

Time and Temperature

Bacteria

Bacteria are found almost anywhere and can grow in food. They can cause food spoilage or foodborne illnesses. They can not be seen with the naked eye; only with the aid of a microscope. Spoilage bacteria may leave an unpleasant odor, texture and/or appearance to food whereas pathogenic bacteria, which cause foodborne illnesses, may not. Therefore pathogenic bacteria usually go unnoticed in food by humans. Bacteria growth can be affected by such factors as nutrients, moisture, time and temperature. Favorable conditions can result in rapid bacteria growth in food to levels that can cause a serious foodborne illness; putting a consumers health and life at risk.

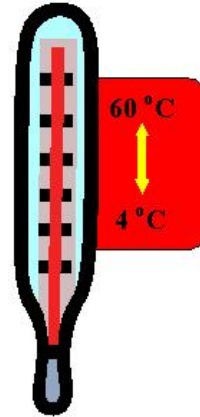
Bacteria grow by doubling; resulting in two bacteria for each one bacteria. Bacteria can therefore increase to significant numbers in a short period of time in favorable conditions, such as bacteria that are left in the “Temperature Danger Zone”.

Temperature Danger Zone

Bacteria grow best at a temperature range between 4 °C and 60 °C. The longer bacteria are exposed to the temperature danger zone the more bacteria that will grow, therefore time is also an essential factor in affecting the growth of bacteria.

Foods should not be exposed to the temperature danger zone at any point during handling, production and storage where bacterial numbers can increase to significant levels.

Temperature Danger Zone



Time and Temperature

A processing facility should have time and temperature controls in place to control the growth of pathogenic and spoilage bacteria. There are a number of temperature treatments that can be used:

1. Refrigeration

Refrigeration cools food to a temperature which slows the growth of bacteria, but like freezing does not kill them. Refrigeration is used for holding food, such as coolers, and to cold down processing areas.

2. Freezing

Freezing stops the growth of bacteria, but does not kill them. Once the product is thawed the bacteria can multiply under the right conditions resulting in high numbers which may lead to a foodborne illness.

3. Cooking

Adequately cooking food will ensure that harmful bacteria are destroyed, but some spores produced by spore forming bacteria can survive cooking and cooking may not inactivate some toxins produced by bacteria. The time and temperature requirements for cooking will depend on the food being treated and/or the bacteria being targeted.

4. Pasteurization

Pasteurization is the partial sterilization of food and beverages to kill harmful microorganisms by heating them at a moderately high temperature for a specific amount of time. The food or beverage is refrigerated after pasteurization. Pasteurization is used in the processing of beer, wine, milk, orange juice and cheese

5. Blanching

Blanching involves the emersion of food into boiling water for a brief period of time. This partial cooking of food inactivates naturally occurring enzymes in the food that may lead to spoilage. Following the blanching process the product is usually refrigerated.

6. Ultra High Temperature (UHT)

UHT is a method of pasteurization where food is exposed to a high temperature for a short period of time. This process increases the shelf-life of the food.

7. Thermal Processing

Although all heat treatments are considered thermal processing the term is usually applied to the specific process of canning and bottling food. The process involves exposing filled containers to a specific temperature for a specific amount of time. Thermally processed food is considered sterile (free from harmful microorganisms) and can be stored without refrigeration.

Thermometers

Thermometers are used to obtain a temperature reading of the inside of a product. Thermometers must be used and calibrated correctly to ensure their effectiveness. Thermometers should be properly washed and sanitized before use and in between uses.

To ensure an accurate reading from a thermometer the thermometer should be placed in the product with the sensor submerged in the thickest part of the product. Several temperatures should be taken in different areas of the product and if necessary the product should be stirred before taking a temperature reading. It is also important to ensure the temperature sensor/probe is not touching the bone or side of the container as this may lead to an inaccurate reading.

There are a variety of thermometers used in the food industry. Ensure that you use the appropriate thermometer for your product and operation.

References/Resources:

J. J. Keller & Associates, Inc. 2004. *Employee Food Safety Handbook*, 3rd Edition. Neenah, Wisconsin

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