



Activity 1 (p.74)

Fungi can be found in almost any environment, indoors or outdoors, and growth is stimulated by warm and humid conditions. In pairs, think of possible places in the food service facility where mould can be found.

Answer

- On the inside of the fridge.
- On any food which is left out for too long, e.g. bread, fruit and vegetables.
- In-between fridge door rubber seals.
- Cheeses.
- Drying racks.
- Wooden chopping boards.
- Piping bags, muslin cloths.
- Any areas where conditions are ideal.



Activity 2 (p.79)

Divide the class into 7 groups. Each group gets to explain one factor that influences the growth of micro-organisms with regard to: time, food, moisture, temperature, oxygen, pH and competition.

Answer

Time

In ideal conditions (in moist foods at 37 °C), bacteria will grow and multiply by dividing into two every 20 minutes.

Under ideal conditions, the growth of a population of bacteria occurs in several stages termed lag, log, stationary, and death.

Availability of food

In order to grow and multiply, micro-organisms need a constant supply of food. Foods high in protein and moisture will sustain micro-organisms. Foods which contain high concentrations of sugar, salt and acid will not support the growth of micro-organisms.

Certain organisms break down different food types.

- Lipolytic organisms break down fats and oils.
- Protolytic organisms break down proteins and amino acids.
- Saccharolytic organisms break down sugars and starches.

Micro-organisms with these characteristics contribute to the spoilage of food with a high fat, protein, sugar and starch content respectively. Foods that support bacterial growth are most likely to cause food poisoning and are known as high-risk foods.

Moisture

Bacteria are made up of about 80–90% water. They require moisture to grow because they obtain most of their nutrients from their aqueous environment.

Most foods naturally contain sufficient moisture to provide bacteria with the water they need in order to grow. Where moisture has been deliberately removed (in dehydrated foods such as milk powder, soup mixes, etc.), bacteria will not grow whilst the food remains dry, but once water is added, then bacterial growth will be encouraged.

Temperature

Temperature can be used to eliminate or control the growth of micro-organisms. Heat treatments (pasteurisation or sterilisation) eliminate contaminating micro-organisms via the application of heat for a specific time period (time and temperatures used being dependent upon the target organism). Refrigeration of a food can prevent spoilage by controlling the growth of thermophilic or mesophilic organisms. Most pathogens are capable of growth at refrigeration temperatures and therefore cannot be controlled via refrigeration alone. Some, for example listeria, can grow at very low temperatures.

Availability of oxygen

All micro-organisms require oxygen for all metabolic processes. Some micro-organisms differ. Pathogens vary in their oxygen requirements. Those which require oxygen are called aerobes. Those which do not need oxygen are called anaerobes. A third kind of organism is adaptable and releases energy for its own use either in the presence or absence of oxygen. Those which will grow or survive with or without oxygen are known as facultative anaerobes and include *salmonella* species and *Staphylococcus aureus*.

pH surrounding bacteria

Like temperature, pH also plays a role in determining the ability of bacteria to grow or thrive in particular environments. Most commonly, bacteria grow optimally within a narrow range of pH, between 6.7 and 7.5. The acidity or alkalinity of foods will affect bacterial growth. Most bacteria like neutral conditions (pH value of 7) and will not grow in foods with a pH below 4.5, although if pathogens are introduced into an acid food, they may not necessarily die off immediately and could still cause illness. Organisms that live in these conditions are known as neutrophiles.

Competition

Where there are a number of different bacteria present in food, they compete for the same nutrients. Pathogens are often not as competitive as spoilage bacteria and, unless present in high numbers, will usually die.



Activity 3 (p.81)

Give definitions for the following words:

Antibiotic
Disinfectant
Sterilisation

Answer

Antibiotic

An antibiotic is a metabolic product produced by one micro-organism that inhibits or kills other micro-organisms (e.g. penicillin).

Disinfectant

Disinfection refers to any physical process or application of any chemical that will kill the growing (vegetative) microbial cells. These processes need not kill or inactivate endospores.

Sterilisation

Sterilisation refers to any process that destroys or removes all infectious organisms including endospores and viruses.



Activity 5 (p.92)

Stephanie Smith, a children's dance instructor, thought she had a stomach virus. The aches and cramping were tolerable that first day, and she finished her classes. Then her diarrhoea turned bloody. Her kidneys shut down. Seizures knocked her unconscious. The convulsions grew so relentless that doctors had to put her in a coma for nine weeks. When she emerged, she could no longer walk. The affliction had ravaged her nervous system and left her paralysed.

Ms. Smith, 22, was found to have a severe form of food-borne illness caused by *E. coli*, which Minnesota officials traced to the hamburger that her mother had grilled for their Sunday dinner in early fall 2007.

Ms. Smith's reaction to the virulent strain of *E. coli* was extreme, but tracing the story of her burger, through interviews and government and corporate records obtained by The New York Times, shows why eating ground beef is still a gamble. Neither the system meant to make the meat safe, nor the meat itself, is what consumers have been led to believe.

Extract from:

The Burger That Shattered Her Life

By MICHAEL MOSS

Published: October 3, 2009

If they were to go back and retrace their steps, what do you think could be the causes of the food poisoning?

Answer

If we eat food which contains harmful micro-organisms, chemicals or toxins (poisons), that food can make us sick. To describe our illness, we can use the terms food-borne illness, food-borne disease, or food poisoning.



Activity 5 (p.92)

Question

After knowing all this information, how do you think one can prevent food poisoning?

Answer

- Wash your hands and clean any dishes or utensils when you are making or serving food.
- Keep juices from meat, poultry, and seafood away from ready-to-eat foods.
- Cook foods to proper temperatures.
- Promptly refrigerate any food you will not be eating right away.
- Boil water before drinking.
- Don't eat raw vegetables or unpeeled fruit.
- Always refrigerate fish.
- Don't eat fish caught during blooms of poison plankton.
- Don't eat shellfish exposed to red tides.