

The Eatwell Guide

- When choosing food and drinks, current healthy eating guidelines should be followed.



The Eatwell Guide

- Comprises 5 main food groups.
- Is suitable for most people over 2 years of age.
- Shows the proportions in which different groups of foods are needed in order to have a well-balanced and healthy diet.
- Shows proportions representative of food eaten over a day or more.

8 tips for healthier eating

These eight practical tips cover the basics of healthy eating, and can help you make healthier choices.

1. Base your meals on starchy carbohydrates.
2. Eat lots of fruit and veg.
3. Eat more fish – including a portion of oily fish.
4. Cut down on saturated fat and sugar.
5. Eat less salt (max. 6g a day for adults).
6. Get active and be a healthy weight.
7. Don't get thirsty.
8. Don't skip breakfast.

Composite/combination food

Much of the food people eat is in the form of dishes or meals with more than one kind of food component in them. For example, pizzas, casseroles, spaghetti bolognese and sandwiches are all made with ingredients from more than one food group. These are often called 'combination' or 'composite' foods.



Key terms

The Eatwell Guide: A healthy eating model showing the types and proportions of foods needed in the diet.

Hydration: The process of replacing water in the body.

Dietary fibre: A type of carbohydrate found in plant foods.

Composite/combination food: Food made with ingredients from more than one food group.

Fruit and vegetables

- This group should make up just over a third of the food eaten each day.
- Aim to eat at least five portions of a variety each day.
- Choose from fresh, frozen, canned, dried or juiced.
- A portion is around 80g (3 heaped tbs).
- 30g of dried fruit or 150ml glass of fruit juice or smoothie count as a max of 1 portion each day.

Beans, pulses, fish, eggs, meat and other protein

- Sources of protein, vitamins and minerals.
- Recommendations include to aim for at least two portions of fish a week, one oily, and; people who eat more than 90g/day of red or processed meat, should cut down to no more than 70g/day.

Hydration

- Aim to drink 6-8 glasses of fluid every day.
- Water, lower fat milk and sugar-free drinks including tea and coffee all count.
- Fruit juice and smoothies also count but should be limited to no more than a combined total of 150ml per day.

Potatoes, bread, rice, pasta or other starchy carbohydrates

- Base meals around starchy carbohydrate food.
- This group should make up just over a third of the diet.
- Choose higher-fibre, wholegrain varieties.

Oil and spreads

- Unsaturated fats are healthier fats that are usually from plant sources and in liquid form as oil, e.g. olive oil.
- Generally, people are eating too much saturated fat and need to reduce consumption.

Fibre

- Dietary fibre is a type of carbohydrate found in plant foods.
- Food examples include wholegrain cereals and cereal products; oats; beans; lentils; fruit; vegetables; nuts; and, seeds.
- Dietary fibre helps to: reduce the risk of heart disease, diabetes and some cancers; help weight control; bulk up stools; prevent constipation; improve gut health.
- The recommended average intake for dietary fibre is 30g per day for adults.

Dairy and alternatives

- Good sources of protein and vitamins.
- An important source of calcium, which helps to keep bones strong.
- Should go for lower fat and lower sugar products where possible.

To find out more, go to:
<https://bit.ly/2QzUMfe>

Foods high fat, salt and sugar

- Includes products such as chocolate, cakes, biscuits, full-sugar soft drinks, butter and ice cream.
- Are high in fat, sugar and energy and are not needed in the diet.
- If included, should be had infrequently and in small amounts.

Meals and snacks can be sorted into The Eatwell Guide food groups.

Composite/combination food - Lasagne



Pasta (lasagne sheets): **Potatoes, bread, rice, pasta or other starchy carbohydrates**

Onions, garlic and chopped tomatoes: **Fruit and vegetables**

Lean minced meat (or meat substitute): **Beans, pulses, fish, eggs, meat and other protein**

Cheese sauce made with milk and cheese: **Dairy and alternatives**

Olive/vegetable oil used to cook onions and mince: **Oil and spreads**

Task

Plan a menu for a day that applies the principles of The Eatwell Guide and the 8 tips for healthier eating. Make one of the dishes, complete a sensory evaluation and calculate the energy and nutrients provided using nutritional analysis.

Energy and activity

Energy is the power to do work. Energy is essential for life, and is required to fuel many different body processes, growth and activities.

These include:

- keeping the heart beating;
- keeping the organs functioning;
- maintenance of body temperature;
- muscle contraction.

Different people need different amounts of dietary energy depending on their:

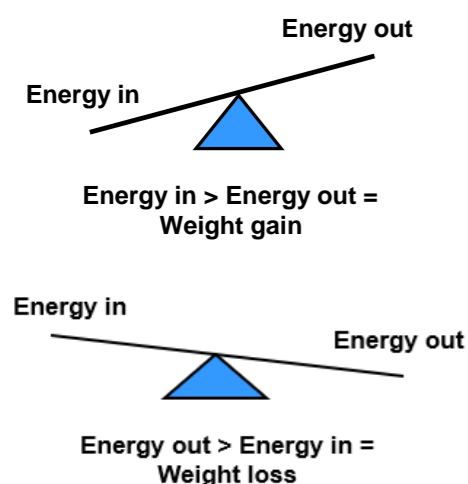
- age;
- gender;
- body size;
- level of activity;
- genes.



The figures determined are known as Estimated Average Requirements (EAR) for energy.

Energy balance

To maintain body weight it is necessary to balance energy intake (from food and drink) with energy expenditure (from activity).



Body Mass Index (BMI) can be used to identify if an adult is a correct weight for height.

$$\text{BMI} = \frac{\text{weight (kg)}}{(\text{height in m})^2}$$

Recommended BMI range (adults)

Less than 18.5	Underweight
18.5 to 25	Desirable
25-30	Overweight
30-35	Obese (Class I)
35-40	Obese (Class II)
Over 40	Morbidly obese

Energy from food

- Energy intake is measured in joules (J) or kilojoules (kJ), but many people are more familiar with Calories (kcal).
- Different macronutrients, and alcohol, provide different amounts of energy.

	Energy per 100g
Carbohydrate	16kJ (3.75 kcals)
Protein	17kJ (4 kcals)
Alcohol	29kJ (7kcals)
Fat	37kJ (9 kcals)

Energy intake is measured in joules (J) or kilojoules (kJ), but many people are more familiar with Calories (kcal).

1 kilojoule (kJ) = 1,000 joules
1 megajoule (MJ) = 1,000,000 joules
1 kilocalorie (kcal) = 1,000 calories

To convert from one unit to another: 1 kcal = 4.184 kJ

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

Basal metabolic rate (BMR)

Basal metabolic rate (BMR) is the rate at which a person uses energy to maintain the basic functions of the body when it is at complete rest, such as:

- breathing;
- keeping warm;
- keeping the heart beating

Physical activity level (PAL)

In addition to their BMR, people also use energy for movement of all types, expressed as PAL. The amount of energy a person uses to perform daily tasks varies.

Energy requirements vary from person to person, depending on BMR and PAL.

$$\text{Total energy expenditure} = \text{BMR} \times \text{PAL}$$

Undernutrition and obesity

Managing energy intake and expenditure, and maintaining energy balance can help reduce the risk of overweight/obesity and being underweight.

People who are obese are more likely to suffer from coronary heart disease, type 2 diabetes, gall stones, arthritis, high blood pressure and some types of cancers, i.e. colon, breast, kidney and stomach.

Being underweight is also linked with health problems, such as osteoporosis (low bone mass), infertility (difficulty to conceive) and even heart failure.

Benefits of physical activity

Physical activity is beneficial because it can:

- help to manage the balance between energy in and energy out, to maintain a healthy weight;
- improve heart health and strengthen muscles and bones;
- improve sleep, relieve stress and lift mood.

Moderate activity



Vigorous activity



Muscle strengthening activities



Activity recommendations

We are all advised to minimise inactivity. In addition, there are specific age-related recommendations.

Pre-schoolers (3 to 4 years): 180 minutes (3 hours) spread throughout the day, including at least 60 minutes of moderate-to-vigorous intensity physical activity.

Children and young people (5-18 years): At least 60 minutes of physical activity every day and engage in a variety of types and intensities of physical activity across the week.

Adults (19-64 years): At least 150 minutes each week (moderate intensity), or have 75 minutes of vigorous activity a week and do muscle strengthening activities on two days or more each week.

Tasks

1. Create an infographic on either energy or physical activity.
2. Keep a food diary for four days and calculate the energy provided per day.
<http://explorefood.foodfactoflife.org.uk>

Key terms

Basal metabolic rate (BMR): The rate at which a person uses energy to maintain the basic functions of the body when it is at complete rest.

Body Mass Index (BMI): An equation that can be used to identify if an adult is a correct weight for their height.

Dietary reference values: Estimated dietary requirements for particular groups of the population.

Energy: The power the body requires to stay alive and function.

Physical activity level (PAL): The amount of energy a person uses to perform daily tasks varies.

Estimated Average Requirements (EAR): An estimate of the average requirement of energy or a nutrient needed by a group of people.

Physical activity

Physical activity should be an important part of our daily energy expenditure.

Many different types of activity contribute to our total physical activity, all of which form part of everyday life.

Inactivity

It is also important that the amount of time being sedentary is reduced.

Over time, sedentary behaviour can lead to weight gain and obesity, which can increase the risk of developing chronic diseases in adulthood.

1 in 4 women and 1 in 5 men are classified as inactive (<30 mins per week).

Macronutrients, fibre and water

Macronutrients

Macronutrients provide energy. The macronutrients are:

- carbohydrate;
- protein;
- fat.

Macronutrients are measured in grams (g).

Alcohol

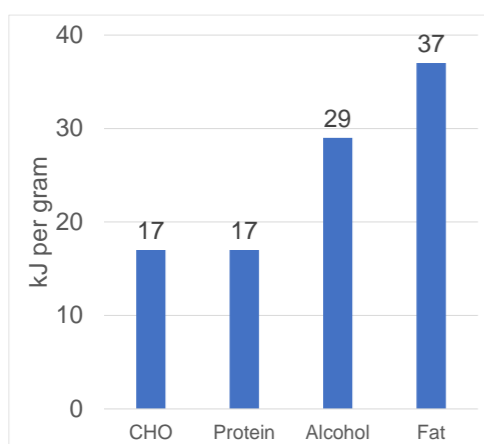
Alcohol is not considered a nutrient, but is a source of energy in the diet.

The government recommends no more than 14 units of alcohol per week for both men and women.

Energy from food

- Energy intake is measured in joules (J) or kilojoules (kJ), but many people are more familiar with Calories (kcal).
- Different macronutrients, and alcohol, provide different amounts of energy.

	Energy per gram
Carbohydrate	16kJ (3.75 kcals)
Protein	17kJ (4 kcals)
Alcohol	29kJ (7kcals)
Fat	37kJ (9 kcals)



Protein

- Made up of building blocks called amino acids.
- There are 20 amino acids found in protein.
- Eight amino acids have to be provided by the diet (called essential amino acids).

The essential amino acids (EAAs) are isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine.

In young children, additional amino acids, e.g. histidine and tyrosine, are sometimes considered to be essential (or 'conditionally essential') because they may be unable to make enough to meet their needs.

Recommendations

- 0.75g/kg bodyweight/day in adults.

Sources:

Animal sources: meat; poultry; fish; eggs; milk; dairy food.

Plant sources: soya; nuts; seeds; pulses, e.g. beans, lentils; mycoprotein.

Protein complementation

Different food contains different amounts and combinations of amino acids.

Vegans and vegetarians can get all the amino acids they need by combining different protein types at the same meal. This is known as protein complementation.

Examples are:

- rice and peas;
- beans on toast;
- hummus and pitta bread;
- bean chilli served with rice.

Carbohydrate

All types of carbohydrate are compounds of carbon, hydrogen and oxygen. They can be divided into three main groups according to the size of the molecule.

These three types are:

- monosaccharides (e.g. glucose);
- disaccharides (e.g. lactose);
- polysaccharide (e.g. sucrose).

The two types main of carbohydrate that provide dietary energy are starch and sugars. Dietary fibre is also a type of carbohydrate.

Starchy carbohydrate is an important source of energy.

Starchy foods - we should be choosing wholegrain versions of starchy foods where possible.

Recommendations

- Total carbohydrate - around 50% of daily food energy.
- Free sugars include all sugars added to foods plus sugars naturally present in honey, syrups and unsweetened fruit juice (<5% daily food energy).
- Fibre is a term used for plant-based carbohydrates that are not digested in the small intestine (30g/day for adults).

Fibre

- Dietary fibre is a type of carbohydrate found in plant foods.
- Food examples include wholegrain cereals and cereal products; oats; beans; lentils; fruit; vegetables; nuts; and, seeds.

Dietary fibre helps to:

- reduce the risk of heart disease, diabetes and some cancers;
- help weight control;
- bulk up stools;
- prevent constipation;
- improve gut health.

Fat

Sources of fat include:

- saturated fat;
- monounsaturated fat;
- polyunsaturated fat.

Fats can be saturated, when they have no double bonds, monounsaturated, when they have one double bond, or polyunsaturated, when they have more than one double bond.

Recommendations

- <35% energy, Saturated fat <11% energy.

A high saturated fat intake is linked with high blood cholesterol levels.

Sources:

Saturated fat: fatty cuts of meat; skin of poultry; butter; hard cheese; biscuits, cakes and pastries; chocolate.

Monounsaturated fat: edible oils especially olive oil; avocados; nuts.

Polyunsaturated fatty acids: edible oils especially sunflower oil; seeds; margarine; spreadable fats made from vegetable oils and oily fish.

Dietary reference values (DRVs) are a series of estimates of the energy and nutritional requirements of different groups of healthy people in the UK population. They are not recommendations or goals for individuals.

Reference Intakes are guidelines for the maximum amount of energy (calories), fat, saturated fat, sugars and salt consumed in a day (based on a healthy adult female).

Tasks

1. Create an infographic on macronutrients. Focus on the definition of each nutrient, daily recommendations and source.

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

Key terms

Dietary reference values: Estimated dietary requirements for particular groups of the population.

Essential amino acids: 8 of the different amino acids found in proteins from plants and animals that have to be provided by the diet.

Macronutrients: Nutrients needed to provide energy and as the building blocks for growth and maintenance of the body.

Protein complementation: Combining different protein types at the same meal to ensure all EAAs are ingested.

Reference Intakes: Guidelines for the maximum amount of nutrients consumed.

Hydration

- Aim to drink 6-8 glasses of fluid every day.
- Water, lower fat milk and sugar-free drinks including tea and coffee all count.
- Fruit juice and smoothies also count but should be limited to no more than a combined total of 150ml per day.

20% of water is provided by food such as soups, yogurts, fruit and vegetables.

The other 80% is provided by drinks such as water, milk and juice.

Drinking too much water can lead to 'water intoxication' with potentially life threatening hyponatraemia.

This is caused when the concentration of sodium in the blood gets too low.

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 $1\text{mg} = 0.001\text{g}$ and $1\mu\text{g} = 0.001\text{mg}$.

Micronutrient recommendations

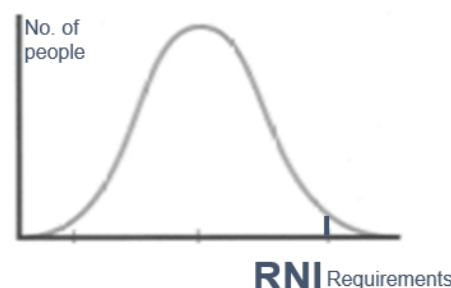
People have different requirements for each micronutrient, according to their:

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

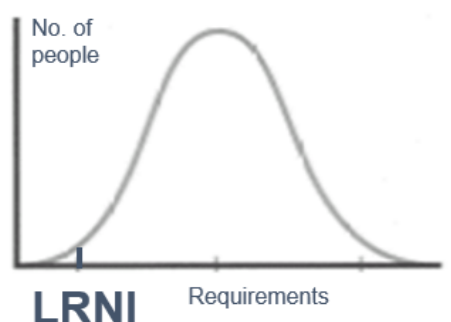


Micronutrient recommendations

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
Vitamin A	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 vitamins	Thiamin, riboflavin, niacin, folate, and vitamin B12 have a range of functions within the body.	Different for each B Vitamin.
Vitamin C	Helps to protect cells from damage and with the formation of collagen.	Fruit (especially citrus fruits), green vegetables, peppers and tomatoes.
Vitamin D	Helps the body to absorb calcium & helps to keep bones strong.	Oily fish, eggs, fortified breakfast cereals and fat spreads.
Vitamin E	Helps to protect the cells in our bodies against damage.	Vegetable and seed oils, nuts and seeds, avocados and olives.
Vitamin K	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
Calcium	Helps to build and maintain strong bones and teeth.	Dairy, calcium-fortified dairy-alternatives, canned fish (where soft bones are eaten) and bread.
Iron	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.
Phosphorus	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.
Sodium	Helps regulate the water content in the body.	Very small amounts found in foods. Often added as salt.
Fluoride	Helps with the formation of strong teeth and reduce the risk of tooth decay.	Tap water, tea (and toothpaste).
Potassium	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.
Iodine	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.

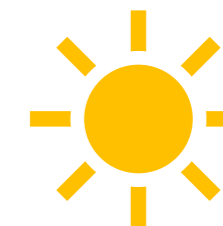
Reference Nutrient Intake (RNI): The amount of a nutrient that is enough to ensure that the needs of nearly all the group (97.5%) are being met. The RNI is used for recommendations on protein, vitamins and minerals.

Vitamin D

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

- ergocalciferol (vitamin D₂);
- cholecalciferol (vitamin D₃).

Vitamin D₃ 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>

Food science

Functions of ingredients

Ingredients provide a variety of functions in recipes.

Carbohydrate, protein and fat

Carbohydrate, protein and fat all have a range of properties that make them useful in a variety of food products.

Carbohydrates perform different functions in food.

They can:

- help to cause the colour change of bread, toast and bakery products (dextrinisation);
- contribute to the chewiness, colour and sweet flavour of caramel;
- thicken products such as sauces and custards (gelatinisation).

Maillard reaction

Foods which are baked, grilled or roasted undergo colour, odour and flavour changes. This is primarily due to a group of reactions involving amino acids (from protein) and reducing sugars.

Dextrinisation

When foods containing starch are heated they can also produce brown compounds due to dextrinisation. Dextrinisation occurs when the heat breaks the large starch polysaccharides into smaller molecules known as dextrans which produce a brown colour.

Caramelisation

When sucrose (table sugar) is heated above its melting point it undergoes physical and chemical changes to produce caramel.

Gelatinisation

When starch is mixed with water and heated, the starch granules swell and eventually rupture, absorbing liquid, which thickens the mixture. On cooling, if enough starch is used, a gel forms.

Proteins perform different functions in food products.

They:

- aerate foods, e.g. whisking egg whites;
- thicken sauces, e.g. egg custard;
- bind ingredients together, e.g. fishcakes;
- form structures, e.g. gluten formation in bread;
- gel, e.g. lime jelly.

Gluten formation

Two proteins, gliadin and glutenin, found in wheat flour, form gluten when mixed with water. Gluten is strong, elastic and forms a 3D network in dough. In the production of bread, kneading helps untangle the gluten strands and align them. Gluten helps give structure to the bread and keeps in the gases that expand during cooking.

Gelation

Gelatine is a protein which is extracted from collagen, present in animal connective tissue. When it is mixed with warm water, the gelatine protein molecules start to unwind. On cooling, a stable, solid network is formed, trapping the liquid.

Denaturation

Denaturation is the change in structure of protein molecules. The process results in the unfolding of the protein's structure. Factors which contribute to denaturation are heat, salts, pH and mechanical action.

Coagulation

Coagulation follows denaturation. For example, when egg white is cooked it changes colour and becomes firmer (sets). The heat causes egg proteins to unfold from their coiled state and form a solid, stable network.

Aeration

Products such as creamed cakes need air incorporated into the mixture in order to give a well-risen texture. This is achieved by creaming a fat, such as butter or baking spread, with sugar. Small bubbles of air are incorporated and form a stable foam.

Fats performs different functions in food.

They help to:

- add 'shortness' or 'flakiness' to foods, e.g. shortbread, pastry;
- provide a range of textures and cooking mediums;
- glaze foods, e.g. butter on carrots;
- aerate mixtures, e.g. a creamed cake mix;
- add a range of flavours.

Plasticity

Fats do not melt at fixed temperatures, but over a range. This property is called plasticity.

Colloidal systems

Colloidal systems give structure, texture and mouthfeel to many different products.

System	Disperse phase	Continuous phase	Food
Sol	Solid	Liquid	Unset jelly
Gel	Liquid	Solid	Jelly
Emulsion	Liquid	Liquid	Mayonnaise
Solid emulsion	Liquid	Solid	Butter
Foam	Gas	Liquid	Whipped cream
Solid foam	Gas	Solid	Meringue

Raising agents

Raising agents include anything that causes rising within foods, and are usually used in baked goods. Raising agents can be:

- biological, e.g. yeast;
- chemical, e.g. baking powder;
- mechanical, e.g. adding air through beating or folding.

Functional ingredients

These are ingredients that are specifically included in food for additional health benefits. They include:

- probiotics – 'good' bacteria that may have a positive impact on human health;
- prebiotics – food ingredients that promote the growth of beneficial microorganisms in the gut;
- sterols/stanols – compounds that can lower cholesterol;
- healthy fats (e.g. omega-3);
- added vitamins and minerals (more than in the original food).

Why is food prepared and cooked?

Food is prepared and cooked to:

- make the food more palatable – improves flavour, texture and appearance;
- reduce the bulk of the food;
- provide variety and interest to meals.

Methods of cooking food

The methods of cooking are divided up into groups. These are based on the cooking medium used.

They are:

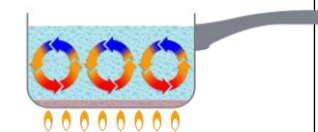
- moist/liquid methods, e.g. boiling;
- dry methods, e.g. grilling;
- fat-based, e.g. frying.

Selecting the most appropriate way of preparing and cooking certain foods is important to maintain or enhance their nutritional value.

- Vitamins can be lost due to oxidation during preparation or leaching into the cooking liquid.
- Fat-based methods of cooking increase the energy (calories) of the food.
- The use of different cooking methods affects the sensory qualities of the food.

There are three ways that heat is transferred to food.

- Conduction – the exchange of heat by direct contact with foods on a surface.
- Radiation – energy in the form of rays.
- Convection – currents of hot air or hot liquid transfer the heat energy to the food.



Tasks

1. Choose a recipe that you enjoy or have made recently and explain in detail the functions of the ingredients.
2. Explain the function of raising agents, giving examples of recipes.

To find out more go to: <https://bit.ly/2SPqWEG>

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 **4Cs**:

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

FOOD SAFETY

COOK cook to proper temperatures	SEPARATE do not cross-contaminate
CLEAN wash hands and surfaces often	CHILL refrigerate promptly

give bacteria no chance

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 **63°C**.

- Bacteria will begin to die when the temperature rises above **60°C**.
- 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 **5°C**. 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 **5°C– 63°C** is known as the 'danger-zone'. Bacteria will multiply most rapidly within this temperature range. Reducing the temperature below **5°C** 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:

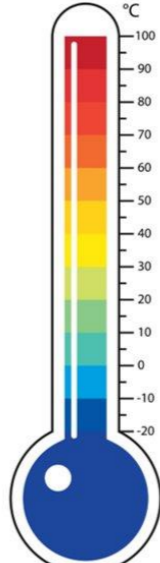
- humans;
- rubbish;
- pests and other animals;
- food, e.g. raw meat or poultry.

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.

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.

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

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 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, 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.

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.

Food labelling and health claims

Food labelling

Manufacturers include a range of information on food labels. Some of which is legally required and some of which is useful to the consumer or supermarket.

Nutrition information helps consumers make healthier choices. Back-of-pack nutrition information is legally required on food packaging.

NUTRITION

When heated according to instructions

Typical values	Per 100g	Each pack (390g**)
Energy	457kJ 109kcal	1781kJ 424kcal
Fat	3.9g	15.2g
of which saturates	1.9g	7.5g
Carbohydrate	12.1g	47.1g
of which sugars	1.6g	6.2g
Fibre	1.1g	4.2g
Protein	5.8g	22.6g
Salt	0.6g	2.2g

Legally required information

- Name of food or drink.
- List of ingredients (including water and food additives), in descending order of weight.
- Weight or volume.
- Date mark (Best-before and use-by).
- Storage and preparation conditions.
- Name and address of the manufacturer, packer or seller.
- Country of origin and place of provenance.
- Nutrition information.

Additional information may also be provided, such as cooking instructions, serving suggestions or price.

Date marks

Best-before-date: The date after which foods may not be at their best, although probably safe to eat if stored according to instructions.

Use-by-date: The date given to foods that spoil quickly, such as cooked meats. It is unsafe to eat foods beyond their use-by-date.



Beetroot salad

Keep refrigerated. Once opened consume within 24 hours and by the 'use-by' date shown.

Additives

Food additives must be shown clearly in the list of ingredients on food labels, either by the additive's name or E number.

Additives are added to ensure safety, increase shelf life or improve the taste, texture or appearance of food. Additives need to be approved before they can be used. Additives are given an 'E number' to show that they have been rigorously tested for safety and have been approved for use in food by the European Commission.

An example is E100 or curcumin, made from turmeric.

Another example is caramel (E150), a synthetic colouring commonly used to colour colas.



Key terms

Additives: Are added to ensure safety, increase shelf life or improve the taste, texture or appearance of food. They must be shown clearly on food labels.

Allergen labelling: Allergens must be clearly shown in **bold**, **highlighted**, **underlined** or in *italics*.

Back-of-pack labelling: Is legally required and can help consumers make healthier choices.

Claim: Any statement about the nutrient content or health benefit of a food product.

Front-of-pack labelling: Is voluntary but must provide certain information and can use red, amber and green colour coding.

Labelling: The term given to the information about the product which is displayed on the packaging.

Nutrition information: Helps consumers make healthier choices.

Front-of-pack labelling

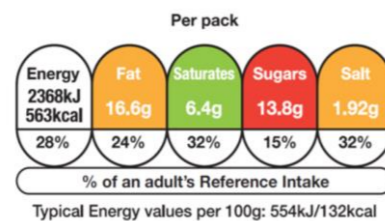
Front-of-pack-nutrition information is voluntary but if a food business chooses to provide this, only the following information may be provided:

- energy only;
- energy along with fat, saturates, sugar and salt.

Red, amber and green colours, if used, show at a glance whether a food is high, medium or low for fat, saturates, sugars or salt. The colour coding can be used to compare two products.

Nutrient	Low	Medium	High
Fat	≤3.0g/100g	>3.0g to ≤17.5g/100g	>17.5g/100g
Saturates	≤1.5g/100g	>1.5g to ≤5.0g/100g	>5.0g/100g
(Total sugars)	≤5.0g/100g	>5.0g and ≤22.5g/100g	>22.5g/100g
Salt	≤0.3g/100g	>0.3g to ≤1.5g/100g	>1.5g/100g

Note: Portion size criteria apply to portion sizes/servings greater than 100g.



To find out more, go to:
<https://bit.ly/2SPnj1g>

Allergen labelling

An allergic reaction to a food can be described as an inappropriate reaction by the body's immune system to the ingestion of a food.

By law, food, drink and ingredients that are known to contain allergens are required to be in **bold**, **highlighted**, **underlined** or in *italics*.

The most common allergens are present in:

Celery (and celeriac)	Milk
Cereals containing gluten	Molluscs
Crustaceans	Mustard
Eggs	Nuts
Fish	Peanuts
Lupin	Sesame
	Soybeans
	Sulphur dioxide

INGREDIENTS

Water, Carrots, Onions, Red Lentils (4.5%), Potatoes, Cauliflower, Leeks, Peas, Cornflour, **Wheat flour**, Cream (**milk**), Yeast Extract, Concentrated Tomato Paste, Garlic, Sugar, **Celery Seed**, Sunflower Oil, Herb and Spice, White Pepper, Parsley

ALLERGY ADVICE

For allergens, see ingredients in **bold**

Nutrition and health claims

Nutrition and health claims are controlled by European regulations. Claims on a food or drink should have been authorised and listed on the European register of claims and have met certain conditions.

Nutrition claims

A nutrition claim describes what a food contains (or does not contain) or contains in reduced or increased amounts. Examples include:

- Low fat (less than 3g of fat per 100g of food);
- High fibre (at least 6g of fibre per 100g of food);
- Source of vitamin C (at least 15% of the nutrient reference value for vitamin C per 100g of food).

Health claims

A health claim states or suggests there is a relationship between a product and health. In order to make a claim, the amount present of the nutrient, substance or food must fulfil the specific conditions of use of the claim. The types of health claims are:

- 'Function Health Claims';
- 'Risk Reduction Claims';
- Health 'Claims referring to children's development'.

Tasks

- Find four different packaged food items in your household or online and list the information provided on the packaging. Explain the purpose of each piece of information and identify if it is legally required or consumer information.
- Explain the importance of date marks and storage instructions, including the consequences of not following them.

What affects food choice

Food choice

Food choices for a balanced diet depend on many factors, such as:

- advertising and other point of sale information;
- cost and economic considerations;
- cultural or religious practices;
- environmental and ethical considerations;
- food availability;
- food preferences;
- food provenance;
- health concerns;
- individual energy and nutrient needs;
- portion size;
- social considerations.

Consumer information

Information can help consumers make informed choices, including:

- advertising and marketing;
- media, online blogs/forums;
- packaging, nutrition and health claims;
- point of purchase information and product placement;
- recipe ideas.

Cost and economic considerations

The cost of food and money available will influence people's food choices. If money is limited, people may choose to buy more basic items. Luxury items might then be selected for special occasions.

Food prices

Food prices can and do change throughout the year and over time. This may be due to a variety of reasons, including:

- climate and weather patterns;
- crop failure;
- crop disease;
- seasonality;
- consumer demand;
- agricultural costs increase;
- fuel prices go up;
- increased use of bio fuels.

Budgeting

There are many things that we can do to spend money wisely on food. Examples can include:

- eating the seasons;
- stocking up on food with a long shelf-life;
- taking time to plan meals and write a shopping list;
- cooking using one pot;
- making fake-aways rather than buying takeaways;
- using leftovers;
- replacing branded items with cheaper items;
- comparing prices and shop around to find the cheapest items;
- growing your own food.

Cultural or religious practices

People around the world choose to eat or avoid certain food due to their cultural or religious practices.

Religion	Pork	Beef	Lamb	Chicken	Fish
Islam	x	Halal only	Halal only	Halal only	✓
Hinduism	x	x	✓	✓	✓
Judaism	x	Kosher only	Kosher only	Kosher only	✓
Sikhism	x	x	✓	✓	✓
Buddism (strict)	x	x	x	x	x
Seventh-day Adventist Church	x	x	x	✓	✓
Rastafari movement	x	x	x	x	x

Environmental and ethical considerations

Some considerations when buying food might be:

- fair trade;
- local food;
- genetically modified (GM) food;
- organic food;
- free range.

Food availability

Buying food when it is in season will often mean that the price is lower. Technology and the importation of food has allowed food to be available all year round.

To find out more, go to: <https://bit.ly/3dpC9Fi>

Personal preferences

A number of factors can influence personal preferences, including:

- colour, size and shape of crockery and cutlery used;
- portion size;
- serving style;
- taste, aroma, texture, appearance, shape and colour of food.

Food provenance

Food provenance is about where food is grown, caught or reared, and how it was produced. Food certification and assurance schemes guarantee defined standards of food safety or animal welfare. There are many in the UK, including:

Red Tractor



The British Lion mark



Marine Stewardship Council



Health concerns

People may choose their food based on their own or their family's health and wellbeing:

- allergy and intolerance, e.g. lactose intolerance, coeliac disease, wheat allergy, dairy allergy;
- body image;
- health issues, e.g. coronary heart disease, type 2 diabetes, inflammatory bowel disease, over or under malnutrition;
- mental health.

Individual energy and nutrient needs

The amount of energy and nutrients needed differs between different age groups and between males and females.

Energy needs also depend on activity levels. For example, athletes will have much higher energy requirements due to their high level of physical activity.

Tasks

1. Consider your own household and create a mind map of the social and economic considerations that affect your food choice. Explain how different this might be to your grandparents at your age.
2. Explain why food provenance is important to some consumers. Include examples of UK food certification and assurance schemes.

Key terms

Advertising: Advertising is a form of communication for marketing and used to encourage, persuade, or manipulate an audience to continue or take some new action.

Ethical: Relating to personal beliefs about what is morally right and wrong.

Food certification and assurance schemes: Defined standards of food safety, quality or animal welfare.

Food provenance: Knowing where food was grown, caught or reared and how it was produced.

Marketing: Promoting and selling products or services, including market research and advertising.

Religion: A particular system of faith and worship.

Seasonal food: Food grown at a particular time of year.

Portion size

Having a healthy, balanced diet is about getting the right types of foods and drinks in the right amounts.



Social considerations

- Body image and peer pressure.
- Development of ready meals and a wider range of convenience foods.
- Development of labour saving devices.
- Lack of competence and confidence in the kitchen.
- Lack of time.
- Living arrangement (e.g. living alone).

Where food comes from – food processing

Where food comes from

No matter where it is bought from, food is grown, reared or caught, then processed in some way, to make it edible and safe to eat.

Food processing

Food processing is any deliberate change in a food that happens before it is available for us to eat; almost all food is processed in some way.

Commercially, the main reasons to process food are to eliminate microorganisms (which may cause disease) and to extend shelf life. Food production and processing ensures that food is edible and safe to eat.

Foods are processed for a number of reasons:

- to extend the shelf life, e.g. making strawberries into jam;
- convenience, e.g. frozen ready meals;
- health, e.g. reduced fat yogurt;
- to provide consumers with more variety and choice;
- to provide additional nutritional benefits, e.g. fortified breakfast cereals.

New product development (NPD)

NPD is the process of creating new or modified food products, with the aim of increasing sales to maintain a company's competitiveness within the consumer market. NPD involves a complex series of stages, requiring the combined talents of many specialists to make it successful:

- initial ideas;
- test kitchen;
- sensory evaluation;
- pilot plant;
- production specification;
- consumer testing;
- scale up and launch.

For more information, go to:

<https://bit.ly/398qABo>

Food Manufacturing

Modern processing has developed over the centuries, with canning and pasteurisation advancing the microbiological safety of food. Food processing can be very simple, e.g. preparing, freezing or drying food to preserve nutrients and freshness. It can also be complex, e.g. formulating a frozen meal with the right balance of nutrients and ingredients.

There are two main stages to food processing:

- primary - foods are processed after harvest or slaughter, e.g. wheat is harvested and then milled into flour;
- secondary - food is made into products, e.g. flour into bread or pasta. Steps need to be taken at all stages of food supply to prevent contamination and spoilage and avoid food wastage.

Hazard analysis, critical control points (HACCP)

Food businesses have a legal responsibility to produce safe food. HACCP is a structured approach to risk assessment, used by food companies to make sure they do not break the law by putting consumers at risk.

The seven principles of HACCP are:

1	Hazard analysis
2	Determine the Critical Control Points (CCP)
3	Establish critical limits
4	Critical Control Point (CCP) monitoring
5	Corrective actions
6	Establish verification procedures
7	Record keeping procedures

Functional foods

Functional ingredients are ingredients that are specifically included in food for additional health benefits, including pre- and pro- biotics.

Food additives

Additives are used to ensure safety, increase shelf life or improve the taste, texture or appearance of food. Additives need to be approved before they can be used.

Additives are given an 'E number' to show that they have been rigorously tested for safety and have been approved for use in food by the European Commission.

Jams contain several kinds of additives, including emulsifiers and gelling agents.



Freezing & dehydrating

The shelf life of food and drink can be extended by freezing and dehydrating.

Freezing – commercial methods are based on two principles:

1. very low temperatures inhibit growth of microorganisms;
2. the formation of ice crystals draws available water from the food.

Dehydration – reduces the water activity level, weight, bulk of the food, and helps to preserve a product. There are a number of techniques used including; sun drying, spray drying, fluidised bed drying, roller drying and accelerated freeze-drying.



Tasks

1. Describe the purpose of food additives. Include at least three examples.
2. Choose a food product and research how it is produced, e.g. frozen fish fingers, chocolate covered biscuits, semi-skimmed milk.

Pasteurisation, sterilisation and irradiation.

The shelf life of food can be extended if sufficient heat is applied to kill microorganisms and inactivate the enzymes that are present.

Pasteurisation – extends shelf life by killing most food spoilage organisms and pathogenic organisms. Products are treated with mild heat, usually to less than 100°C for 30-35 minutes.

Sterilisation – is a more severe process that destroys all microorganisms.

Irradiation – produces an effect in food similar to pasteurisation.

Filling, forming and enrobing

Many manufactured food products go through a number of processes before they make it to the shop shelves.

Filling – a measured quantity of food mixture is injected or sandwiched into the centre of food.

Forming – ensures that products are of a uniform shape and size.

Enrobing – is a process of coating the outer layer of a product, e.g. chocolate-coated biscuits.

Extrusion and canning

Extrusion – is a process where raw materials are forced through a cylindrical barrel in order to form, shape and sometimes cook.

Canning – aims to destroy all microorganisms and their spores through the application of heat by sterilising food in airtight containers.

Key terms

Additives: Are added to ensure safety, increase shelf life or improve the taste, texture or appearance of food.

E numbers: Given to an additive to show it has been approved for use in the EU.

Food labels: Provide information and help consumers make choices.

Food processing: Any deliberate change in a food that happens before it is available for us to eat.

Hazard analysis, critical control point (HACCP): A system which looks for and prevents potential problems before they happen.

Packaging: Used to protect the food or drink from physical damage, chemical or bacterial contamination and provide information.

Pathogenic: Disease causing microorganisms.

Packaging

Due to advances in technology, most food items are now sold pre-packed.

Food products often have a long journey from the initial manufacturer, until finally being eaten by the consumer. The aim of packaging includes:

- preventing physical damage, e.g. from knocking, shaking or crushing;
- preventing contamination from microorganisms, pollution or vermin;
- protecting against dehydration or dampness;
- protecting the product's nutritional and sensory characteristics;
- keeping the product in peak condition;
- helping to increase a product's shelf life.

Packaging is also designed to be visually stimulating and provide information about the product.

Food labelling

Manufacturers include a range of information on food labels. Some of which is legally required and some of which is useful to the consumer or supermarket. Best-before and use-by dates are examples of information that is legally required.

Where food comes from

Where food comes from

Food can be grown, reared or caught.

Plants are grown in an environment where light, food (soil) and water are available to help them grow and photosynthesise.

Food production and processing ensures that food is edible and safe.

Historical changes

Throughout the ages, people have hunted animals and gathered plants for food, relying on what was growing locally and animals that were easy to catch. The discovery of fire meant animals and plants could be cooked to eat and taste better. The industrial revolution in the 19th century led to greater mechanisation of food production allowing for the development of new products and increased volumes of production, as well as jobs outside of the home or even the local area.

Today, other factors that affect food production include:

- domestication of animals and crops;
- preservation methods;
- development of villages and towns;
- changes of land ownership;
- transport and travel;
- war;
- religion and culture;
- famine, drought, flood, disease,
- research and development of food ingredients.

Diets have changed too and the need for cooking in the home has been reduced by the availability of processed foods.

Food provenance

Food provenance is about where food is grown, caught or reared, and how it was produced. Food certification and assurance schemes guarantee defined standards of food safety or animal welfare. There are many in the UK, including:



Farming systems

Agriculture in the UK can be grouped into the following:

- **Intensive** – a system of production using large amounts of labour and capital relative to land use (high input/high output);
- **Extensive** – a system of production using small amounts of labour and capital in relation to area of land being farmed (low input/lower output);
- **Conventional** – a system that may include the use of artificial and natural pesticides (to control pests, weeds and diseases), artificial fertilisers and organic manures; other techniques used may include concentrated animal feeding/rearing operations, includes both intensive and extensive approaches;
- **Organic** – a system where artificial fertilisers are not allowed to be used, soil fertility is built through crop rotation, and inorganic pesticide use is severely restricted. It is a form of extensive farming;
- **Free-range** – a system where animals, for at least part of the day, can roam freely outdoors. This may be done within a conventional or an organic system;
- **Regenerative farming** – a cropping system and grazing practice that, among other benefits, reverses climate change by rebuilding soil organic matter and restoring degraded soil biodiversity, resulting in both carbon capture and improving the water cycle.



Farming types in the UK

There are seven main types of farming in the UK:

- **aquaculture** – farming fish in fresh or sea water;
- **arable** – growing of crops and cereals;
- **horticulture** – production of flowers, fruit, vegetables or ornamental plants;
- **market gardening** – small scale production of fruit and vegetables;
- **mixed farming** – combination of arable and pastoral;
- **pastoral** – rearing and production of animals, including pigs, chickens, hill farming sheep, beef and dairy cattle;
- **viticulture** – grapes.

For more information, go to: <https://bit.ly/398qABo>

Farming across the UK

Some parts of the UK have excellent soil for crops, while others are used for cattle, sheep, pigs and poultry.

North West England, Wales and Scotland	Sheep and beef cattle are most suited to the land and colder temperatures.
Northern Ireland	Sheep, cattle, pigs and dairy are the largest commodity sectors.
South West England	Dairy farming is suited to this region due to the quality grass grown.
East of England	Arable crops such as wheat and barley and vegetables are grown.
South East of England and lowlands of Scotland	Grain, potatoes and sugar beet are grown along with vegetables.

Hydroponics

Hydroponic vegetables are grown in a nutrient solution rather than soil. Tomatoes, peppers and lettuce are increasingly grown this way. Growing vegetables hydroponically enables them to be grown in a controlled environment with less chance of disease, faster growth and greater yield.

Genetic modification and biotechnology

Genetic modification of plants and crops can help:

- improve crops resistance to pests, disease or drought;
- extend shelf life;
- improve nutrition and taste;
- produce higher yields;
- animals may be made more resistant to disease, produce less fatty meat, grow faster or be more fertile.

Tasks

1. The Red Tractor food assurance scheme requires strict standards of animal welfare. List the main requirements for cows, sheep and pigs.
2. Create a presentation about farming in your local area. Include how it has changed over time.

Key terms

Food provenance: Knowing where food was grown, caught or raised and how it was produced.

Genetic modification: The direct manipulation of an organism's genes using biotechnology.

Hydroponics: The process of growing plants in sand, gravel, or liquid, with added nutrients but without soil.

Organic farming: A system of farming and food production. Certification is legally required to grow, process or market organic products.

Photosynthesis: The process by which green plants and some other organisms use sunlight to synthesise nutrients from carbon dioxide and water.

Seasonality: Fruit and vegetables naturally grow in cycles, and ripen during a certain season each year.

Seasonality in the UK

Fruit and vegetables naturally grow in cycles and ripen during a certain season each year. When they are in season they are harvested.

Buying and eating food that is season means that it is fresh, has the best flavour, texture and colour, and has optimum nutritional value. Other benefits include lower cost, supporting local growers, reduced energy needed to grow and transport the ingredients and food.

World food

There are a wide variety of ingredients and foods that are not readily available in the UK, due to the climate. These are imported from other countries.

The availability of these ingredients and foods provides consumers with a wide choice throughout the year.

The variety of ingredients and foods that are now readily available have been introduced to the UK over a long period of time.

