

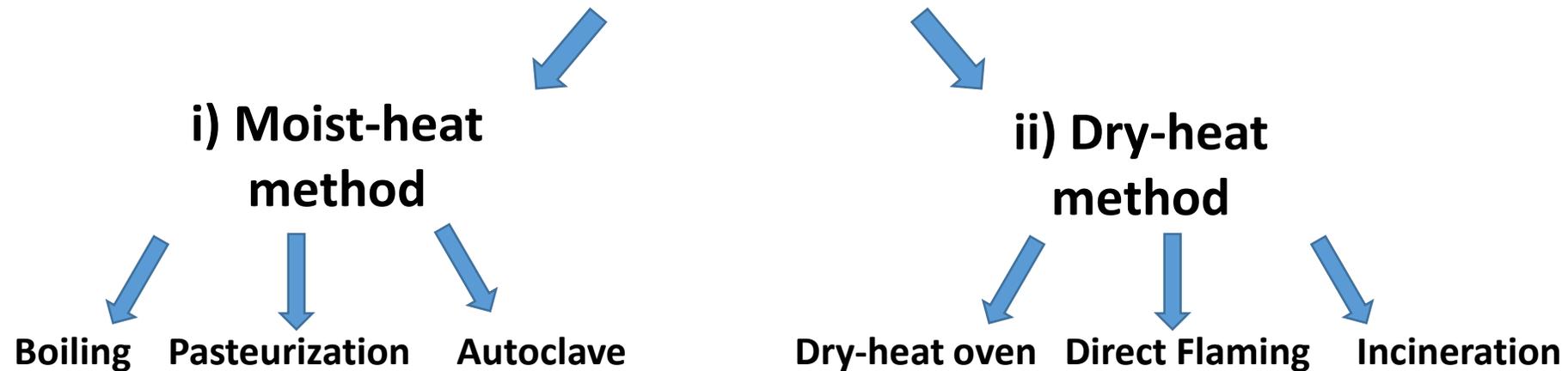
Physical methods of controlling microorganism

- 1. Heating (High Temperature)**
- 2. Low Temperature**
- 3. Radiation**
- 4. Filtration**
- 5. Desiccation or Drying**

1. Heating or high temperature

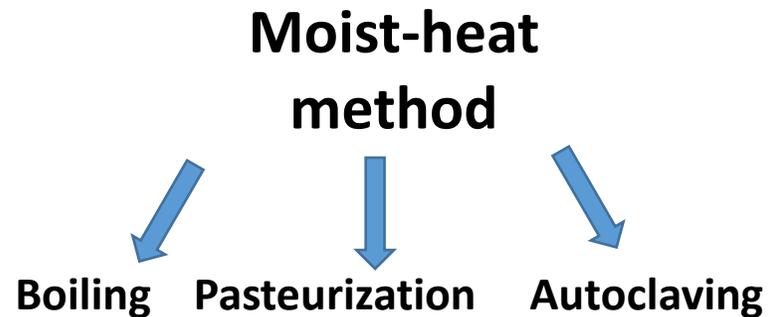
Heating or high temperature is one of the most common and oldest forms of microbial control methods because it is fast, reliable, inexpensive & nontoxic. Heat works by altering cell membranes and denaturing proteins /enzymes.

Heating



i) Moist-heat controlling

Moist-heat controlling : It is a high heat controlling technique in presence of moisture or water. It is typically the more effective protocol because it penetrates cells better than dry heat does.



a) Boiling:

- boiled at 100°C for 10 minutes.
- reduces or kills most microbes &
- inactivates most viruses, but does not destroy endospores.



b) Autoclaving:

- hot steam under pressure at 15-20 psi (Pounds per square inch)
- high temperature at 121°C for 15-20 minutes.
- destroys all microorganisms and endospores.



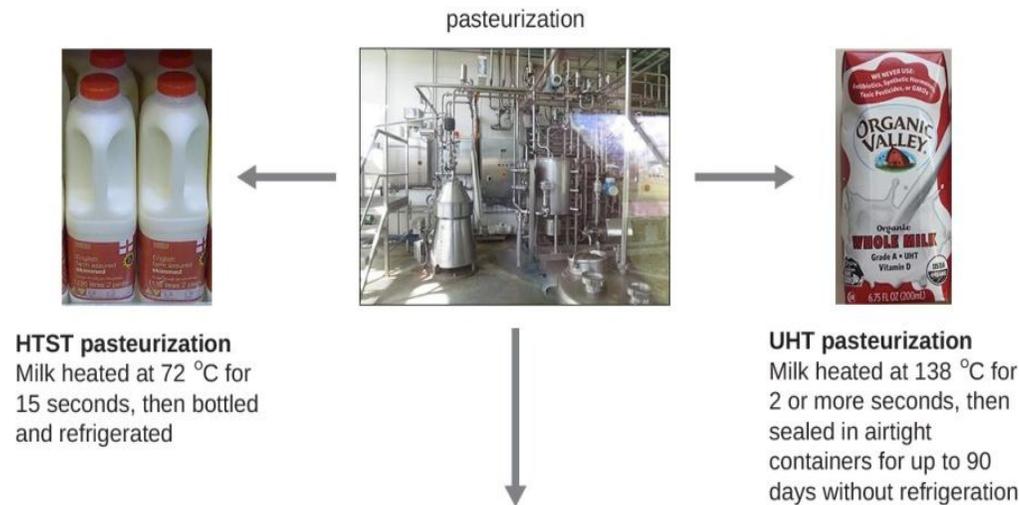
c) Pasteurization:

Pasteurization is a form of microbial control for food that uses a brief heat treatment followed by rapid cooling in a vacuum chamber. Developed by Louis Pasteur to prevent the spoilage of beverages. Used to kill pathogens and reduces the number of spoilage organisms in milk, juices, wine, beer while maintaining food quality, but does not sterilize.

Low Temperature Long Time (LTLT): Treated at 63°C- 65°C for 30 minutes

High Temperature Short Time (HTST): Treated at 72°C for 15 seconds

Ultra High Temperature Pasteurization (UHT): Treated at 138 - 140°C for 2- 3 seconds



Milkborne organisms killed by pasteurization: *Campylobacter jejuni*, *Coxiella Burnetii*, *Listeria monocytogenes*, *Escherichia coli* O157:H7, *Mycobacterium tuberculosis*, *M. paratuberculosis*, *Salmonella* spp., *Yersinia enterocolitica*

ii) Dry-heat sterilization

Dry-heat sterilization: Protocols use direct application of high heat on materials, such as sterilizing inoculating loops. Microorganisms are killed by oxidation effects.

a) Dry-heat oven or Hot air oven: Objects are placed in an oven and treated at 160-170°C for 2-3 hours for sterilization when moisture is undesirable. Dry heat is transferred less effectively to a cool body, than moist heat.



b) Direct Flaming: Used to sterilize inoculating loops and needles. The hottest part of a Bunsen burner flame reaches 1,870°C for flaming. The metal part is heated until it has a red glow to destroy any microorganisms on the loop.



c) Incineration (burning): Incineration is an effective way to destroy all microorganisms to sterilize disposable items (paper cups, dressings) and biological wastes at very high temperatures (800°C to 6500°C).

