

**You must** be able to know and understand the growth conditions for microorganisms and enzymes and the control of food spoilage. **You must** know and understand that bacteria, yeasts and moulds are microorganisms. **You must** demonstrate the knowledge and understanding of the positive use of microorganisms in food production such as moulds in the production of blue cheese or yeast as a raising agent in bread. **You should** be able to explain different sources of bacterial contamination. **You should** know the main types of bacteria that cause food poisoning. **You should** demonstrate knowledge and understanding of the main sources of food poisoning bacteria types and how it is controlled. **You should** be able to recognise the symptoms of food poisoning. **You should** demonstrate knowledge of temperature control and the danger zone temperatures.

**Key words:** bacteria, microorganism, enzymes, moulds, warmth, moisture, time, pH, oxidation, pathogens, food poisoning, cross contamination, food poisoning, Staphylococcus Aureus, Bacillus Cereus, Salmonella, Listeria E Coli, Clostridium Perfringens, Clostridium Botulinum, danger zone, high/low risk food, use by date, best before date, preservation.

**Key points:** Food spoilage is a natural process caused by bacteria, mould, fungi and yeasts. Once a food is picked, slaughtered, cooked or stored, microorganisms will start to cause decay and eventually make food unsafe to eat. This decay can happen more quickly when warmth, moisture and oxygen are present. How quickly a food will spoil determines its use by date. Bacterial contamination is the presence of harmful bacteria in our food, which can lead to food poisoning and illness. As a food handler, you must do everything possible to prevent this contamination. Pathogenic microorganisms cause food poisoning. Non-pathogenic microorganisms do not cause food poisoning. Microorganisms are used to make a wide range of food products. Moulds are used to make cheese, yoghurt is made by non-pathogenic bacteria and yeast is used to make bread. Yeast are tiny plants in the air which settle on food. Cross-contamination occurs when juices from raw meats or bacteria from unclean equipment touch cooked or ready-to-eat foods. Raw meat, poultry, and sea food should be kept at the bottom of a fridge in a sealed container. Hands should be washed in hot soapy water for 20 seconds before, during and after using high risk foods. Separate equipment should be used for raw and cooked food to avoid cross contamination.

**Food poisoning:** High risk foods that will spoil quickly are most likely to cause food poisoning because bacteria and other microorganisms can reproduce very quickly on it, i.e. they have the right conditions for growth nutrients (especially protein) and moisture. These foods need to be stored correctly before and after they have been cooked correctly. Examples of these foods are meat, fish, cream, eggs.

#### **Pathogenic bacteria examples:**

- Salmonella: found in raw and uncooked poultry and eggs, incubation period is 12-36 hours.
- E.coli: found in beef, dirty water. Incubation period is 12-24 hours.
- Listeria: found in soft cheese, unpasteurised salad vegetables, pate. Incubation period is 1-70 days.
- Staphylococcus aureus: found on people's hands, mouth, nose, skin. Incubation is 1-4 hours.

#### **Symptoms of food poisoning are:**

- abdominal pain
- nausea
- diarrhoea
- headache
- fever.

**Preparing and cooking food:** Bacteria can spread, and cross contamination can occur when juices from raw food or bacteria from unclean equipment transfer to cooked or ready-to-eat food. Raw meat, poultry and sea food should be kept on the bottom shelf of the fridge in a sealed container. The person cooking should follow personal hygiene rules by wearing a clean apron, making sure hair is tied back or that they are wearing a net. The area where food is being cooked should be clean by spraying the surface with antibacterial spray, making sure all equipment is clean. Separate utensils should be used for raw and cooked food, e.g. using a red chopping board for raw meat. High risk food should be cooked until 75°C using a food probe to ensure that pathogenic bacteria is killed. Food should be covered to protect from pests.

#### **Key temperatures:**

- 75°C: Cooked food temperature with a food probe, hot food holding temperature.
- 5-63°C: The danger zone in which bacteria multiply rapidly, the optimum 63°C or above conditions for growth.
- 0-5 °C: Chilled food temperature, bacteria multiply slowly.
- -18°C to -24°C: Freezer temperature and bacteria lie dormant.