

**Food & Nutrition**

**Year 10 Summative Assessment**

**Revision Knowledge Organiser  
Booklet**

# MEAT

Meat is the flesh and organs of an animal that is used for food

Meat that has been labelled British has to come from animals which have been bred, born, reared and slaughtered in Britain.



## Animal Welfare

Animal welfare refers to the well-being of the animal. It gives assurance that the animal has been reared without any pain, injury or disease, has plenty of shelter and comfort, and access to clean water and healthy food.



## Beef

Beef is the meat obtained from cows. It comes in many forms such as joints for roasting, steaks for quick cooking, and mince for frying.



## Veal

Is the meat from young male cows,

Other meats - Goat, Rabbit, Horse, Venison

## Pork



Pork is the meat obtained from pigs. It comes in many forms such as gammon joints, bacon rashers, and roasting joints such as leg.

## Meat from Sheep



**Lamb** - young sheep under 1 year

**Hoggart** - sheep older than 1 year

**Mutton** - an older sheep

## Offal



Offal is the name given to the edible organs of an animal such as kidneys, lungs, heart, liver and tongue.

## Nutrition

Meat and meat products are a good source of:  
Protein - Fat - Vitamins A & D, Iron & Zinc

## Marinades

Used to tenderise and flavour meat before cooking. Usually acidic (lemon/vinegar) along with herbs and spices.

## Cooking meat products

We need to cook meat:

- To make it safe to eat
- To make it tender
- To make it easier to digest
- To improve the colour
- To improve the flavour

Some types such as steak require quick cooking. Some such as beef brisket require long, slow cooking due to the amount of collagen to be broken down to help the meat become tender.

## The effect of heat on meat and fish

The proteins **coagulate** when heat is applied. At 60°C the proteins begin to change their shape and structure - **denaturation**.

## Methods of cooking



- **Grilling** - suitable for bacon, chops, steak.
- **Roasting** - larger joints such as pork leg.
- **Braising** - a moist method suitable for brisket or lamb shanks.
- **Stewing** - a moist and slow method suitable for oxtail.

## Fat content of meat

Meat and meat products can be high in **saturated fat**. There are many ways to reduce the saturated fat content of meat:

- Trim off visible fat
- Dry fry
- Grill
- Choose leaner cuts
- Skim fat off stews

Portion Size - we should eat around 80g as a portion.

## What happens when meat is cooked

When meat is cooked many chemical and physical changes occur that affect sensory attributes.

- Changes in colour - browning - **Maillard affect**
- Proteins shrink and lose moisture
- Connective tissue softens/collagen melts - making the meat more tender
- The fat melts or renders
- The flavour enhances

## Safe storage and preparation of meat

Raw meat should be prepared on a **RED** chopping board and cooked meat should be cut on a **YELLOW** board.

Raw meat should be stored at the bottom of a fridge (below 5°C) or in a freezer (-18°C).



Name:

Date:

# Food commodities: Red meat and poultry

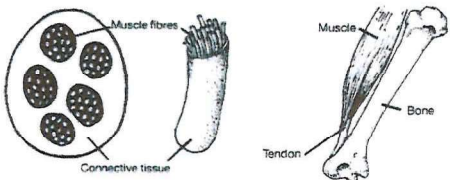


## Livestock farming

- There are more than 10 million cattle, 5 million pigs, over 33 million sheep and 182 million livestock birds in the UK.
- Pigs are generally reared by specialist pig farmers, with 50% of pig production being outdoors.
- In the UK, cattle and sheep graze outdoors in the summer; however, many are housed in sheds during the winter to protect them from bad weather.
- The health and welfare of all animals is a top priority for livestock farmers, as well as sustainability.
- Farmers manage and maintain the countryside including hedgerows and field boundaries, which are habitat for wildlife.
- Grazing cattle and sheep play an important part in managing our natural grasslands.

## What is meat?

- Lean meat is the muscle tissue of animals which is made up of bundles of muscle fibres held together by creamy white connective tissue. Tendons join the muscle to the bones of the animal.
- Connective tissue is made up of two proteins called collagen and elastin.
- Two different types of fat can be found in meat, visible and invisible.
- The colour of meat varies due to the red protein called myoglobin and some haemoglobin remaining in the muscles. Exposure to oxygen increases the red colour of meat.
- Lean meat comprises water, protein, fats, vitamins, and minerals.



For more information, go to: <https://bit.ly/3yLkfbq>

## Preparing & storing meat

- Food preservation is important to increase the shelf life of products including meat. Shelf life depends on water; acidity; hygienic handling; methods of preservation.
- Meat changes colour during food preparation when the pigment myoglobin changes.
- Meat should be stored in sealed containers on the bottom shelf of the fridge.
- Chicken must not be washed before cooking as this can increase the risk of food poisoning from campylobacter bacteria, as the bacteria can be spread around the sink area and work surfaces.
- When cooking chicken and poultry, there should be no pink meat and the juices should run clear when cooked.

## Tenderising meat

The tenderness of meat can be increased by:

- Physical action e.g. mincing, chopping or separating the muscle fibres with a meat hammer.
- Chemical tenderising (marinating): mixing the meat with an acid such as lemon juice or vinegar before cooking or adding acids or tomatoes to the cooking liquid can help to tenderise the meat by breaking down some of the collagen. Powdered artificial tenderisers are concentrated enzymes which break down proteins into amino acids by breaking the structure of the meat. This can also be done by using the leaves of certain trees and the juices of some fruits such as pineapples and papaya.

## Cooking meat

There are three main methods of heat transfer normally used for cooking meat - convection; conduction; radiation.

- Convection is where currents of hot air or hot liquid transfer the heat energy to the food, e.g., roasting.
- Conduction is where heat is transferred through solid objects by the vibration of heated molecules, e.g., stir frying.
- Radiation is where heat is transferred from a heat source in the form of rays which travel quickly in straight lines, e.g., grilling.

## Meat types and cuts

- Meat is available to buy in the form of cuts, joints or mince. It is also available ready prepared, e.g., sausages, ham, burgers.
- The variety of cuts of meat available to the consumer provide choice, are convenient to prepare, simple to store and easy to cook.
- Different cuts of meat have different characteristics, e.g., energy and nutrients, composition, weight, size and appearance.
- Because of where the cut of meat comes from on the animal, different cuts require different cooking methods, e.g., slow (casserole), quicker (stir-fry).
- To add choice and variety, pork is cured e.g., bacon, and offal is available to be used in a range of popular dishes, e.g., liver, kidney.
- Types of poultry meat include chicken, turkey, duck, goose and game birds e.g., pheasants and partridges.
- Portion sizes (per person/adult):
  - Steak 175g raw and 130g cooked;
  - Mince 125g raw and 100g cooked;
  - Sausages 114g raw and 90g cooked;
  - Chicken breast 160g raw and 120g cooked.
- It is recommended that we do not have more than about 70g of cooked red or processed meat a day (about 500g per week).

## Meat and poultry nutrition

Meat and poultry are good sources of protein as well as different vitamins and minerals.

- Poultry, such as chicken, provides B vitamins, phosphorus and selenium and can be low in fat if you choose chicken breast without skin.
- Red meats like beef, lamb and pork provide B vitamins, phosphorus, potassium and zinc. Meat is one of the main sources of vitamin B12 in the diet. Beef is a source of iron and pork a source of selenium. Red meat can be high in saturated fat, but you can reduce this by choosing lean cuts and cutting off any extra fat.
- Game is also rich in protein and many B vitamins. Game birds such as pheasant and grouse are high in vitamins B3, B6 and B12; both are also sources of iron and selenium. Venison (deer) is also high in four B vitamins, as well as iron, copper, and zinc. Game meats are also typically lower in saturated fats than many other meat options.

## Key terms

**Curing:** A preservation process that removes moisture from meat.

**Gelatine:** A protein formed from the hydrolysis of collagen. It has the capacity to hold water molecules in a gel matrix. Used to set sweet and savoury jellies.

**Haemoglobin:** A component of red blood cells that contains iron. Its function is to carry oxygen around the body in the blood.

**Iron:** A mineral element that is essential in the diet to make red blood cells that carry oxygen to the tissues.

**Muscle fibres:** Are made up of cells which contain proteins actin and myosin.

**Myoglobin:** A component of muscle tissue that contains iron. Its function is to bind and store oxygen that the muscles can use when it is needed.

**Offal:** The collective name for the internal parts of the animal that we eat.

**Preservation:** The process of extending the shelf-life of a food product by inhibiting the growth of micro-organisms.

**Protein:** A component of food that is made up of amino acids.

**Tenderising:** To apply a process or substance that breaks down the connective tissue found in meat.

**Traceability:** A system to track food through the stages of production, processing and distribution.

## Traceability and food labels

- Farm animals (cattle, sheep and pigs) wear eartags to ensure traceability.
- The eartag number of an animal is linked to its own passport, which details information of parentage, birth and all movements the animal undertakes up to slaughter.
- Assurance schemes certify traceability (or what farm it came from), high production standards and care for our environment and wildlife. These include Red Tractor and RSPCA.
- The food label shows the country of slaughter, country of origin, handling information, accreditation, product safety information.

## Tasks

1. Research the UK livestock industry and explain how farmers are working towards producing meat in a more sustainable way.
2. Research recipes to find some examples of the use of tenderisers in meat cookery. Explain how the ingredients help to make the meat more tender.



Egg Farming	Description
<b>Barn</b>	<ul style="list-style-type: none"> <li>hens can move around the barn</li> <li>amount of light and feed are controlled</li> </ul>
<b>Battery/Caged</b>	<ul style="list-style-type: none"> <li>hens kept in cages indoors</li> <li>light, temperature and feed are controlled</li> <li>cheapest form of egg production</li> </ul>
<b>Free-range</b>	<ul style="list-style-type: none"> <li>hens have access to outside and can roam freely</li> <li>live in hen houses at night to protect them from predators</li> </ul>
<b>Organic</b>	<ul style="list-style-type: none"> <li>hens live on organic land</li> <li>fed with organic food</li> <li>farms are inspected regularly to maintain organic certificate</li> <li>most expensive form of egg production</li> </ul>

### Cooking Methods

- baking
- frying
- scrambling
- poaching
- boiling

### Storage

At room temperature (20°C or below) or in the fridge, away from strong-smelling foods.

### Pasturised Eggs

- Eggs are washed, sanitised and separated into sterilised containers.
- Yolk and white are combined and strained before heating then rapidly cooled.
- Available as dried, whole, white or yolk.

### Eggs

#### Egg Printing/Labelling

##### Origin Country

Where the hen laid the egg.

##### Lion Mark

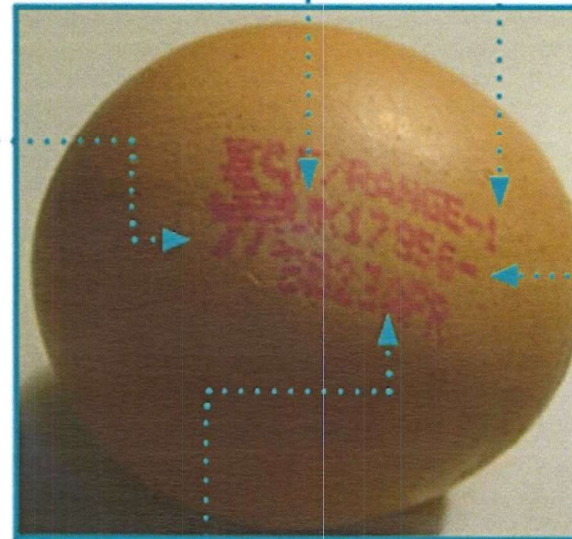
A stamp to indicate the hen has been vaccinated against salmonella.

##### Composition

10% shell  
60% white  
30% yolk

##### Nutrition

13% protein  
75% water  
12% fat



##### Farming Methods

0 = organic  
1 = free-range  
2 = barn

##### Best Before

The date before which the egg is at its best quality.

##### Farming Identification Number

Each farm is registered for traceability and to identify exactly where the egg was produced.

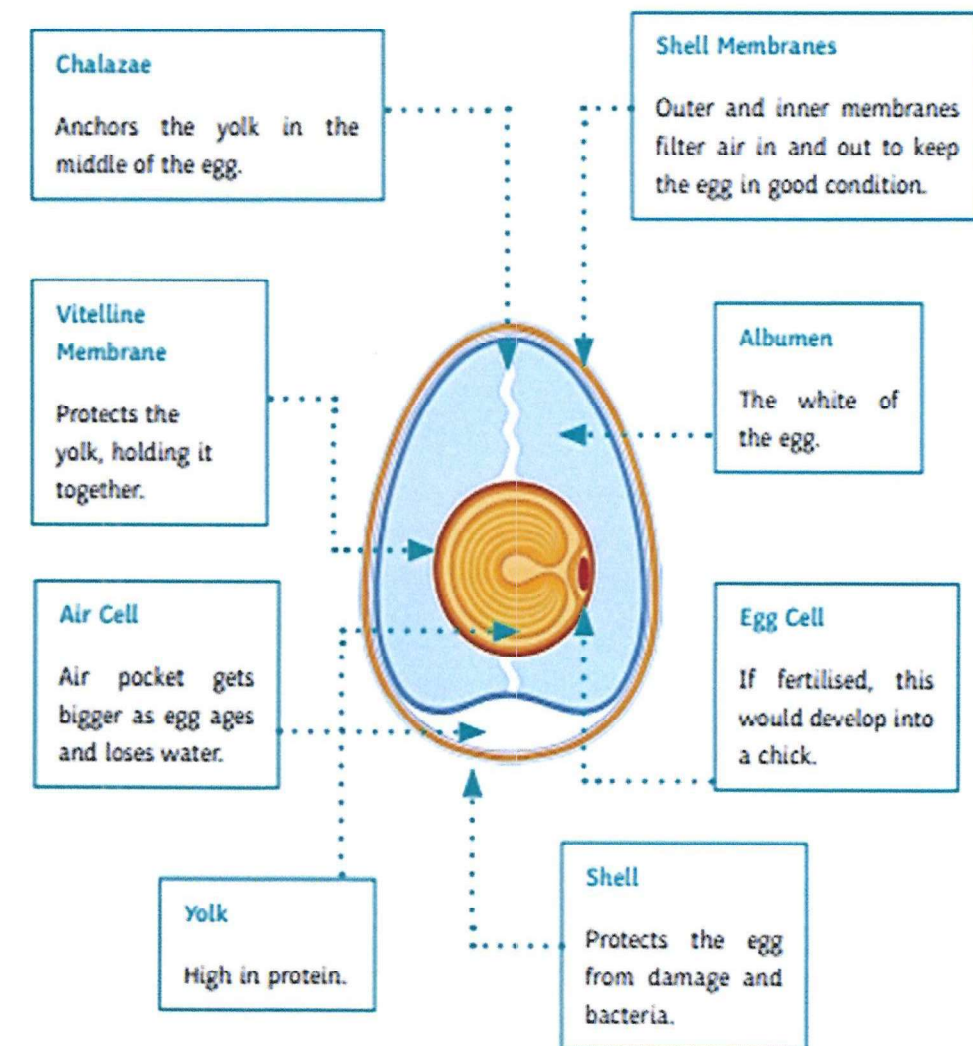
### Allergy Information

People can be allergic to all egg forms or specific egg dishes (such as quiches), part-cooked or raw (mousses).  
Egg alternatives are available from health food shops, but have limited nutritional value.



Function	Description	Example
<b>Aeration</b>	Adding air into a mixture.	mousse, soufflé, sponge, meringue
<b>Binding</b>	When exposed to heat, eggs coagulate to hold mixtures together.	burgers, stuffing, fish cakes
<b>Coating</b>	Dipping food into an egg wash before heating allows the coating to stick after coagulating.	fish cakes, battered fish, scotch eggs
<b>Emulsifying</b>	Holds oil and water together.	mayonnaise, cake mixture
<b>Enriching</b>	Adds a richer flavour and more nutrients.	custard, mash potato, milk puddings
<b>Garnish</b>	Adds colour and texture to a dish.	salads
<b>Glazing</b>	Beaten egg brushed over a product will turn golden brown when cooked.	scones, pastry dishes, bread
<b>Thickening</b>	When exposed to heat, eggs coagulate and thicken the mixture.	custard, sauces, soups

### Structure of the Egg





# Food commodities: Dairy

## Dairy farming

- There are thousands of dairy farms in the UK. The farming techniques and the size of dairy farms differ around the UK. Although different feed, housing and milking parlours may be used, the health and welfare of the dairy cows remains the highest priority for farmers.
- Dairy farms are mainly based in the western half of Britain where the warm, wet climate is ideal for grass growth.
- In the UK most cows eat grass during the summer and silage (dried grass or maize) in the winter. This is usually supplemented with dry feeds such as cereals and protein feeds to ensure they have a nutritionally balanced diet. Animal nutritionists help plan special diets for them.
- Dairy cows eat 25-50kg of food a day and drink around 60 litres of water.
- A dairy cow needs to give birth to a calf to produce milk. A cow is milked 2-3 times a day and can produce around 22 litres of milk a day.
- Holstein-Friesian cows, which are black and white, are the most common type of dairy cow in the UK.
- Cows wear ear tags so they can be identified and are a unique passport. Traceability from the farm is important when producing food.
- After milking, the milk is chilled and stored, ready to be taken away to be processed by the dairy.
- Farmers use modern technology to help manage their farm which includes systems to monitor individual cow's movements and milk yield, robotic milking systems, and satellite-controlled tractors.

## The farm environment

- Throughout the year, the farmer will maintain the fields, gateways, fences, and hedgerows to help protect and enhance the environment.
- Cow manure known as slurry is spread on the land as an excellent source of nutrients and reduces the need for chemical fertilisers.
- The carbon footprint of milk produced in the UK is nearly a third lower than the global average.

## Farm assurance and standards

- The Red Tractor symbol on packaging helps consumers know that the milk and dairy foods have been produced according to the high standards of the Assured Dairy Farms scheme.



## Processing milk

- After the milk is delivered to the dairy it is pasteurised. Pasteurisation is a process used to kill harmful microorganisms, such as certain pathogenic bacteria, yeasts and moulds, which may be present in the milk.
- Pasteurisation involves heating the milk to a temperature of no less than 71.7°C for 25 seconds. This process extends the shelf life of milk and is known as High Temperature Short Time (HTST).
- The milk is then cooled for packing, labelling, storage, transportation and then distributed to retailers.
- Homogenisation of milk involves it being pumped at very high pressures through narrow tubes, breaking up the fat globules in order for these to disperse through the liquid. Most milk available to purchase is homogenised.
- Sterilisation is a process that destroys all micro-organisms present in a food. It uses a temperature more than 100°C. Sterilising enables milk to be kept for months unopened and unrefrigerated, but may result in a burnt, caramelised flavour and browning.
- Ultra-heat treatment (UHT) destroys all micro-organisms in the food without causing as much damage to the product as sterilisation. Typical temperatures are 130°C-150°C for 1-3 seconds.

## Types and nutrition of milk

There are several different types of milk available for consumers to buy. The fat content of cow's milk will vary according to the type:

- Whole milk contains 3.5%
- Semi-skimmed milk 1.7%
- Skimmed milk is 0.1-0.3%

Dairy foods provide protein, calcium, B vitamins and iodine.

Dairy alternative milks include oat, soy, coconut, almond. Choose those that are fortified with calcium and ideally other vitamins and minerals.

Other types of milk:

- Evaporated milk – is heated to reduce the liquid content
- Condensed milk – is evaporated milk that has had sugar added
- Dried milk powder – is heated to dry the milk and remove the water

## Types of cheeses

There are over 750 different cheeses produced in Britain today. Here are some examples:

- Hard e.g. West Country Cheddar
- Semi-hard e.g. Wensleydale
- Soft e.g. Cornish Brie
- Blue e.g. Blue Stilton

For more information, go to: [bit.ly/3ucDIFr](http://bit.ly/3ucDIFr)

## Processing yogurt

- The milk is pasteurised and homogenised. A starter culture (harmless bacteria) is then added, and the bacteria will ferment the lactose (sugar) in the milk to produce lactic acid.
- The lactic acid fermentation process allows the milk proteins to coagulate and set producing sharp, tangy flavoured 'natural' yogurt.
- Sugar, sweetener, pieces of fruit and/or fruit flavouring are added to the yogurt either before or after the fermentation stage. It is then packaged and chilled.

## Processing cheese

- Pasteurisation - the first stage in the process is the pasteurisation of the milk.
- Curdling - a starter culture, similar to freeze dried natural yogurt, is then added to the pasteurised milk. This begins to acidify the milk and allows the bacteria to grow and begin fermentation. Rennet is added so the milk curdles and separates into curds and whey. It is then drained on cooling tables.
- Cheddaring - as the liquid is drained off a solid mass is created, called curd mats, which are cut into sections, piled on top of each other and turned regularly. Salt is added to preserve it and to prevent the cheese from going rancid during the maturing process. It is then stored in a cool room to ripen.
- Whey - the liquid from curdling, known as whey, is further processed where cream is removed called 'whey cream' and made into butter. Protein is also extracted from the whey for different ingredients and commonly used as a protein supplement. In addition, lactose (a sugar in the milk) is removed from the water and used in the food industry and for animal feed.

## Tasks

- Explain in detail pasteurisation and the importance of this to ensure food is safe to consume.
- Research 5 different types of cheeses and explain how and where they are made.

## Key terms

**Cheddaring:** A secondary process in making cheese.

**Curds:** A solid product formed during cheesemaking, through coagulation.

**Lactose:** A sugar present in milk. Lactose is a disaccharide (galactose in chemical combination with glucose).

**Milking parlour:** A building where cows are milked on a dairy farm.

**Milking:** The primary process in making dairy products.

**Pasteurisation:** The process of heating food to kill most food spoilage organisms and pathogenic organisms, e.g., milk.

**Rennet:** A mixture of enzymes in cheese production. Makes the milk 'curdle'.

**Sterilisation:** The severe heating of food to kill all micro-organisms, e.g., sterilised milk.

**Traceability:** A system to track food through the stages of production, processing and distribution.

**Ultra-heat treatment (UHT):** The heating of food to kill or inactivate all micro-organisms without causing damage to the product, e.g., UHT milk.

**Whey:** The liquid remaining after the curds have been separated from the milk.



## Dairy Sources

Cow, sheep,



## Alternative Sources

Rice, soya, oat, almond



## 4.8% Carbohydrate

In the form of



What is a benefit of Soya milk?



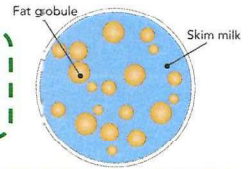
## Vitamins & Minerals

A good source of calcium, phosphorus and vitamin A.  
Low in B vitamins

About  
85%  
Water

Remember  
there is no  
fibre in milk

**Milk is an emulsion**— tiny globules of fat floating in water



## Dairy products:

Butter, Ice-cream, Bio drinks, yogurt drinks



Yakult is not a yoghurt; it is a fermented skimmed milk drink containing gut friendly bacteria

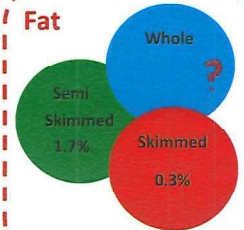
## Eatwell Guide

Milk, cheese, yoghurt and fromage frais are good sources of protein and some vitamins, and they're also an important source of calcium, which helps keep our bones strong.

Try to go for lower fat and lower sugar products where possible, like 1% fat milk, reduced-fat cheese or plain low-fat yoghurt.



## Fat



## 3.5% Protein

H B V  
proteins which are needed for growth and the repair and maintenance of all body cells.

## Yogurt

Similar nutritional value to milk. Can be high in sugar.  
Taste and texture are brought about by harmless bacterial cultures.



**Icelandic Skyr**- Cultured dairy product. It contains more protein and 1/3 less sugar than regular yogurt.



## Cream

Cream	% Fat
Single	18
Crème Fraiche	30
Whipping	35
Double	48
Clotted	55

Production: Involves the separation of fat from milk through **centrifugation**.

Which cream would you use for piping and why?



## Processing

**Pasteurisation**—milk is heated to 75 °C for 25 seconds and then very quickly cooled to below 5 °C.

**Sterilisation**—milk is heated to 110 °C–130 °C for 10–30 mins. 6 month shelf-life but flavour is altered.

**UHT**—milk is heated to about 135 °C for 1–2 seconds before being sealed into tetra-pak packaging. Once opened refrigerate.



**Dried**— 12 month shelf-life, **reconstitute** with water

**Evaporated**— water is removed.

**Condensed**— water removed and sugar added

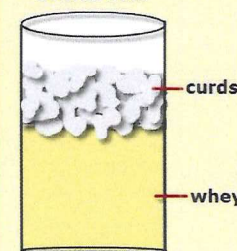


? ..... Fat globules are broken up to ensure an even consistency.

## Effects of Cooking

**Heat coagulates** some proteins e.g. skin on milk  
**Acid** causes milk to curdle. The **casein** starts to clump together- this is the basis for making cheese.

## Soured Milk



## Cheese Manufacture

1. Starter culture add
2. **Rennet** (Enzyme)
3. Curds are formed and cut
4. **Whey** is drained
5. **Curd** is pressed
6. Wrapped & stored to develop flavour



## Effect of Heat on Cheese

It melts making it spreadable & stringy. Too much heat will burn the protein making it tough and hard and more difficult to digest.

**Cheese:** Contains: HBV protein, fat, calcium, Vit A some B vitamins.

**Hard Cheese:**

**Soft Cheese:**



**Blue:**

**Fresh:** *Mozzarella, Ricotta, cream cheese..*





## Wheat

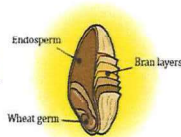
Wheat is a good source of starchy carbohydrate, found in the endosperm.

It is also a good source of protein and provides us

with a range of vitamins and minerals. If the wheat still has the bran it will provide dietary fibre in the form of non starch polysaccharides (NSP). B vitamins are found in the bran layers. Flour sold in the UK is fortified with calcium, iron and B vitamins.

Each grain of wheat has three distinct parts.

1. Bran layers - the coarse outer.
2. Wheat germ - a new plant would grow from this part.
3. Endosperm (the starchy store of food which the germ feeds on while it grows).



## Coeliac disease

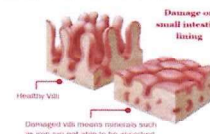
Coeliac disease is an autoimmune condition. This is where the immune system – the body's defence against infection – mistakenly attacks healthy tissue.

In coeliac disease, the immune system mistakes substances found inside gluten as a threat to the body and attacks them.

This damages the surface of the small bowel (intestines), disrupting the body's ability to absorb nutrients from food.

Gluten is found in wheat, barley and rye.

Symptoms can include: fatigue, diarrhoea, abdominal pain, indigestion, vomiting, bloating and itchy rashes.



## Cereal grains and uses

**Wheat** - Wheat flour, pasta, bread, cakes.

**Barley** - Vinegar, beer, pearl barley.

**Rye** - Rye bread, Ryvita, rye beer.

**Rice** - rice cakes, rice noodle, rice milk.

**Maize (corn)** - Popcorn, corn chips, corn flour.

**Oats** - Flapjack, porridge, oat milk.

Others include; sorghum, quinoa, millet.

## Bread making stages

**Mixing** - Ingredients are mixed together and combined.

**Kneading** - During kneading, two proteins (gliadin and glutenin) become hydrated and when the dough is kneaded an elastic protein called gluten is formed. Gluten gives the bread structure.

**Proving** - Fermentation of the yeast takes place and CO<sub>2</sub> is produced allowing the bread to rise.

**Knocking back** - This removes any large bubbles of CO<sub>2</sub> to give an even texture and better rise.

**Shaping** - Bread is shaped as desired.

**Proving** - A further prove increases the rise.

**Baking** - The heat of the oven causes more CO<sub>2</sub> to be produced as the yeast ferments. The gluten traps the CO<sub>2</sub>. The heat eventually kills the yeast. The starch in the flour swells and the structure of the bread is produced.

## Rice

Rice is a widely consumed staple food for a large part of the world. There are many different types of rice grown and used in cooking. Rice is categorised into long or short grain.

### Long grain

**Brown long grain**—nutty flavour and nutritionally the most complete rice. A versatile rice.

**Basmati rice**—flagrant flavour and aroma, used in Indian cuisine.

### Short grain

**Arborio rice**—Italian rice used to make risotto.

**Pudding rice**—used in desserts as its starchy qualities make for a smooth creamy finish.

## Ingredient functions in bread

**Flour**—adds bulk, gluten helps from structure, absorbs water, provides flavour and nutrition.

**Liquid**—Moisture allows yeast to grow. Turns to steam when baked to help the rise.

**Yeast**—Needs warmth, moisture, food and time to produce CO<sub>2</sub>.

**Salt**—improves taste, controls the yeast, aids gluten formation.

**Fat**—Gives a short texture, improves colour and flavour.

## Nutritional value of rice

**White rice** is about 90% carbohydrate, 8%protein and 2% fat and is a good source of iron and B vitamins. It is low in fibre.

**Brown rice** is a whole grain. It is about 85% carbohydrate, 8% protein and 7% fat. It has four times as much fibre as white rice and more minerals. It is a good source of B vitamins.

**Beri beri** is a common deficiency disease in developing countries caused by a lack of Vitamin B1 (thiamine).

## Key vocabulary

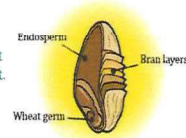
Cereal	An edible grass.
Endosperm	The main part of the grain, a starch and protein supply.
Germ	Source of fat and B vitamins, it is where the new plant grows.
Staple foods	Food that forms a large part of the diet, usually from starchy foods.
Whole grain	100% of the grain, nothing has been removed.
Primary processing	The conversion of raw materials into food commodities e.g. milling of wheat grain into flour.
Secondary processing	Converting primary processed foods into other food products e.g. flour into biscuits.
Fortification	Adding vitamins and minerals to foods.
Gelatinisation	The thickening of a mixture, in the presence of heat, due to swelling of starch grains.
Gluten	Formed from the whole wheat proteins gliadin and glutenin, in presence of water. Gluten is developed by kneading.



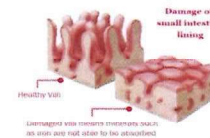
## Wheat

Each grain of wheat has three distinct parts.

1. Bran layers - the coarse outer.
2. Wheat germ - a new plant would grow from this part.
3. Endosperm (the starchy store of food which the germ feeds on while it grows).



## Coeliac disease



## Cereal grains and uses

## Bread making stages

## Rice

## Key vocabulary

Cereal	
Endosperm	
Germ	
Staple foods	
Whole grain	
Primary processing	
Secondary processing	
Fortification	
Gelatinisation	
Gluten	

## Ingredient functions in bread

## Nutritional value of rice

**Key words:**

**Conduction:** transferring heat through a solid object into food

**Convection:** transferring heat through a liquid or air into food

**Radiation:** transferring heat by infra-red waves which heat up what they come into contact with food

**Conduction:**

Atoms in metal pans and baking trays start vibrating as heat energy from cooker goes into metal. Vibrations transfer heat energy to other metal atoms.

Metal gradually heats up and passes heat energy to food. Metals are good conductors of heat.

**Convection**

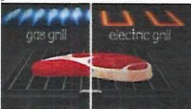
When a pan of water is heated, heat is conducted through the metal pan to water molecules. These move upwards then downwards in circular motion (convection currents) taking heat energy with them and passing it into the food. The more heat energy, the faster the water molecules move in circular convection currents. Also happens in oven with hot air currents. Gas oven/ordinary electric oven have zones of heat: hotter at top than bottom shelf due to convection. Electric fan ovens – heat evenly distributed by fan – same temperature on each shelf.

**Radiation**

Grilled/barbecued food heated by radiant heat. Infrared heat rays heat the surface of the food and are absorbed. Food must be no more than 3.5cm thick otherwise may be undercooked inside which could be a food poisoning risk. Food must not be too close to grill or it may burn easily.

**Why is food cooked?**

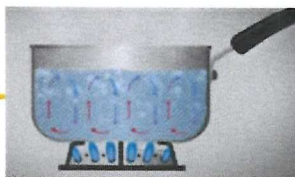
- **To make food safe to eat** – Some foods must be thoroughly cooked to destroy the food poisoning bacteria they could contain. – Some foods contain natural toxins (poisons) which would be harmful if the food was eaten raw e.g. raw red kidney beans. Cooking destroys the toxins and makes the food safe to eat.
- **To develop flavours in the food** – Cooking develops flavour by causing chemical reactions to take place in the food e.g. gelatinisation and intensifying flavour by causing water to evaporate
- **To improve the texture and appearance of food**, and make it easier to eat, swallow and digest. Cooking causes starch granules to swell, gelatinise and thicken or soften a food. Cooking softens the structure of the cells in vegetables to make them less bulky and easier to eat – Cooking tenderises meat. This means the cooking process softens the meat so that it is easy to chew and digest.
- **To improve the shelf life** of food – Cooking destroys harmful micro-organisms such as bacteria and moulds, which preserves the food (makes the food last longer)
- **To give people a variety of foods in their diet** – Foods can be cooked in different ways to give variety, for example, eggs can be fried, soft or hard boiled, scrambled, poached, used in quiches, eggs Benedict.

Dry heat	Moist (in liquid)	In oil
Baking in oven	Boiling: Cooking food in water at 100°C	Roasting: In oven in hot fat
Grilling/toasting	Simmering: Cooking food in small quantities of liquid at just under boiling point.	Saut�eing: Pan frying in hot fat
Dry frying in no added oil	Stewing: slow-cooking on hob or in slow-cooker with liquid	Stir frying in little fat over high heat
	Poaching: Cooking in water	Deep fat frying
	Steaming: Cooking food over boiling water.	Shallow frying: Frying in a small amount of oil
	Braising: Slow-cooking <b>pre-sealed</b> meat + veg. in oven with liquid	
Other		
Induction cooking		Micro waving

**Heat Insulators**

These are used to protect us from burning ourselves when cooking. E.g.

- Pan handles are plastic or wood making them comfortable to hold
- Hollowed metal pan handles allow the air to protect them from becoming too hot
- Wooden and silicone utensils protect us.
- Use insulated pan stands made from wood, cork, ceramics or metal to protect work surfaces
- Wearing oven gloves because these are made of thick,

**Retaining water soluble vitamins: B and C**

- Do not prepare veg too far in advance; vitamin C will be exposed to oxygen and lost when it is cut or peeled.
- Put veg. into a small amount of boiling water so they cook quickly; vitamin C and B vitamins will be lost in the water.
- Cook all veg. for the minimum amount of time to minimise the damage by heat to vitamin C and B vitamins.
- Steaming veg will reduce the loss of vitamin C and B vitamins to cooking water.
- Serve the vegetable cooking water in the gravy to conserve some of the vitamins that have gone into it.
- Do not prepare fruit too far in advance, to preserve the vitamin C. Add lemon juice to prevent enzymic browning and add acid to help stabilise vitamin C (ascorbic acid).
- Keep the fruit cold and in a box to minimise its exposure to oxygen and conserve the vitamin C





## SCIENCE OF COOKING FOOD

### Raising Agents

- **Whisking:** whisking eggs to trap air and creating a foam, used for meringues and soufflés
- **Sieving:** Sieving will trap air, used for cakes and bread
- **Rubbing in:** Rubbing fat in to flour with add some air, used for cakes and biscuits
- **Creaming:** Mixing fat and sugar together traps air, used for cakes
- **Laminating:** Layers of fat in pastry will trap air when cooked, used for puff and flaky pastry

### WHY DO WE COOK FOOD?

- To kill bacteria
- To make it easier to eat and digestible
- To improve the sensory attributes
- Adds variety
- To enable ingredients to perform their function

### Acids & alkalis

- **Acids:** can soften connective tissue such as lemon juice or vinegar in a marinade. Can also be used to preserve foods by pickling.
- **Alkalis:** Bicarbonate of soda is used as a raising agent. Mixed with cream of tartar creates 'Baking powder'

### Radiation



The transfer of heat by electromagnetic radiation.  
Example: Grilling or BBQ

### Conduction



The transfer of heat by direct contact. Example: Frying

### Convection



The transfer of heat via mass movement of particles.  
Example: Boiling, Poaching

### Effect of heat on foods

- **Protein:** proteins denature (unravel) and coagulate. When protein and carbohydrate are heated the maillard effect occurs which turns meat products brown
- **Fat:** Fat melts and becomes soft, this is called plasticity. Fats can also brown adding flavour and colour.
- **Carbohydrate—starch:** When starch and liquid are heated gelatinisation occurs which makes the starch swell, used to thicken sauces. When direct heat is applied to starch Dextrinization occurs turning the food brown and crisp.
- **Carbohydrate—sugar:** When heat is applied to sugar caramelisation occurs which turns the sugar brown and in some cases will go crisp



### Oxygen and Food

- Fruit and vegetables when contact with oxygen is made, this is called enzymic browning
- Meat that comes in to contact with oxygen will turn brown, this is a discolouration of the myoglobin
- Fats and oils that come in to contact with oxygen will go rancid where it develops an unpleasant odour and flavour.



### Dry Cooking Methods

Roasting	Cooked in the dry heat of the oven and basted with hot fat
Baking	Cooked in the dry heat of the oven
Grilling	Cooked by the radiant heat of a hot grill

### Frying Methods

Stir Fry	Cooked quickly over intense heat in a wok with little oil
Shallow Frying	Cooked in a shallow pan with hot fat
Deep Frying	Cooked submerged in very hot oil

### Moist cooking Methods

Boiling	Cooked quickly in boiling water
Poaching	Cooked in gentle simmering water
Stewing	Cooked gentle and slow in liquid

**EMULSION:** a stable mixture of liquids that will not freely combine that has been forced together.  
Resource author: AGBFOODTEACH  
create an emulsion. Example Mayonnaise





Name:

Date:

# Micronutrients

**Micronutrients** are needed in the body in tiny amounts. They do not provide energy, but are required for a number of important processes in the body.

There are two main groups of micronutrients:

- vitamins;
- minerals and trace elements.

Micronutrients are measured in milligrams (mg) and micrograms (µg) with 1mg = 0.001g and 1µg = 0.001mg.

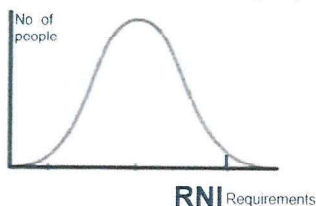
**Micronutrient recommendations**  
People have different requirements for each micronutrient, according to their:

- age;
- gender;
- physiological state (e.g. pregnancy).

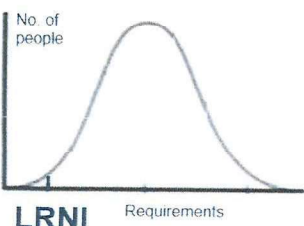


## Micronutrient recommendations

The recommendations for vitamins and minerals are based on the **Reference Nutrient Intake (RNI)**.



When looking at low intakes of micronutrients, the **Lower Reference Nutrient Intake (LRNI)** is used.



For more information, go to: <https://bit.ly/36KUnji>

## Vitamins

Vitamins are nutrients required by the body in small amounts, for a variety of essential processes.

Most vitamins cannot be made by the body, so need to be provided in the diet.

Vitamins are grouped into:

- fat-soluble vitamins (vitamins A, D, E and K);
- water-soluble vitamins (B vitamins and vitamin C).

## Minerals

Minerals are inorganic substances required by the body in small amounts for a variety of different functions.

The body requires different amounts for each mineral.

Some minerals are required in larger amounts, while others are needed in very small amounts and are called 'trace elements'.

## Vitamins

Nutrient	Function	Sources
<b>Vitamin A</b>	Helps the immune system to work as it should and with vision.	Liver, cheese, eggs, dark green leafy vegetables and orange-coloured fruits and vegetables.
<b>B vitamins</b>	Thiamin, riboflavin, niacin, folate, and vitamin B12 have a range of functions within the body.	Different for each B Vitamin.
<b>Vitamin C</b>	Helps to protect cells from damage and with the formation of collagen.	Fruit (especially citrus fruits), green vegetables, peppers and tomatoes.
<b>Vitamin D</b>	Helps the body to absorb calcium & helps to keep bones strong.	Oily fish, eggs, fortified breakfast cereals and fat spreads.
<b>Vitamin E</b>	Helps to protect the cells in our bodies against damage.	Vegetable and seed oils, nuts and seeds, avocados and olives.
<b>Vitamin K</b>	Needed for the normal clotting of blood and is required for normal bone structure.	Green vegetables and some oils (rapeseed, olive and soya oil).

## Minerals

Nutrient	Function	Sources
<b>Calcium</b>	Helps to build and maintain strong bones and teeth.	Dairy, calcium-fortified dairy-alternatives, canned fish (where soft bones are eaten) and bread.
<b>Iron</b>	Helps to make red blood cells, which carry oxygen around the body.	Offal, red meat, beans, pulses, nuts and seeds, fish, quinoa, wholemeal bread and dried fruit.
<b>Phosphorus</b>	Helps to build strong bones and teeth and helps to release energy from food.	Red meat, poultry, fish, milk, cheese, yogurt, eggs, bread and wholegrains.
<b>Sodium</b>	Helps regulate the water content in the body.	Very small amounts found in foods. Often added as salt.
<b>Fluoride</b>	Helps with the formation of strong teeth and reduce the risk of tooth decay.	Tap water, tea (and toothpaste).
<b>Potassium</b>	Helps regulate the water content in the body and maintain a normal blood pressure.	Some fruit and vegetables, dried fruit, poultry, red meat, fish, milk and wholegrain breakfast cereals.
<b>Iodine</b>	Helps to make thyroid hormones. It also helps the brain to function normally.	Milk, yogurt, cheese, fish, shellfish and eggs.

## Key terms

**Micronutrients:** Nutrients needed in the diet in very small amounts.

**Lower Reference Nutrient Intake (LRNI):** Is the amount of a nutrient that is enough for only the small number of people who have low requirements (2.5%). The majority of people need more.

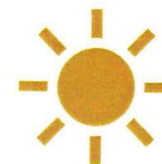
**Reference Nutrient Intake (RNI):** The amount of a nutrient that is enough to ensure that the needs of nearly all the group (97.5%) are being met. The RNI is used for recommendations on protein, vitamins and minerals.

## Vitamin D

Vitamin D is a pro-hormone in the body. It can be obtained in two forms:

- ergocalciferol (vitamin D<sub>2</sub>);
- cholecalciferol (vitamin D<sub>3</sub>).

Vitamin D<sub>3</sub> is also formed by the action of sunlight. Different to most vitamins, the main source of vitamin D is synthesis in the skin following exposure to sunlight. The wavelength of UVB during the winter months in the UK does not support vitamin D synthesis.



## Tasks

1. Create an infographic on micronutrients. Focus on the definition of each micronutrient, daily recommendations and source.
2. Keep a food diary for four days and calculate the micronutrients provided per day.  
<http://explorefood.foodafactoflife.org.uk>



## MINERALS and VITAMINS

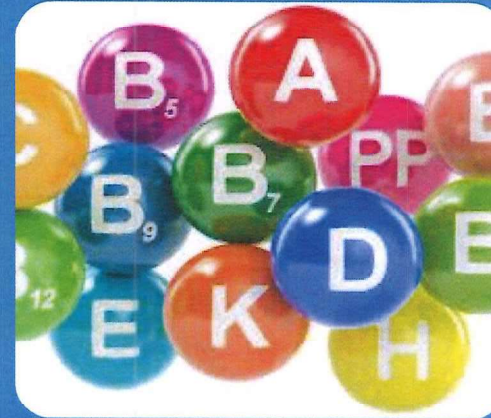
These are naturally occurring compounds that your body needs in order to remain healthy.

They are particularly useful for our hair, skin, nails, bones, blood and immune system.

**Only small amounts of vitamins and minerals are needed each day. Too much can be bad for us and too little can cause diseases**



Think of it like Goldilocks and the Three Bears: not too little, not too much, but just *the right* amount of vitamins and minerals are necessary to keep the body in tip top condition!



Each vitamin has a name but to make it easier they are labelled with letters. The most common ones are: A, D, E, K, B and C.

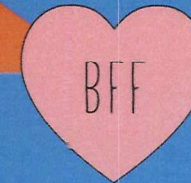
Some vitamins and minerals WORK together (Vitamin D and calcium, Vitamin C and iron.)

### DIETARY SOURCES OF MINERALS



Minerals are needed for general good health. There are lots of different minerals too but the common ones are CALCIUM and IRON.

Your body needs Vitamin D to absorb calcium, which keeps your bones, teeth and muscles strong.



Vitamin C helps iron absorption; iron makes haemoglobin which carries the oxygen from the lungs to the rest of the body.



# Oxidation

- Enzymes can cause foods to spoil by the process of oxidation. Oxidation can be used to describe the loss of water-soluble vitamins (B group and C) from some fruits and vegetables during food preparation and cooking processes.
- <https://www.youtube.com/watch?v=6hFxSJcq-KU>



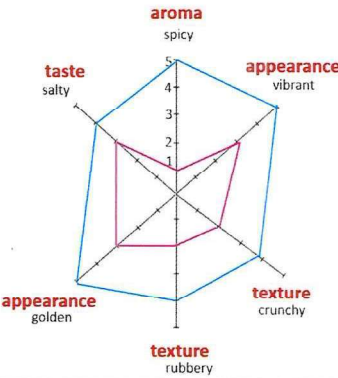
Food Groups	What do they do?	Where do we find them?
<b>Protein</b>	Help build, repair and maintain our muscles, organs and body tissue	Meat, beans, eggs, lentils, fish
<b>Dairy</b>	Helps maintain healthy bones and teeth	Milk, yoghurt, cream, cheese
<b>Carbohydrates</b>	Gives us energy	Potatoes, pasta, breads, rice, cereal
<b>Vitamins &amp; minerals</b>	Helps us to grow maintain a healthy body	Fruit, vegetables
<b>Fats &amp; sugars</b>	Used for energy, insulation and to protect the vital organs	Cakes, biscuits, sweets, oil

<b>Vegan</b>	A person who does not eat any food derived from any animals.
<b>Lacto-ovo vegetarian</b>	A person who does not eat meat or fish but does eat eggs and dairy products.
<b>Lacto vegetarian</b>	A person who does not eat meat, fish or eggs but will eat dairy products.
<b>Pescetarian</b>	A person who does not eat meat but does eat fish.
<b>Deficiency</b>	An inadequate supply of essential nutrients such as vitamins and minerals in the diet. These can be supplemented in the diet with nutrient rich foods, fortified foods and supplements such as tablets.
<b>Allergy</b>	A food allergy is a rapid and potentially serious response to a food by the immune system. It can trigger classic allergy symptoms such as rash, wheezing and itching. In rare cases the symptoms can be severe and fatal.


### Sensory Star Graph


We use a star graph to record our opinions of a dishes sensory qualities.


- The bigger the shape the better the dish was received over all
- Areas that scored less indicate areas for modification/improvement
- A smaller shape indicates more areas for modification/improvement




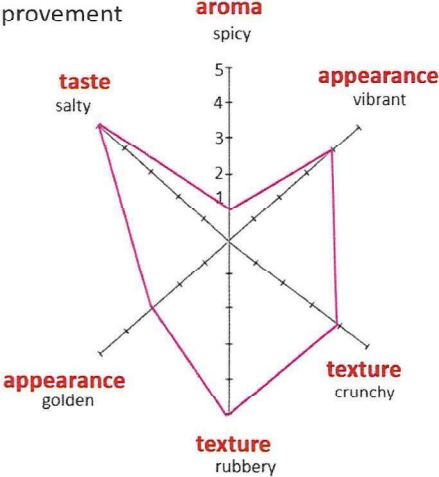
**The senses:**

  
**aroma**

  
**appearance**

  
**texture**

  
**taste**



<b>Iron</b>	A mineral that helps make red blood cells which carry oxygen around the body.	Red meat is a really good source of iron.
<p>Other sources of iron include:</p> <ul style="list-style-type: none"> <li>• dark-green leafy vegetables, such as watercress and curly kale</li> <li>• iron-fortified cereals or bread</li> <li>• brown rice</li> <li>• pulses and beans</li> <li>• nuts and seeds</li> <li>• meat, fish and tofu</li> <li>• eggs</li> <li>• dried fruit, such as dried apricots, prunes and raisins</li> </ul>		
<p>A deficiency in iron can commonly cause tiredness and lack of energy, shortness of breath, heart palpitations, and a pale complexion.</p>		

<b>aroma</b>	<b>Taste</b>
aromatic floral rotten musty acid citrus sweet perfumed fragrant buttery strong spicy	bitter warm zesty hot cool tangy sharp rich salty bland acidic weak spicy strong aweeet
<b>appearance</b>	<b>texture</b>
Round square bright dull plain colourful stacked cubed Small large stringy interesting shapes variety boring size	brittle rubbery short gritty clammy stodgy tender waxy Soft hard crumbly crispy chewy smooth mushy sticky dry fluffy firm moist



# Food spoilage, contamination and food poisoning



## Food spoilage

As soon as food is harvested, slaughtered or processed it starts to change. This happens for two main reasons:

- autolysis – self destruction, caused by enzymes present in the food;
- microbial spoilage – caused by the growth of micro-organisms, i.e. bacteria, yeasts and moulds.

## Food spoilage: Autolysis – enzymes

Enzymes are chemicals which can cause food to deteriorate in three main ways:

- ripening – this will continue until the food becomes inedible, e.g. banana ripening;
- browning – enzymes can react with air causing certain foods, e.g. apples, to discolour;
- oxidation – loss of nutrients, such as vitamin C from food, e.g. over boiling of green vegetables.

## Food spoilage: Microbial spoilage

Spoilage can be caused by the growth of:

- bacteria – single celled micro-organisms which are present naturally in the environment;
- yeasts – single celled fungi;
- moulds – fungi which grow as filaments in food.

## Food contamination

Food contamination can lead to food poisoning. There are three ways which food can be contaminated: **bacterial**, **chemical** and **physical**.

## Chemical contamination

Chemical contamination can occur in a variety of ways at different stages of food processing and production. For example, chemicals from the farm; cleaning products used in the processing plant and fly spray used in the kitchen.

## Physical contamination

This can occur in a variety of ways at different stages of food processing and production. Some examples are:

- soil from the ground when harvesting;
- a loose bolt from a processing plant when packaging;
- a hair from a chef in the kitchen.

## Bacterial contamination

Most bacteria are harmless but a small number can cause illness. These are known as pathogenic bacteria. Food which is contaminated with pathogenic bacteria can look, taste and smell normal.

Bacteria can be transferred onto food through cross-contamination, via equipment, people or pests, or can be naturally present in the food. Some bacteria can produce toxins which can cause food poisoning.

## Micro-organisms

Micro-organisms need conditions to survive and reproduce these can include:

- temperature;
- moisture;
- food;
- time;
- oxygen and pH level.

## Temperature

Bacteria need warm conditions to grow and multiply.

- The ideal temperature for bacterial growth is 30°C – 37°C.
- Some bacteria can still grow at 10°C and 60°C.
- Most bacteria are destroyed at temperatures above 63 °C.
- Bacterial growth danger zone is 5°C - 63°C.

At very cold temperatures, bacteria become dormant – they do not die, but they cannot grow or multiply.

## Moisture

Where there is no moisture bacteria cannot grow. However, bacteria and moulds can both produce spores which can survive until water is added to the food.

To find out more, go to: <https://bit.ly/3nE9fpE>

## Food

Bacteria need a source of food to grow and multiply, these food are usually high in moisture, fat and protein, and may be ready to eat. Food where bacteria rapidly multiply in is called a **high risk food**. For example:

- meat, meat products and poultry;
- milk and dairy products;
- eggs – uncooked and lightly cooked;
- shellfish and seafood;
- prepared salads and vegetables;
- cooked rice and pasta.

## Time

Given the right conditions, one bacterium can divide into two every 10-20 minutes through a process called binary fission.



## People at high risk of food poisoning

Elderly people, babies and anyone who is ill or pregnant needs to be extra careful about the food they eat.

## Symptoms of food poisoning

Food poisoning can be mild or severe. The most common symptoms are:

- feeling sick;
- being sick;
- diarrhoea;
- abdominal pain.

## Campylobacter

### Sources

Raw and undercooked poultry, unpasteurized milk, contaminated water.

### Signs and symptoms

Onset 2 – 5 days (can be longer). Fever, headache and dizziness for a few hours, followed by abdominal pain.

## E Coli 0157

### Sources

Raw and undercooked meat and poultry. Unwashed vegetables. Contaminated water.

### Signs and symptoms

Onset usually 3-4 days. Diarrhoea, which may contain blood, can lead to kidney failure or death.

## Listeria

### Sources

Unpasteurised milk and dairy products, cook-chill foods, pate, meat, poultry and salad vegetables.

### Signs and symptoms

Onset 1-70 days. Ranges from mild, flu-like illness to meningitis, septicaemia, pneumonia. During pregnancy may lead to miscarriage or birth of an infected baby.

## Salmonella

### Sources

Raw meat, poultry and eggs. Flies, people, sewage and contaminated water.

### Signs and symptoms

Onset 6-48 hours. Headache, general aching of limbs, abdominal pain and diarrhoea, vomiting and fever. This usually lasts 1 – 7 days, and rarely is fatal.

## Staphylococcus aureus

### Sources

Humans: nose, mouth and skin. Untreated milk.

### Signs and symptoms

Onset 1 – 6 hours. Severe vomiting, abdominal pain, weakness and lower than normal temperature. This usually lasts 6 – 24 hours.

## Task:

Explain in detail the conditions bacteria need to survive and reproduce. Give examples of controls to reduce the likelihood of bacterial multiplication and risk of food poisoning.

## Key terms

**Bacteria:** Small living organisms that can reproduce to form colonies. Some bacteria can be harmful (pathogenic) and others are necessary for food production, e.g. to make cheese and yogurt.

**Binary fission:** The process that bacteria uses to divide and multiply.

**Cross-contamination:** The transfer of bacteria from one source to another. Usually raw food to ready to eat food but can also be the transfer of bacteria from unclean hands, equipment, cloths or pests. Can also relate to allergens.

**Food spoilage:** The action of enzymes or microorganisms which make the food unacceptable to consume.

**Food poisoning:** Illness resulting from eating food which contains food poisoning micro-organisms or toxins produced by micro-organisms.

**Toxin:** A poison produced by some bacteria which can cause food poisoning.

## Allergens

Allergenic ingredients can cause adverse reactions in some people. Care must be taken at each stage of food processing to prevent contamination.

## Desirable food changes

Desirable changes that can be caused by micro-organisms include:

- bacteria in yogurt and cheese production;
- mould in some cheeses, e.g. Stilton;
- yeast in bread production.



## LO4 Know how food can cause ill health

### Common types of food poisoning

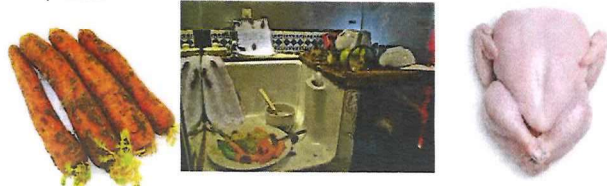
Food poisoning can be caused by pathogenic bacteria but it can also be caused by virus, chemicals and metals contaminating the food. Food can even be contaminated with poisonous plants and animals.



### Sources of food poisoning

Food can become contaminated during production, preparation and retailing. The main sources are:

- Raw food-for example meat, poultry, shellfish and eggs.
- People- food-poisoning bacteria are found on the skin, in septic wounds, in the nose and sometimes in the gut.
- Pests- for examples rats, mice, cockroaches, ants, wasps and flies.
- Animals- domestic pets and farm animals can carry *E.coli* in their intestines.
- Air and dust- food must be covered as bacteria in the air can settle on the surface.
- Water- bacteria such as *Salmonella* are carried in untreated water.
- Soil- bacteria and spores can survive in soil, so can be found on unwashed vegetables.
- Food waste-waste needs to be disposed of correctly as it could be a source of contamination and may attract pests.



### Conditions necessary for food poisoning

Bacteria can grow rapidly in the correct conditions. A single **bacterium** can divide into two by the process called **binary fission**. A single bacterium can produce 16 million bacteria in only 12 hours.

Food poisoning bacteria have four essential requirements for growth:

- **Food**- bacteria grow rapidly in high risk foods that are good sources of protein; such as cooked meat and poultry, shellfish, and seafood, undercooked or lightly cooked eggs, unpasteurised milk and cheeses, cooked rice and pasta, and salads.
- **Moisture**- bacteria cannot multiply without moisture, which means that they do not usually affect dried foods or products with high quantities of salt or sugar, which absorb water.
- **Warmth**- most bacteria multiply at **ambient temperature** -normal room temperature. This falls within the danger zone between 5°C and 63°C. Below 5°C most bacteria are unable to multiply rapidly, and below -18°C they become **dormant**. Cooking food at high temperatures above 63°C will destroy most bacteria; when cooked, the food should reach 75°C for at least two minutes.
- **Time**- in the right conditions the number of bacteria can double every 20 minutes.

The acidity and alkalinity of a food can influence the growth of bacteria. If conditions are too acidic or too alkaline, bacteria can not grow.

### Symptoms of food –induced ill health

#### How bacteria make you ill

- **Eating pathogenic bacteria**- when bacteria enter the stomach and intestines they multiply. This is how *Campylobacter* and *Salmonella* cause illness. Some types of food poisoning require the consumption of thousands of bacteria; others, such as *E.coli*, only require the consumption of a few to cause serious illness.
- **Eating a toxin**- a toxin is a poison produced as a waste product by bacteria. Some bacteria, such as *Staphylococcus aureus* and *Bacillus cereus*, produce a toxin when they multiply. Eating the toxin makes you ill, not eating the bacteria.

### Symptoms of food poisoning

- A symptom is a sign or indication of a disease.
- The body reacts to bacteria or toxins by developing symptoms such as diarrhoea, vomiting, stomach pains, headache and sweating.
- Some of these symptoms are visible and some are non-visible

Visible symptoms	Non-visible symptoms
Shivering Diarrhoea Vomiting	Feeling tired or weak Stomach ache Headache Feeling nauseous (sick)

### Symptoms of food allergies

A food allergy is a serious reaction to a food or ingredients in food. It is caused by the body's immune system reacting to an allergen. If the reaction to a food is a bad one, it could give the following symptoms:

- Skin rash
- Itchiness of skin, eyes and mouth.
- Swollen lips, face, eyes
- Difficulties in breathing.

In severe cases, it can bring about anaphylactic shock- the person develops swelling in their throat and mouth, making it difficult to speak or breathe. This can lead to death if appropriate treatment, such as an EpiPen, is not used quickly.

### Symptoms of food intolerances and coeliac disease

Some people have a sensitivity to certain foods, which can cause symptoms such as nausea, abdominal pain, joint aches and pains, tiredness and weakness. This is called a food intolerance- this is not an allergic reaction and it does not involve the immune system.

Coeliac disease is neither a food allergy nor a food intolerance but an autoimmune disease caused by a reaction of the immune system to gluten- a protein found in wheat, rye and barley. The symptoms of coeliac disease vary from person to person and can range from mild to severe.

Symptoms of coeliac disease include:

- Severe diarrhoea, excessive wind and/or constipation
- Persistent or unexplained gastrointestinal symptoms, such as nausea and vomiting.
- Recurrent stomach pain, cramping or bloating.
- Iron, vitamin B12 or folic acid deficiency.
- Anaemia
- Tiredness
- Sudden or unexpected weight loss.

### Symptoms of lactose intolerance include:

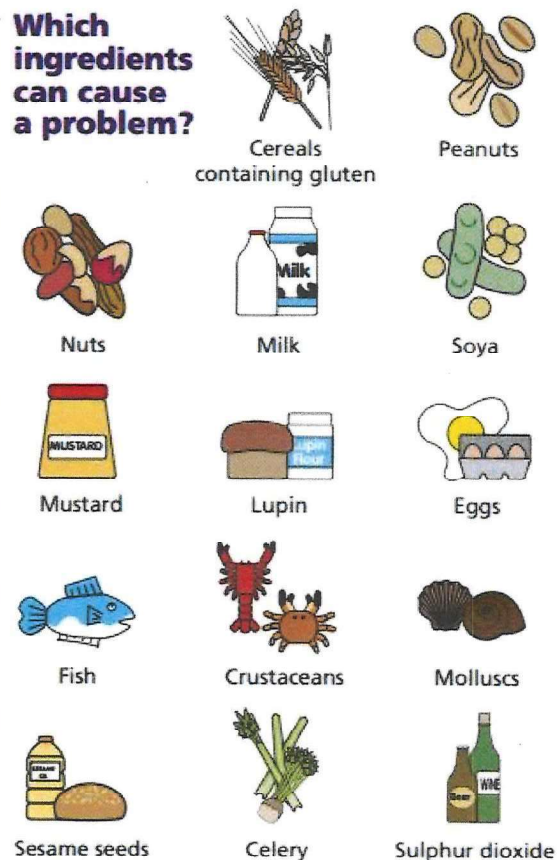
- Abdominal pain
- Nausea
- Diarrhoea
- flatulence



## Allergies

- A person with a food allergy experiences an allergic reaction when they eat or come into contact with specific foods.
- Allergic reactions are caused by the body's immune system reacting to the food and can be fatal.

### Which ingredients can cause a problem?



Make sure you understand the difference between a food intolerance and an allergy. An intolerance is a sensitivity to some foods; a person with a food allergy can suffer a fatal reaction if that food is eaten.

## Intolerances

Some people have sensitivity to certain foods. This is called a food intolerance. Eating these foods can cause symptoms such as nausea, abdominal pain, joint aches and pains, tiredness and weakness

### Lactose intolerance

- A person with a **lactose** intolerance cannot digest the sugar in milk called lactose.
- People with a lactose intolerance need to avoid all dairy products and foods that contain dairy products in their ingredients.



### Gluten intolerance

- Gluten is a protein present in a number of cereals including wheat, rye and barley.
- Wheat is a nutritious staple food in the UK diet and is found in a number of foods including flour, baked products, bread, cakes, pasta and breakfast cereals.
- People with a gluten intolerance need to follow a gluten free diet.
- It is important not to confuse gluten intolerance with **coeliac disease** which is an autoimmune disease caused by a reaction of the immune system to gluten. A person with coeliac disease is called a **coeliac**.



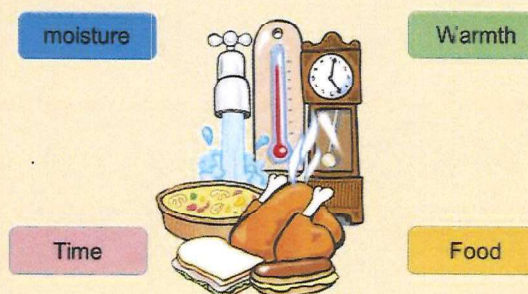
## LO4 Know how food can cause ill health

### Food-related causes of ill health

## Bacteria

- Bacteria are single-celled micro-organisms. Bacteria can be found everywhere around you; on your skin, in food, in soil, in water and in the air.
- Most bacteria are harmless, but some are **pathogenic** and can cause food poisoning. General food poisoning **symptoms** are vomiting (being sick) and diarrhoea.
- Other types of bacteria cause food to decay; these are called food spoilage bacteria, which cause food to smell and lose its texture and flavour.

### What do bacteria need to multiply?



### Influence of temperature

