Name: Date:

Food commodities: Cereals and rice

What are cereals?
Cereals are the grain or seeds of cultivated grasses; the main cereals are wheat, rice, oats, corn (maize), rye and barley.
The grains of barley, oats and rice are covered with a protective husk which must be removed before they can be used for food. Wheat, corn and rye do not have this protective husk.

Stages of processing wheat
1. Growing and harvesting.
2. Primary processing: cleaning, milling.
3. Secondary processing: mixing, slicing, proving and baking.

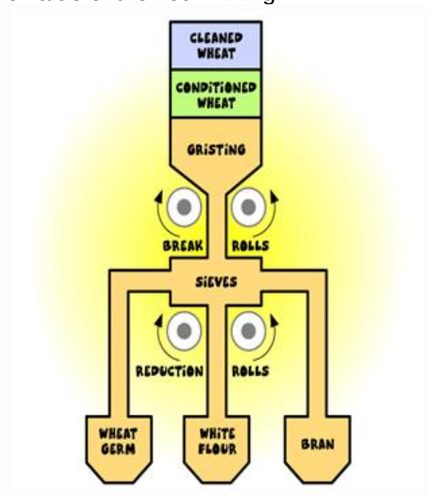
Growing wheat in the UK
UK growers produce 14-15 million tonnes of wheat each year, supplying approximately 5 million tonnes to the British milling industry, and also exporting to millers overseas.

Most wheat grown in the UK is winter wheat and is sown on two fifths of arable land. This is planted in the autumn, generally between September and November. Harvesting takes place between August and September and removes the grains from the plants.

Varieties of wheat
Different varieties of wheat are suited to different types of flour. Key considerations are:
- achieving the right technical standards in relation to the grain protein content;
- making sure it is kept free of insects, other pests and potential harmful contaminants;
- protecting the environment by ensuring correct usage of fertilizer and plant protection products, if necessary.

Parts of a wheat grain
- Bran layers consist of four separate layers: the pericarp; testa; nucellar layers and aleurone cells.
- Wheat germ contains elements of the young wheat plant, providing vitamins, protein and oil.
- Endosperm is the potential white flour. When milled, the endosperm fractures along the cell walls, and separates from the bran layers.

The process of milling
- The harvested grain is delivered to the mill, where it is cleaned and conditioned.
- The wheat is blended with other types of wheat to make different kinds of flour – this is called 'gristing'. The grist is passed through a series of fluted break rolls, rotating at different speeds, designed not to crush the wheat but shear it open to separate the white inner portion from the outer skins.
- The fragments are then separated by the sieves and the white particles are channeled through a series of smooth 'reduction' rolls for final milling into white flour. The outer skins are now blended to make different types of flour.
- The percentage of the grain used in producing flour is known as the extraction rate, which in turn affects the nutritive value of the flour milling.



The process of malting
To make malt, cleaned barley, water, air and heat are needed. The main stages are:
1. steeping - typically takes 48 hours and the grain is covered in water 2 to 3 times. At the end of steeping, the grain will contain 45% moisture;
2. germination - over the next 4-5 days, the grain is encouraged to grow under controlled conditions;
3. kilning - uses kilns for warm air drying to stop the germination process and reduce the moisture content of the grain by 43%.

Different types of flour
- White – usually contains 75% of the grain and most of the bran and wheatgerm are removed.
- Brown – usually contains about 85% of the original grain and some of the bran and wheatgerm are removed.
- Wholemeal – made from the whole wheat grain.
- Malted wheatgrain – brown or wholemeal flour with malted grains added after milling.
- Wheatgerm – white or brown flour with at least 10% made up of wheatgerm added during milling.
- Strong – contains a higher gluten content to make a range of different breads, pizzas and crumpets.
- Plain – contains a lower gluten content and used to make biscuits, pastry, sauces, pancakes, batters and Yorkshire puddings.
- Self-raising – baking powder is added as part of the milling process and mainly used to make cakes and scones.

Around the world there are flours which are not made from wheat. Some of the less common types include flour made from coconut, potato, peas and chickpeas. Other grains such as rye, oats and spelt are also used.

Wheat flour (apart from wholemeal) is fortified with iron, thiamin and niacin, and all flours (except wholemeal and some self-raising varieties) with calcium. It is a legal requirement to fortify flour in the UK. 85% of flour in the UK is milled from wheat that is grown in the UK.

What makes bread?
- Flour contains a protein called gluten, which is formed from two classes of proteins, gliadins and glutelins, which are commonly found in grains, such as wheat, rye and barley. Once water is added a dough is created.
- Yeast, a microorganism, is a leavening ingredient added to dough to start fermentation and which makes bread rise.
- Salt helps the proving stage to tighten the gluten strands and adds taste.
- Warm water is needed as if it is too cool, the yeast won't multiply and if it is too hot (over 43°C) the yeast will be killed.

Tasks
1. Investigate and produce a report on UK wheat farming.
2. Create a display to explain the stages of making bread.

Key terms
Arable land: Land able to be ploughed and used to grow crops
Contaminants: Unwanted substances that lower the quality of the grain
Extraction rate: Percentage by weight that is 'extracted' from the whole grain to make flour
Grist: The blend of wheat used to make flour
Kilning: Process of drying that generates both flavour and colour in the malt
Plant protection products: Used by farmers to protect crops from insects and diseases, e.g. pesticides.
Proving: The process where the dough is rested to allow the yeast to ferment and produce gas bubbles which help the dough to rise.

What is rice?
Rice is a short-living plant that requires a substantial amount of water when growing. When farming rice, the fields are flooded and then drained before harvest. The rice, once harvested, is known as a paddy grain. The paddy grains are sent to a mill to be threshed and turned into grains of rice for cooking.

There are more than 40,000 varieties of cultivated rice said to exist. These can be divided into three groups:
- long grain – all purpose and can be used as an accompaniment e.g. basmati;
- medium grain – used in risttos and puddings as it is creamy when cooked e.g. Arborio;
- short grain – used to make sushi and puddings as it tends to be stickier when cooked e.g. bomba.

Name: Date:

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 to discolour, e.g. apples;
- 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 grown and multiply.

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

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, pâté, 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.

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.

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.

This resource meets the ***Guidelines for producers and users of school education resources***

Name: Date:

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-Friesen 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

1. 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.
2. Pasteurisation involves heating the milk to a temperature of no less than 71.7ºC for 25 seconds. This process extends the shelf life of milk and is known as High Temperature Short Time (HTST).
3. The milk is then cooled for packing, labelling, storage, transportation and then distributed to retailers.
4. 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.
5. Sterilisation is a process that destroys all micro-organisms present in a food. It uses a temperature more than 100ºC. Sterilising enables milk to be kept for months unopened and unrefrigerated, but may result in a burnt, caramelised flavour and browning.
6. Ultra-heat treatment (UHT) destroys all micro-organisms in the food without causing as much damage to the product as sterilisation. Typical temperatures is 130ºC-150ºC 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/3ucDlFr

Processing yogurt

1. The milk is pasteurised and homonogised. A starter culture (harmless bacteria) is then added, and the bacteria will ferment the lactose (sugar) in the milk to produce lactic acid.
2. The lactic acid fermentation process allows the milk proteins to coagulate and set producing sharp, tangy flavoured 'natural' yogurt.
3. 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.

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.

Processing cheese

1. Pasteurisation - the first stage in the process is the pasteurisation of the milk.
2. 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.
3. 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.
4. 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

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

This resource meets the ***Guidelines for producers and users of school education resources about food***.

Name: Date:

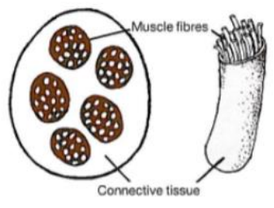
Food commodities: Red meat and poultry

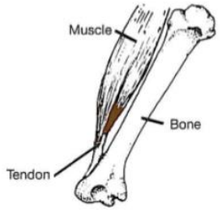
Livestock farming

- 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 tracebility (or what farm it came from), high production standards and care for our environment and wildflife. 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.

Name: Date:

Good food hygiene and safety practices

Good food hygiene practices are necessary in order to produce, make and supply food that is safe to eat. This involves more than just being clean. A simple way to remember is the **4C**s:

- cleaning;
- cooking;
- chilling;
- cross-contamination.

Cleaning

Cleaning the kitchen is important to keep food safe and prevent bacteria from spreading.

'Clean as you go' means people make sure that they clean the area and utensils they have been working in or with, as they prepare food. This avoids build-up of mess and leads to better hygienic conditions. Areas which need particular attention are:

- surfaces that come into contact with food, e.g. chopping boards, utensils;
- surfaces that come into contact with hands, e.g. cupboard and fridge doors.

Cleaning – personal hygiene and getting ready to cook

Good personal hygiene is essential to reduce the risk of food poisoning.

- **Hands**: Thoroughly wash and dry hands before and after touching food and regularly throughout cooking.
- **Clothing**: Clean clothing should be worn. Long sleeves should be rolled up and a clean apron or chef's jacket worn over outside clothes. Enclosed, non-slip, shoes should be worn in the kitchen.
- **Jewellery**: All jewellery, including a watch, should be removed (piercings should be covered if they cannot be removed).
- **Skin**: Cuts and wounds should be covered with a coloured, waterproof dressing. The plasters are often blue in colour so they can be easily identified if they fall into food.
- **Face**: Do not cough or spit near or over food, taste food with fingers, bite nails, eat, chew or smoke, touch nose, or remove earrings.

For more information, go to: https://bit.ly/3nE9fpE

Cooking

To reduce the risk of food poisoning, hot food must be served steaming hot, that is above **63ºC**.

- Bacteria will begin to die when the temperature rises above **60ºC**.
- Some foods change colour when they are cooked.
- Cooking food thoroughly to a minimum core temperature of **75°C** will ensure most bacteria is destroyed.
- When cooking burgers, sausages, portions of pork and chicken, there should be no pink meat. They should also be steaming hot inside and the juices should run clear when cooked.
- Steak or other cuts of beef or lamb can be eaten less well done as long as they have been properly sealed. Sealing the meat will kill any bacteria on the outside.
- Leftovers should be cooled as quickly as possible within two hours and then stored in the fridge below **5ºC**. When leftovers are re-heated, they need to be steaming hot. Leftovers should not be re-heated more than once and should be used within 48 hours from when it was made (24 hours for rice dishes).

Chilling

The temperature between **5ºC– 63ºC** is known as the 'danger-zone'. Bacteria will multiply most rapidly within this temperature range. Reducing the temperature below **5ºC** slows the reproduction of microorganisms. Cold temperatures do not kill bacteria.

High-risk food, such as such as meat, fish and dairy products plus opened bottles, jars or tubes, should be stored below 5°C. Eggs should be stored in a cool, dry place. Ideally, eggs should be stored in the fridge.

Cross-contamination

The process by which bacteria are transferred from one area to another is known as **cross-contamination**. The main carriers of bacteria and causes of cross contamination are:

- humans;
- rubbish;
- pests and other animals;
- food, e.g. raw meat or poultry.

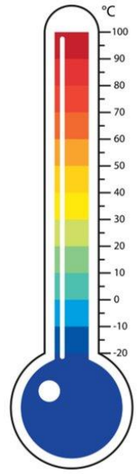
Cross contamination – raw meat

- Keep raw meat separate from ready-to-eat food.
- Do not let raw meat drip onto other food.
- Never use the same chopping board for raw meat and ready-to-eat food without washing the board (and knife) thoroughly in between. Ideally use a red board.
- Do not wash meat before cooking it.

Temperatures to remember

To reduce the risk of food poisoning, good temperature control is vital:

- 5-63°C – the danger zone where bacteria grow most readily.
- 37°C – body temperature, optimum temperature for bacterial growth.
- 8°C – maximum legal temperature for cold food, i.e. your fridge.
- 5°C (or below) – the ideal temperature your fridge should be.
- 75°C – if cooking food, the core temperature, middle or thickest part should reach at least this temperature.
- 75°C – if reheating food, it should reach at least this temperature. In Scotland food should reach at least 82°C.



Safe use of a food probe

Digital probes can be used to check the temperature of food. To use a food probe:

- clean with a disinfectant wipe before and after use;
- insert the probe into the core (centre) or the thickest part of the food;
- do not touch the bottom of the pan or cooking dish.

Food labelling

Food labels help consumers make healthier choices. Some information also helps to reduce the risk of food poisoning or other adverse reactions to food:

- date marks;
- list of ingredients with allergens in **bold**, highlighted, underlined or in *italics*;
- storage and preparation conditions.

Key terms

Best-before-date: Relates to the quality of the food. Food may still be eaten beyond this date.

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.

Danger zone: Bacteria will multiply most rapidly between 5-63°C.

Optimum temperature: Bacteria that cause food poisoning reproduce around body temperature (37°C).

The 4Cs: Cleaning, cooking, chilling and cross-contamination.

Use-by-date: Relates to the safety of the food. Food must be eaten by this date.

Use-by-date

You have until the end of this date to use or freeze the food before it comes too risky to eat.

USE BY:
25/08/20
KEEP REFRIGERATED

Best-before-date

You can eat food past this date but it might not be at its best quality.

BEST BEFORE:
25/08/21
STORE IN A COOL DRY PLACE

Tasks

1. Write a detailed explanation of the 4Cs, demonstrating how they can help to reduce the risk of food poisoning.
2. Explain, giving detailed reasons, the food hygiene controls when buying, preparing, cooking and serving fresh poultry.

This resource meets the ***Guidelines for producers and users of school education resources***

Name: Date:

Food commodities: Fish and shellfish

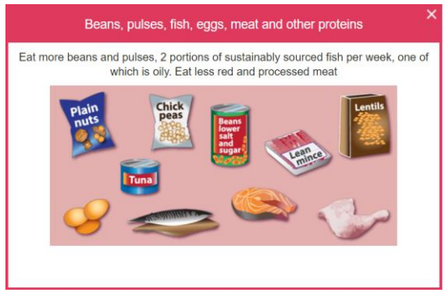
Types of fish and shellfish
There are over 33,000 fish species in the world, but people often prefer to eat a few species that are easier to catch and eat.

The 'big five' are the most common seafood items that are eaten in the UK. They are:

- cod;
- haddock;
- tuna;
- salmon
- prawns.

Recommendations
Fish is part of the Beans, pulses, fish, eggs, meat and other proteins food group in the Eatwell Guide.

Around one-sixth of the food that people consume should come from this group in the diet.
It is recommended to consume two portions (one portion is 140g) of sustainably sourced fish per week.



Nutrients provided by fish
Fish provides a range of nutrients, including:

- Omega-3 fats (in some fish);
- protein;
- vitamin D (in some fish);
- B vitamins;
- iodine.

Oily fish
The UK Eatwell Guide states that one of the recommended two portions of fish a week should be oily.

Salmon and **trout** are classified as 'oily fish', which means they contain a type of healthy fat called Omega-3. Omega-3 is important for brain development and heart health.

Mackerel, herring and **sardines** are types of small oily fish that are mostly sold in cans. Kippers are herring that have been filleted, salted and smoked. The skin and bones of whole sardines are soft and edible and can provide extra calcium.

White fish
Cod and **haddock** are the most popular fish in the UK. They are flaky, white fish when cooked. Most of the cod and haddock eaten in the UK is breaded or battered.
Plaice, sole, halibut and **turbot** are all types of flatfish that are classed as white fish.

Tuna
Fresh tuna used to be classed as an oily fish but new research shows that there are not enough healthy Omega-3 fatty acids in tuna for it to be called oily.

Shellfish
Shrimp and prawns are a wide group of small shellfish. The words 'shrimp' and 'prawn' are used to describe many different species.

Mussels and oysters are 'bivalve molluscs'. Bivalve means that they have two shells that close around the soft body inside. Cockles, whelks and winkles are small shellfish that are common around the UK.

Squid and octopus
Squid and octopus are not fish but cephalopods, along with cuttlefish and some other species. Squid is often called 'calamari' when it is used in dishes.

To find out more, go to: https://bit.ly/3DHagr9

Catching fish at sea (trawling)
Most fishers go out to sea in boats and use nets to catch a large number of fish at one time.
When the boat is in the right position, the fishers drop their nets. Once dropped, the boat then tows the net around, scooping up fish. This is known as trawling.

Catching fish at sea (trolling)
Some fish are caught on lines, rather than nets.
Some other fish, like mackerel, can also be caught on lines by a method called 'trolling'.
Trolling is similar to trawling, but instead of dragging a net, the boat drags many lines with hooks to catch the fish.

Preparing fish
Whole fish usually require preparation before they can be eaten.
This could include: descaling, gutting, filleting and pin boning.

To **descale** a fish, the knife should be run along the scales of the fish, in the opposite direction to the scales.
Gutting removes the entrails of the fish.
Filleting results in portions of fish that are separated from the head, tail and major bones.
Pin boning removes the remaining small bones.

Marine Stewardship Council
The MSC logo means that this fish has been caught in a way that is more sustainable.

Logo© Marine Stewardship Council

Cooking with fish
Fish can be cooked in a variety of ways, such as being grilled, baked, sautéed, fried or barbequed.

Grilling and baking are usually healthier cooking methods and they can also help to bring out the flavour of many fish.
Some fish can be eaten raw (e.g. sushi).

Growing mussels
Mussels can be grown on ropes, so they can be easily collected in large numbers. 'Seed' mussels stick to the rope and grow in place before harvesting.

Wild fishing

Advantages
- Wild fish have a more varied diet than farmed fish and therefore may taste different.

Disadvantages
- Can be less sustainable due to overfishing and may become more expensive.
- Nets can damage the seabed.

Farming fish

Advantages
- Prevents wild fish from being overfished.
- Can provide fish to communities where wild fish is scarce.
- Can allow for fish farmed that are hard to catch.

Disadvantages
- Disease can be more common if many fish are kept close together.
- Farmed fish may harm wild fish if they escape.
- If waste from the fish farm is not disposed of correctly it can cause pollution.

Preparing shellfish safely
Many shellfish are filter feeders. This means that they can gather up bacteria and viruses from their environment.
The best way to avoid illness is to make sure that shellfish are properly cooked.
When cooked in the shell, mussels, clams and oysters will open.
Raw shrimp and prawns will turn pink and firm up when properly cooked.

Task
Create an infographic that highlights all the reasons we should eat fish.
Include the recommendations, the nutrients in fish and how we can cook them in healthier ways.

Key terms
Oily fish: A fish that contain a type of healthy fat called Omega-3.
Omega-3: A type of polyunsaturated fatty acid found in fish.
Shellfish: An aquatic shelled mollusc or crustacean that is edible.
MSC: Marine Stewardship Council logo, a logo that means fish has been caught sustainably.

This resource meets the ***Guidelines for producers and users of school education resources about food***.