12.9) are mostly confined to thiamin (50–75%) and pantothenic acid (20–35%).
- In canned fruits and vegetables, significant losses may occur in all watersoluble vitamins, particularly ascorbic acid.



CANS ARE WIDELY USED TO PACK FOOD

- Predominantly, the cans are internally coated with a polymeric coating to prevent corrosion or food spoilage
- The most widely used lacquer types for food cans, where the food is retorted in the can to ensure preservation are:
 - ✓ **epoxyphenolic**
 - ✓ **organosol**



Altogether, about 25,000 million food cans are produced and filled in Europe per annum, about 20% of these having plain internal (unlacquered) tin-coated steel bodies. Worldwide, the total for food packaging is approximately 80,000 million cans.

