Food preservation by preservatives

- **Food preservatives:** are natural or synthetic substances which reduce the growth of undesirable microorganisms and do not affect the food quality.

- **<u>Preservatives must have the following properties: -</u>**

1- Have the ability to kill or inhibit M.O.
2- Not harmful to human health.

- **Food Preservation is done for three reasons:**
  1. To preserve the quality of food.
  2. To increase the shelf life of food for storage

- **<u>Types of Preservatives:</u>**

1- <u>Acids</u>:

- It is one of the most important factors which influence the tolerance of M.O.
- Preservation of acid food need low heat treatment while non-acid food need high heat treatment.
- It was found that change of pH toward acidity or alkalinity increase the percentage of death of M.O.

2- **Salt and sugar:**

- The addition of salts such as NaCl needed to prevent microbial growth is related to:

✓ pH.

✓ Water content.

✓ Types of M.O.

✓ Temperature.

✓ Chemical concentration of substrate.

- While the Sugar is one of the preservative materials that they kill microorganisms by lowering the **water activity (a_w).**

3- **Organic acids (**Ex. Benzoic acid)**:**

- It is one of the organic acids which is used in a small amount.
- Its effect is due to lowering the pH.

4- **Antimicrobial chemicals:**

➢ Are used in food in relatively small doses either to kill undesirable microorganisms or to prevent their growth.

➢ Example of antimicrobial agents: Curing agents that contain nitrite used to control growth and toxin production by *Clostridium botulinum in* heat-processed meat, poultry, and fish.

- The antimicrobials can be directly added into the product formulation, coated on its surface or incorporated into the packaging material.
- **Direct incorporation** of active agents onto food results in an **immediate but short-term** reduction of bacterial populations, while the **antimicrobial films** can maintain their activity for a **long period of time.**

Food Spoilage

- **Food spoilage:** can be defined as undesirable changes in the normal state of food and subsequently changes its quality.
- **These changes are due to a number of reasons such as:**

1) Growth and activities of microorganisms (bacteria, yeasts, and molds).

2) Activities of food enzymes and other chemical reactions within food itself.

3) Infestation by insects and rodents.

4) Inappropriate temperatures for a given food.

5) Either the gain or loss of moisture.

6) Reaction with oxygen.

7) Light.

- **Food is considered spoiled when it loses its acceptance qualities.**
- **The factors considered in judging the acceptance qualities of a food include:**

✓ Changes in color

✓ Nutrient loss

✓ Changes in Odor

✓ Changes in Texture

✓ Formation of slime

✓ Accumulation of gas (or foam)

✓ Accumulation of liquid (exudates).

❑ Spoilage of Meat and Meat Products

❖ **Meat is considered as a good media for M.O. because of:**

✓ High moisture.

✓ Neutral pH.

✓ High nutrient components (minerals, proteins, lipids, etc.).

The important source of contamination comes from external source during bleeding, handling and processing (skinning and cutting).

❖ Fresh meats from food animals and birds contain a large group of potential spoilage bacteria that include species of:

- *Pseudomonas,*
- *Acinetobacter,*
- *Moraxella,*
- *ShewanelIa,*
- *Aeromonas.*
- *Escherichia,*
- *Enterobacter,*
- *Micrococcus,*
- *Enterococcus,*
- *Lactobacillus,*
- *Leuconostoc,*
- *Clostridium,*
- *Proteus,*
- yeasts and molds

❑ Cutted meat is more favorable for M.O. because of cutting tissue increase the surface area and also excretion of meat juice.
❑ Number of bacteria should not be more than (5×10^6 cell/gm).
❑ Number of *E. coli* should not be more than (10-50 cell/gm).

Types of meat spoilage:

A- By bacteria:

1. Surface slime by:

1. *Pseudomonas.*
2. *Achromobacter.*
3. *Bacillus.*
4. *Micrococcus.*

2. Change color of meat by:

1. *Pseudomonas mephtica* (green spots).
2. *Pseudomonas syncynea* (blue spots).
3. *Serratia mercesence* (red spots).

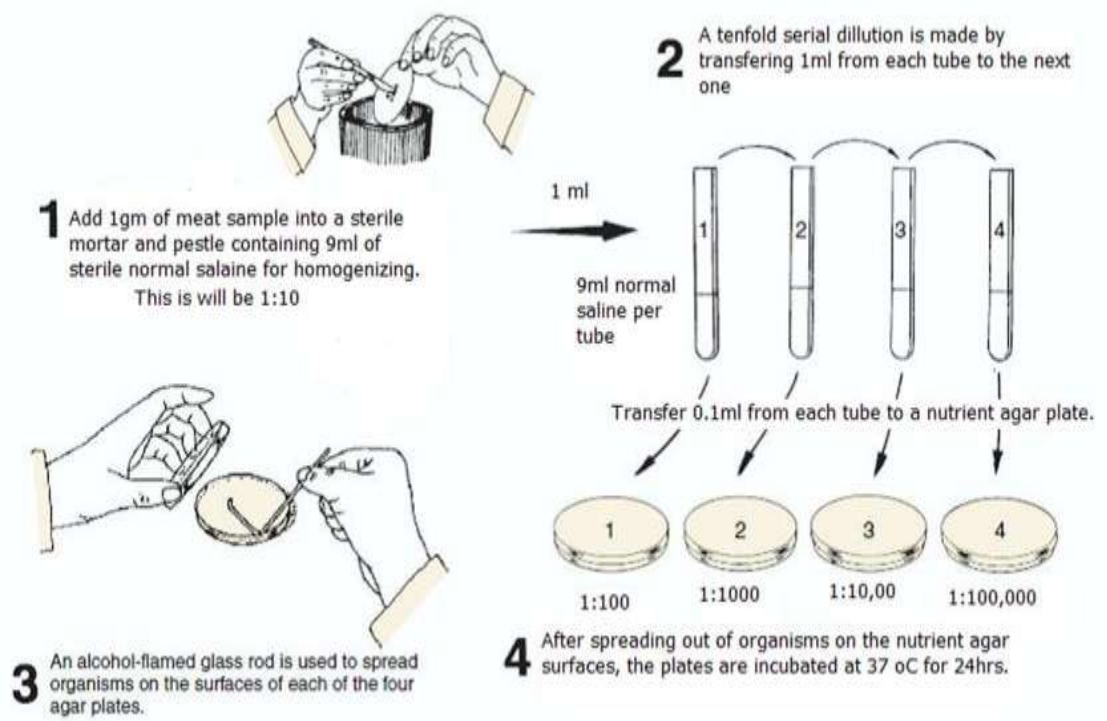
3. Rancidity (bad smell) by:

1. *Achromobacter.*
2. *Pseudomonas.*

B- Spoilage by mold:

1. Green spots *Pencillium expansum*.
2. Black spots *Cladosporium herbarium*.
3. White spots *Spirotrichum carnis*.

PROCEDURE:



5. Count the number of bacterial cell/gm of meat sample.