



Spoilage and Micro-organisms

Keywords and definitions:

Artificial additive: produced chemically and *not* copies of natural substances

Blanching: peeled and sliced fruits / vegetables are plunged into boiling water. The intense temperature will prevent enzyme action

Curds: a soft white substance when milk sours – used for cheese making

Enzymic browning: A chemical process where oxygen and enzymes react, causing food to go brown. It cannot be reversed

Micro-Organisms: The ones most commonly used / found in food are Yeast, Mould, Bacteria

Natural additive: obtained from natural sources such as extracts

Rennet: is an enzyme produced from vegetarian sources

Spores: a bacterium that has produced a string, protective outer coating.

Starter Culture: a bacteria mix used to ripen milk and help start the cheese making process

Synthetic additive: man-made copies of natural substances

Toxins: poisons that can cause illness

Whey: The watery part of milk that is left after curds are formed.

Signs of Food Spoilage:

Food Spoilage is a natural process caused by bacteria, moulds, enzymes and yeast. Food spoilage happens more quickly in warm, moist conditions. The signs of food spoilage are:

- Discolouration
- Changes in texture – wrinkly, slimy, lumpy, hard, sloppy
- Visible mould
- Unpleasant odour
- Changes in flavour – e.g. sour milk
- Can and jar lids have been “blown” out due to microorganisms producing gases in the jar / can.

Enzymes:

Enzymes are protein molecules that control chemical reactions in food. They are found in plants and animals and are inactive until food is either harvested or slaughtered. Once enzymes are activated, they can cause unwanted or undesirable changes in food such as colour, an example of this is enzymic browning.

Enzymes also turn starch into sugars in fruits, helping them ripen.

Enzyme action can be prevented and controlled by:

- A heat treatment such as blanching
- Coating the sliced fruit / vegetables in an acid such as lemon juice



Bacteria:

Bacteria are small single-celled organisms. They can only be seen under a microscope. They reproduce very quickly by splitting in 2 every 20 minutes (approximately). Best growth conditions are:

- Moisture – Warmth (37°C is best) – A food Supply – Oxygen (for some bacteria)

Bacteria produce toxins which can be harmful to humans causing food poisoning. To prevent and control bacteria production:

- Store food in the fridge between 0°C and 5°C
- Cooked foods (that are not going to be eaten) should be cooled and stored at the above temperature within 90 minutes
- Leftover food should only be reheated once – more than once and the bacteria will multiply into dangerous levels.

Bacteria in cheese and yoghurt production:

- Milk is heat treated and cooled
- Specific bacteria called a starter culture is added to the milk
- The culture “ripens”, fermenting the lactose into lactic acid
- FOR MILK: Rennet is added once enough lactic acid has formed, helping coagulate the mixture into curds and whey. The whey is drained and the curds are “scalded”. Cheese is pressed to remove any whey and set its final shape. It is then left to mature.
- FOR YOUGHURT: the fermentation process allows the milk to coagulate. Sugar, sweetener, or fruit are added. It is chilled and packaged.

Additives:

Additives are added to foods to perform a specific function. They can be Natural, Synthetic or Artificial. There are lots of different types of additives, depending on their function:

- **Preservatives** prevent microbial growth which causes food spoilage. This can extend shelf life, examples are nitrite (E249) and nitrate (E252) added to ham and bacon.
- **Colours** restore the original colour of food that has been lost through processing or storage. Some colour additives have been linked to hyperactivity in children.
- **Flavour enhancers** bring out the natural flavour in some processed foods
- **Sweeteners** are used to make a product sweeter, especially in drinks and diet foods.
- **Anti-caking agents** are used to prevent dry food e.g. flour from sticking together
- **Emulsifiers** help mix ingredients together that normally would not stay together like in mayonnaise
- **Stabilisers** prevent ingredients from separating
- **Gelling agents** are used to change the consistency of a food product. An example is Pectin (E440) which is used in jam.

Yeast:

Yeast is widely used in the production of bread and some alcoholic drinks such as beer. Yeast is anaerobic, meaning it does not need oxygen to reproduce.

Yeast cells will reproduce with the following conditions:

- Water / liquid
- A food supply (e.g. a little sugar)
- time
- A warm environment

To prevent and control yeast production:

- Keep yeast cold so that they are inactive or dormant
- Keep dried / fresh yeast away from moisture
- Yeast is killed at high temperatures (100°C and above)

Mould:

- Moulds are small plants that can grow on many types of foods. They have threads that grow up and roots that grow down to absorb the nutrients in the food.
- They have a fuzzy appearance and are a type of fungi. They will often be blue/green, white or black in colour.
- They reproduce by producing spores which travel in the air, and will grow on other things if the conditions are correct.
- Some moulds are considered harmless and used in the production of cheese e.g. Danish Blue.
- To prevent mould growth; store suitable foods in the fridge or in a cool dry place, managing the temperature. Cook to a high temperature to destroy heat resistant spores.