

DT Year 10 Food Preparation and Nutrition	Term 1	Term 2	Term 3
Topic	Nutrition	Food provenance	Food choice
Core Knowledge	<p>Knowledge and understanding of</p> <p>The range of factors that influence food choices, including enjoyment, preferences, seasonality, costs, availability, time of day, activity, celebration, or occasion</p> <p>The choices that people make about certain foods according to religion, culture, ethical belief or medical reason</p> <p>How to make informed choices about certain foods according to religion, culture, ethical belief or medical reason</p> <p>How to make informed choices about food and drink to achieve a varied and balanced diet, including awareness of portion sizes and costs, how the information about food available to the consumer, including food labelling and marketing, influences of food choice.</p> <p>The scientific principles underlying the preparation and cooking of food:</p> <p>Why food is used</p> <p>How heat is transferred to food through conduction, convection and radiation</p> <p>Appropriate cooking methods to conserve or modify nutritive value or improve palatability</p>	<p>Knowledge and understanding of</p> <p>Why food is cooked</p> <p>How heat is transferred to food through conduction, convection and radiation</p> <p>Appropriate cooking methods to conserve or modify nutritive value or improve palatability.</p> <p>Understanding of the working characteristics, functional and chemical properties of ingredients to achieve a particular result:</p> <p>Carbohydrates – gelatinisation, dextrinisation</p> <p>Fats/oils – shortening, aeration, plasticity and emulsification</p> <p>Protein – coagulation, foam formation, gluten formation, acid denature</p> <p>Fruit/vegetables - enzymic browning, oxidisation</p> <p>How preparation and cooking affects the sensory and nutritional properties of food</p> <p>Food safety principles when buying, storing, preparing and cooking food:</p> <p>How to store foods correctly and the importance of date-marks</p> <p>The growth conditions and control for enzyme action, mould growth and yeast production.</p>	<p>Specifications must require students to demonstrate and apply skills when planning, preparing, cooking and presenting a selection of recipes, modifying recipes, or creating new recipes, to meet particular requirements. Students must be able to:</p> <p>consider the influence of lifestyle and consumer choice when developing meals and recipes</p> <p>consider the nutritional needs and food choices when selecting recipes, including when making decisions about the ingredients, processes, cooking methods, and portion sizes</p> <p>develop the ability to review and make improvements to recipes by amending them to include the most appropriate ingredients, process, cooking methods, and portion sizes</p> <p>manage the time and cost of recipes effectively</p> <p>use their testing and sensory evaluation skills, adjusting where</p>

		<p>The signs of food spoilage, including enzymic action, mould growth, yeast production and bacteria. Some bacteria have helpful properties in food production The factors which affect bacterial growth – time, temperature, moisture and food availability.</p> <p>The types of bacterial cross-contamination and their prevention</p>	<p>needed, to improve the recipe during the preparation and cooking process</p> <p>Explain, justify and present ideas about chosen recipes and cooking methods to others.</p> <p>Make decisions about which techniques are appropriate based on understanding of nutrition, food, different culinary traditions and cooking and food preparation content in order to achieve their intended outcome. They must be able to carry out these techniques safely and combine them into appealing meals whilst evaluating the results</p> <p><b>Practice Investigation</b> A food science investigation</p>
<p>Core Skills</p>	<p><b>Use of equipment</b></p> <p>Dry heat and fat based methods using the hob Be able to demonstrate the following techniques:</p> <ul style="list-style-type: none"> <li>• dry frying</li> <li>• pan (shallow frying)</li> <li>• stir frying</li> </ul> <p>Using the grill Be able to demonstrate the following techniques with a range of foods, such as vegetables, meat, fish or</p>	<p>Make sauces Be able to demonstrate the following techniques:</p> <ul style="list-style-type: none"> <li>• make a blended white sauce (starch gelatinisation) such as a roux and all in one blended sauce, infused sauce, veloute, bechamel, to demonstrate understanding of how liquid/starch ratios affect the viscosity and how conduction and convection work to cook the sauce and the need for agitation</li> <li>• make a reduction sauce such as pasta sauce, curry sauce, gravy, meat</li> </ul>	<p>Judge and manipulate sensory properties Be able to demonstrate the following techniques:</p> <ul style="list-style-type: none"> <li>• how to taste and season during the cooking process</li> <li>• change the taste and aroma through the use of infusions, herbs and spices, paste, jus, reduction</li> <li>• how to change texture and flavour, use browning (dextrinisation) and glazing, add crust, crisp and crumbs</li> </ul>

	<p>alternatives such as halloumi, seeds and nuts:</p> <ul style="list-style-type: none"> <li>• char</li> <li>• grill or toast</li> </ul> <p>Using the oven</p> <p>Be able to demonstrate the following techniques:</p> <ul style="list-style-type: none"> <li>• baking</li> <li>• roasting</li> <li>• casseroles and/or tagines</li> <li>• braising</li> </ul>	<p>sauce (including meat alternatives such as myco-protein and textured vegetable protein) to demonstrate how evaporation concentrates flavour and changes the viscosity of the sauce</p> <ul style="list-style-type: none"> <li>• make an emulsion sauce such as a salad dressing, mayonnaise, hollandaise to demonstrate the technical skill of how to make a stabilised emulsion</li> </ul> <p>Set a mixture - removal of heat (gelation)</p> <p>Be able to demonstrate the following techniques:</p> <ul style="list-style-type: none"> <li>• use starch to set a mixture on chilling for layered desserts such as custard or cheesecake</li> </ul> <p>Set a mixture - heating (coagulation)</p> <p>Be able to demonstrate the following techniques:</p> <ul style="list-style-type: none"> <li>• use protein to set a mixture on heating such as denatured protein in eggs for quiche, choux pastry</li> </ul> <p>Use of raising agents</p> <p>Be able to demonstrate the following techniques:</p> <ul style="list-style-type: none"> <li>• use egg (colloid foam) as a raising agent - create a gas-in-liquid foam - whisking egg whites, whisked sponge</li> <li>• use chemical raising agents - self raising flour, baking powder</li> <li>• use steam in a mixture (choux pastry, batter)</li> </ul> <p>Make a dough</p>	<ul style="list-style-type: none"> <li>• presentation and food styling – use garnishes and decorative techniques to improve the aesthetic qualities, demonstrate portioning and presenting</li> </ul>
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		<p>Be able to demonstrate the following techniques:</p> <ul style="list-style-type: none"> <li>• use the technical skills of shortening, gluten formation, fermentation (proving) for bread, pastry, pasta</li> </ul> <p>Shaping and finishing a dough</p> <p>Be able to demonstrate the following techniques:</p> <ul style="list-style-type: none"> <li>• roll out pastry, use a pasta machine, line a flan ring, create layers (palmiers), proving/resting,</li> <li>• glazing and finishing such as pipe choux pastry, bread rolls, pasta, flat breads, pinwheels, pizza, calzone</li> </ul> <p>Test for readiness</p> <p>Be able to demonstrate the following techniques:</p> <ul style="list-style-type: none"> <li>• use a temperature probe, knife/skewer, finger or 'poke' test, 'bite', visual colour check or sound to establish whether an ingredient or recipe is ready</li> </ul>	
Enhanced Knowledge	You can demonstrate your knowledge by being able to use appropriate methods of food preparation taking into account people's individual choices. You can use your knowledge to make informed choices with regards to economics and health aspects.	You can demonstrate a solid knowledge of food chemistry and bacterial decomposition and food poisoning. You can demonstrate that you are aware what precautions to follow to avoid bacterial contamination.	You can demonstrate an understanding of meal planning and composition. You can show that you can manipulate the properties of food to maximise enjoyment for the customer.
Enhanced Skills	1. Dry frying bacon and pine nuts and pan (shallow frying) sautéed potatoes	1. Mayonnaise and demo of hollandaise 2. Chicken with a veloute	



	<p>2. Stir frying vegetables and making spring rolls</p> <p>Using the grill Be able to demonstrate the following techniques with a range of foods, such as vegetables, meat, fish or alternatives such as halloumi, seeds and nuts:</p> <p>3. Char grill peppers and halloumi and serve in a mixed salad and an emulsion salad dressing</p> <p>4. Grill a sausage (use a temperature probe) and make cheese on toast</p> <p>Using the oven Be able to demonstrate the following techniques:</p> <p>5. Brownies (skewer test)</p> <p>6. Roast chicken (temperature probe)</p> <p>7. Beef casserole (knife test for softness)</p> <p>8. Braising deboned chicken legs</p> <p>9. Tagliatelli Bolognese (dry frying meat, reduction sauce and bite test for pasta)</p> <p>10. Bread (colour and sound test), pizza, calzone making (gluten formation, fermentation (proving) and glazing)</p>	<p>3. Pasta bake with béchamel sauce (gelatinisation – setting a mixture through heating starch)</p> <p>4. ice cream (gelation)</p> <p>5. Angel delight (starch setting a mixture on chilling) and crème brûlée (setting a mixture through heating)</p> <p>6. quiche (setting a mixture on heating such as denatured protein in eggs)</p> <p>7. Italian sponge cake (use egg (colloid foam) as a raising agent, create a gas-in-liquid foam)</p> <p>8. Scones (self-raising flour, baking powder)</p> <p>9. Profiteroles (use steam in a mixture and piping)</p> <p>10. Flan made with vegetable shortening (Crisco or cookeen), pastry rolled out neatly, flan ring lined and flan decorated with pastry offcuts</p> <p>11. Palmiers (create layers and resting)</p>	
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Year 10 Curriculum Overview Food Preparation and Nutrition 2023-24

Assessment Focus	Knowledge based assessment and practical skills test  2 theory assessments:		Knowledge based assessment and practical skills
Homework	Homework project over 1 term	Homework project over 1 term	Homework project over 1 term
British values	Further the freedom to make life choices and choices with regards to economics and health aspects in a supportive environment.	Further the respect for others and ensure their physical welfare.	Further tolerance and harmony between different cultural traditions by enabling students to acquire an appreciation of and respect for their own and other cultures. Further tolerance and respect for all age groups within society.

# Knowledge organiser

KS 4 Food preparation and nutrition

# Macronutrients – Fats and Proteins

Chemical compounds found in food, and needed by the body in large amounts.  
Provide energy and building materials for the bodily processes.

## PROTEINS

large biomolecules built of amino acids bound together into long chains

15% of daily energy intake



Proteins have many functions in our bodies:

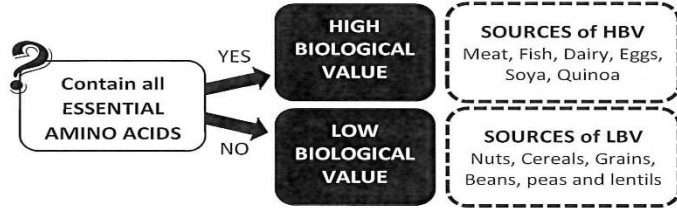
### Functions

- Build enzymes and hormones
- Build cell membranes
- Repair and maintain tissues
- Defend the body (antibodies)
- Secondary source of energy

There are approximately 20 amino acids in total and each one has a specific function in our body. While most can be made by our bodies, approximately nine cannot and have to be consumed by food.

- **Essential amino acids** – cannot be made by our bodies and need to come from food
- **Non-essential amino acids** – readily made by the body

Different foods contain different amounts of these essential amino acids. Foods that contain them all are called **high biological value** foods and a protein source that lacks one of these essential amino acids is called a **low biological value** protein.



**Essential amino acids:** histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, valine

**Non-essential amino acids:** alanine, arginine, asparagine, aspartic acid, cysteine, glutamic acid, glutamine, glycine, proline, serine, tyrosine

Too much or too little protein and the following can happen:

<b>Excess</b>	<ul style="list-style-type: none"> <li>• Kidney and liver diseases</li> <li>• Weight gain</li> </ul>
<b>Deficiency</b>	<ul style="list-style-type: none"> <li>• Kwashiorkor</li> <li>• Slowing growth rate</li> <li>• Swelling</li> </ul>

## What about vegetarians and vegans?

### Protein Alternatives

Vegetarians and vegans don't consume meat so instead they use protein alternative products, which are manufactured in order to provide protein in a diet, and protein-rich plant foods.

Examples include:

- Mycoprotein (Quorn®)
- Tofu
- Tempeh
- Soy chunks
- Textured vegetable proteins (TVP)
- Beans, lentils, chickpeas

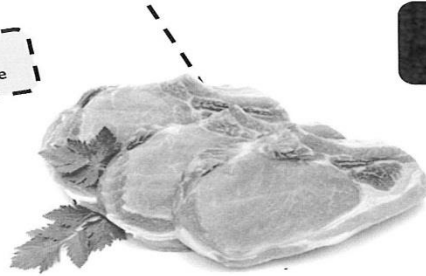


You can obtain HBV proteins by combining two LBV proteins. This is called:

### Protein Complementation

A process of combining two or more LBV protein sources to obtain an HBV protein

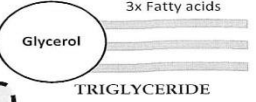
- Examples of protein complementation:
- Baked beans + Bread
  - Rice + Peas
  - Peanut butter + Porridge oats



## FATS

large biomolecules built of one molecule of glycerol and three molecules of fatty acids that provide energy.

35% of daily energy intake



### Functions

- Source of energy
- Insulation
- Dissolve vitamins
- Build hormones
- Build cell membranes

The functions of fats include:

There are two types of fatty acids, outlined below:

### Saturated

Contain only single bonds. Solid at room temperature.

#### Sources:

Meat, cheese, butter, cream, whole milk, lard, suet, eggs



### Unsaturated

Contain one or more double bonds. Liquid (oils) at room temperature.

Unsaturated fats (or fatty acids) can be divided into two further categories:

#### Monounsaturated

One double bond. Go solid when refrigerated.

#### Polyunsaturated

More than one double bond. Remain liquid even at low temperatures.

**Sources:** fish and fish oil, vegetable oils and spreads, nuts and grains, avocados, olives.



Include **Omega 3** and **Omega 6** fatty acids

Present in fish, fish oil and cold-pressed vegetable oils

Food can contain fat even when you can't see it.

### Visible



### Invisible



- Fats you can see, such as on meat, are often saturated.
- However, visible fats can be unsaturated, e.g. oils in fish and from plants.
- Unsaturated fats you cannot see, such as in nuts and avocados, are often good for the brain!
- However, some invisible unsaturated fats can be found in processed foods.

### Excess

- Obesity
- Hypertension
- Coronary heart disease
- Fatty liver disease
- Type 2 diabetes

Fats are needed, but so is a balance of them; too much or too little has consequences...

### Deficiency

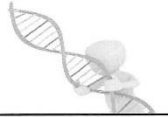
- Weight loss
- Vitamin deficiency
- Heart disease
- Feeling cold

### Cholesterol

Fatty substance present in animal-origin foods, responsible for transporting fats around the body

**Low Density Lipoprotein (LDL)** is 'bad' cholesterol  
**High Density Lipoprotein (HDL)** is 'good' cholesterol

# Macronutrients – Carbohydrates



## CARBOHYDRATES

50% of daily energy intake

large biomolecules built of carbon, oxygen and hydrogen, in form of simple, double or complex molecules built of hundreds of molecules of sugar bonded together

There are two types of carbohydrate: sugars and complex carbohydrates known as polysaccharides, which are further broken down into subgroups.

### SUGARS

Sweet-tasting carbohydrates made up of simple or double molecules of carbohydrates

**Monosaccharides**  
One sugar molecule

**Disaccharides**  
Two sugar molecules

There are three main monosaccharides found in food:

- Glucose** – also known as blood sugar, can be found in fruits and vegetables. Also found in muscles and liver cells.
- Fructose** – sweet sugar found in many fruits
- Galactose** – A less sweet monosaccharide found in mammals' milk

There are three main disaccharides found in food:

- Lactose** – products made from mammals' milk
- Sucrose** – white sugar
- Maltose** – Produced when starch is broken down, found in cereals

#### Sources of sugars

- Fruit and vegetables
- Milk and dairy products
- Sweets and condiments
- Juices and beverages
- Sugar, honey and syrups

#### Free sugar

Sugar that is added to foods, and the sugar naturally present in honey and fruit juices.

These should make up no more than 5% of your daily energy intake.

VS

#### Intrinsic sugar

Sugar that is naturally present in fruit and vegetables.

### POLYSACCHARIDES

Long chains of sugar bound together. Also known as complex carbohydrates. Polysaccharides are either digestible or non-digestible.

#### Digestible

Are absorbed and provide source of energy

#### Sources of digestible polysaccharides

- Starch** – made up of several glucose molecules, this is found in grains, cereals and starchy vegetables
- Dextrin** – produced when starchy foods are cooked, e.g. toast or baking cakes

#### Sources of starches

- Starchy vegetables, e.g. potatoes, parsnips
- Grains**, e.g. wheat, rice, barley, maize, quinoa, bread and pasta, porridge, couscous

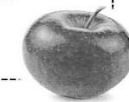
#### Non-digestible

Are not absorbed and support digestive health. Also known as dietary fibre.

#### Sources of non-digestible polysaccharides (dietary fibre)

- Cellulose** – often found in plants' cell walls
- Pectin** – found in cell walls of vegetables and fruits

30 g every day



Dietary fibre can be either soluble or insoluble:

#### SOLUBLE

- Swells in stomach and increases satiety
- Slows down sugar ingestion and prevents high blood sugar levels

#### Sources of soluble dietary fibre

Beans, oats and vegetables (especially the skins)

#### INSOLUBLE

- Adds bulk to the stool
- Regulates bowel movements
- Prevents bowel cancer

#### Sources of insoluble dietary fibre

Wholemeal products, bran, oatmeal, pasta and bread



What do we need carbohydrates for?

#### Functions

- Primary source of energy
- Store energy for later
- Build DNA
- Prevent the body from using own proteins as energy source

What happens if you eat too much or too little carbs?

#### Excess

- Tooth decay
- Type 2 diabetes
- Weight gain and obesity
- Hyperglycaemia

#### Deficiency

- Weight loss
- Lack of energy, tiredness
- Severe weakness
- Hypoglycaemia

- ➔ **Hypoglycaemia** – very low blood sugar level
  - collapse/fainting, coma
- ➔ **Hyperglycaemia** – very high blood sugar level
  - type 2 diabetes, damage to the nerves

What happens if you eat too much or too little fibre?

#### Excess

- Constipation or diarrhoea
- Impaired absorption of nutrients

#### Deficiency

- Constipation or diarrhoea
- Increased risk of obesity, type 2 diabetes, cardiovascular disease, bowel cancer

# Micronutrients – Minerals and Trace Elements

Micronutrients are needed by the body in small amounts to facilitate a range of physiological functions

## Calcium (Ca)

- Works together with phosphorus and vitamin D to ensure proper bone and tooth health
- Works with vitamin K to ensure proper clotting of blood
- Supports muscle contractions
- Takes part in transmitting nerve impulses

### Excess

Excess is rare but too much may lead to it being stored in the kidneys, stopping them from working.

May also cause constipation and stomach issues.



DRV: 700 mg daily

Commonly found in milk and dairy products

Also present in nuts, bread and cereals, oily fish and green vegetables

**Rickets** – effect of Ca deficiency in children, in which bones don't grow properly and impair movement

**Osteoporosis** – effect of Ca deficiency in adults, in which bones become weak, brittle and easy to break, and heal slowly

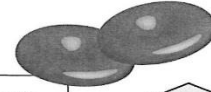
**Excessive bleeding** when cut as the blood cannot clot properly

### Deficiency

## Iron (Fe)

- Necessary to build haemoglobin

**HAEMOGLOBIN:** red pigment in the blood cells, which binds oxygen and carries it around the body



### Excess

- Stomach ache
- Nausea
- Vomiting
- Constipation

**Haem iron**  
(Easily absorbed by the body)

Red meat, offal, egg yolk

**Non-haem iron**  
(Difficult to absorb)

Green leafy vegetables, dried fruit, chocolate, lentils

Iron deficiency anaemia, of which symptoms include:

- pale complexion
- tiredness
- weak and split nails

### Deficiency

Deficiency is usually caused by loss of blood, impaired absorption or genetic disorders.

**MENSTRUATION:** Part of the female monthly cycle when bleeding occurs, that increases the risk of developing iron-deficiency anaemia in girls and women

DRV: 11 mg boys / 15 mg girls

## Potassium (K)

- Maintains body water balance
- Necessary for muscle contractions
- Important electrolyte
- Controls the heart's electrical activity



Both deficiency and excess are very rare and usually cannot occur as a result of imbalanced diet, but if they happen, they may lead to...

DRV: 3500 mg daily

### Excess

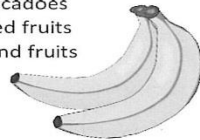
- Irregular heartbeat (arrhythmia) leading to heart paralysis and heart failure
- Nausea and vomiting
- Difficulty breathing
- Chest pain

### Deficiency

- Weakness
- Abnormal heart ratio and arrhythmia
- Paralysis of the respiratory system
- Hypertension
- Muscle cramps
- Swelling of the body

### Sources:

- Potatoes and yams
- Milk, chocolate, cocoa beans
- Bananas, avocados
- Nuts and dried fruits
- Vegetables and fruits
- Red meats



## Magnesium (Mg)

- Essential for energy synthesis
- Necessary to build DNA
- Together with calcium, controls muscle contractions
- Increases bowel movements

### Excess

- Nausea and vomiting
- Diarrhoea
- Very low blood pressure
- Slow heartbeat

- Painful muscle cramps
- Abnormal heartbeat
- High blood pressure

### Deficiency

- Leafy green vegetables, e.g. spinach
- Nuts and whole grains
- Mineral water



DRV: 300 mg daily

## Iodine (I)

- Builds hormones in the thyroid gland
- Controls the ratio of metabolism

### Excess

- Weight gain
- Change in metabolism

- Swelling of the thyroid (GOITRE)

### Deficiency

- Red meat, sea fish, shellfish, cereals, grains, nuts and meat
- May be inhaled at the seaside and in salt caves

DRV: 140 mcg daily

**THYROID:** small gland found at the front of the neck

## Trace Elements

Micronutrients needed in very small amounts

## Fluoride (F)



- Builds and strengthens tooth enamel

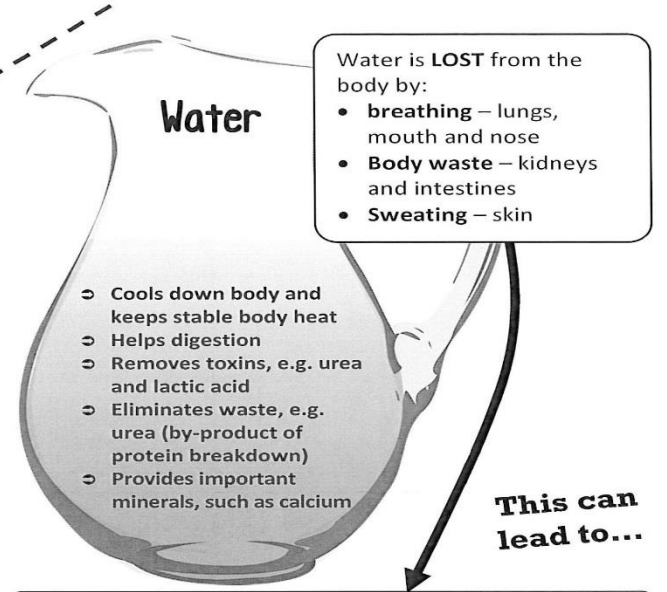
DRV: 3.5 mg daily

### Excess

- Brittle tooth enamel (fluorosis)
- Tooth decay

- Soft tooth enamel or no enamel
- Tooth decay / dental caries

### Deficiency



## Water

Water is LOST from the body by:

- breathing – lungs, mouth and nose
- Body waste – kidneys and intestines
- Sweating – skin

- Cools down body and keeps stable body heat
- Helps digestion
- Removes toxins, e.g. urea and lactic acid
- Eliminates waste, e.g. urea (by-product of protein breakdown)
- Provides important minerals, such as calcium

This can lead to...

**HEAT STROKE:** Uncontrolled, life-threatening increase in body temperature

**DEHYDRATION:** A harmful reduction in water loss in the body

**HYDRATION:** Amount of water necessary for proper functioning of the body

Adult people should drink around two litres of water a day!

- Drink more
- on hot, sunny days
- when you exercise a lot
- when you have fever
- when you want to lose weight



# Micronutrients – Vitamins

Micronutrients are needed by the body in small amounts

## Fat-soluble Vitamins

Vitamins A, D, E and K, present mainly in fatty foods, which can be stored in the body for long periods of time – excess may be harmful

### Vit. A

#### Retinol

active form of vitamin A, found in animal-origin foods

#### Beta carotene

inactive form of vitamin A, found in plant foods

#### Functions:

- Growth and development of the body
- Helps support vision at night
- Keeps the skin and cell membranes healthy



#### Sources:

- Retinol: liver, milk and dairy, egg yolk, oily fish
- Beta carotene: red, yellow and green vegetables and fruit

**Deficiency:** night blindness, flaky and dry skin  
**Excess:** toxic, harmful for unborn babies

**DRV**  
600 mcg daily

### Vit. D

#### Cholecalciferol

Vitamin D deficiency is very common in the UK. For that reason, a doctor can prescribe you a vitamin supplement.

#### Functions:

- Healthy bones and teeth
- Helps absorb calcium

**DRV**  
10 mg daily



#### Sources:

- Produced in the skin in response to sunshine exposure
- Liver, milk and dairy, egg yolk, oily fish

**Deficiency:** rickets, osteoporosis, depression, increased risk of cancer  
**Excess:** damage to the kidneys and other organs, weakened bones

### Antioxidants

- Protect cells from the damage caused by free radicals
- Help prevent cardiovascular disease and cancer, and maintain youth

### Free Radicals

Particles of oxygen which have too few electrons and steal electrons from other particles in the body, causing damage and oxygen stress.

### Vit. E

Fat-soluble vitamin present in vegetable oils, nuts and seeds. Needed to maintain healthy skin. Antioxidant.

### Vit. K

Fat-soluble vitamin present in leafy green vegetables, dairy and egg yolks. Also produced by bacteria in the gut. Necessary for proper blood clotting.

**Vitamins ACE**

## Water-soluble Vitamins

Group B vitamins and vitamin C

Easily excreted from the body, usually non-toxic in excess, deficiency may be harmful

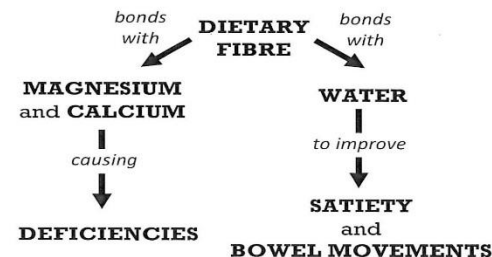
	Function in the body	Source	Effects of deficiency and excess
<b>Vitamin B1</b> <i>Thiamine</i> <b>DRV 1 mg daily</b>	<ul style="list-style-type: none"> <li>• Helps release energy from food</li> <li>• Supports the nervous system</li> </ul>	<ul style="list-style-type: none"> <li>• Liver, milk and dairy</li> <li>• Bread and cereals</li> <li>• Eggs, nuts, peas</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Deficiency:</b> beriberi disease</li> <li>• <b>Excess:</b> very rare</li> </ul>
<b>Vitamin B2</b> <i>Riboflavin</i> <b>DRV 15 mg daily</b>	<ul style="list-style-type: none"> <li>• Supports healthy skin, nerves and mucous membranes</li> </ul>	<ul style="list-style-type: none"> <li>• Chicken, eggs, milk and dairy</li> <li>• Rice, bread, cereals, leafy vegetables, soya</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Deficiency:</b> skin problems, dry lips, poor growth</li> <li>• <b>Excess:</b> very rare</li> </ul>
<b>Vitamin B3</b> <i>Niacin</i> <b>DRV 15 mg daily</b>	<ul style="list-style-type: none"> <li>• Releases energy from carbohydrates</li> <li>• Helps keep skin and nerves healthy</li> </ul>	<ul style="list-style-type: none"> <li>• Meat and poultry</li> <li>• Cereals and grains</li> <li>• Pulses (beans, lentils and other)</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Deficiency:</b> pellagra, inflammation of skin, dementia (memory loss)</li> <li>• <b>Excess:</b> damage to the liver</li> </ul>
<b>Vitamin B9</b> <i>Folate / folic acid</i> <b>DRV 200 mcg daily</b>	<ul style="list-style-type: none"> <li>• Ensures proper development of the nervous system</li> <li>• Helps build red blood cells</li> </ul>	<ul style="list-style-type: none"> <li>• Bread and cereals</li> <li>• Broccoli, Brussels sprouts, spinach</li> <li>• Liver, chickpeas and peas</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Deficiency:</b> spina bifida in newborns</li> <li>• <b>Excess:</b> no known effects</li> </ul>
<b>Vitamin B12</b> <i>Cobalamin</i> <b>DRV 1.5 mcg daily</b>	<ul style="list-style-type: none"> <li>• Helps build new cells</li> <li>• Supports production of myelin which covers nerves</li> </ul>	<ul style="list-style-type: none"> <li>• Meat, milk and dairy, egg yolk</li> <li>• Fish and beef</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Deficiency:</b> pernicious anaemia, more likely in vegans</li> <li>• <b>Excess:</b> no known effects</li> </ul>
<b>Vitamin C</b> <i>Ascorbic acid</i> <b>DRV 40 mg daily</b>	<ul style="list-style-type: none"> <li>• Builds connective tissues (such as skin and mucous membranes)</li> <li>• Helps healing of wounds</li> <li>• Increases absorption of iron</li> </ul>	<ul style="list-style-type: none"> <li>• Potatoes, tomatoes, Brussels sprouts</li> <li>• Berries, currants</li> <li>• Citrus fruit (lemon, orange, kiwi)</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Deficiency:</b> scurvy, impaired healing</li> <li>• <b>Excess:</b> stomach pain and diarrhoea</li> </ul>

## Complementary Actions of Nutrients

Various nutrients work together in the body to carry out chemical processes and ensure we stay healthy.

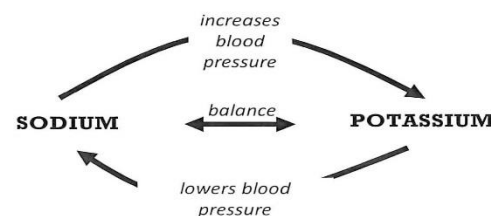


Vitamin D, calcium and phosphorus cooperate to build healthy bones and teeth. Deficiency of one of them may disrupt the process, leading to bone and teeth issues.

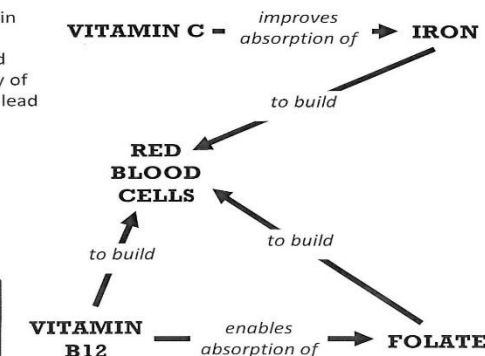
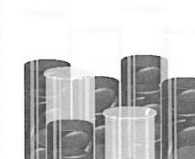


Dietary fibre absorbs water to enhance digestion. Excess fibre can affect absorption of minerals from food, leading to deficiency of them.

It is important to maintain a balance between sodium and potassium, as too much sodium and too little potassium will cause hypertension, and too little sodium with too much potassium may lead to heart issues.



Vitamin C, iron, vitamin B12 and folate are all important to build red blood cells. Deficiency of only one of them can lead to anaemia.



# Planning Balanced Diets for Individuals with Specific Lifestyle Needs

## Planning Meals for Specific Dietary Needs

Some people cannot, or do not want to, eat certain products. It is important to take that into account when planning a meal or diet for them.

### Vegetarians

People who do not eat meat and sometimes other foods of animal origin.

- Lacto-ovo-vegetarians – eat dairy and eggs
- Lacto-vegetarians – eat dairy
- Ovo-vegetarians – eat eggs
- Pescatarians – eat fish

Vegetarians often choose foods which were produced with respect to **animal welfare**, such as free range eggs or organic milk.

- + Vegetarian diet is suitable for all people, including pregnant women and toddlers.
- Vegetarian diet may be low in HBV protein, so people must remember about **protein complementation** when planning their meals.

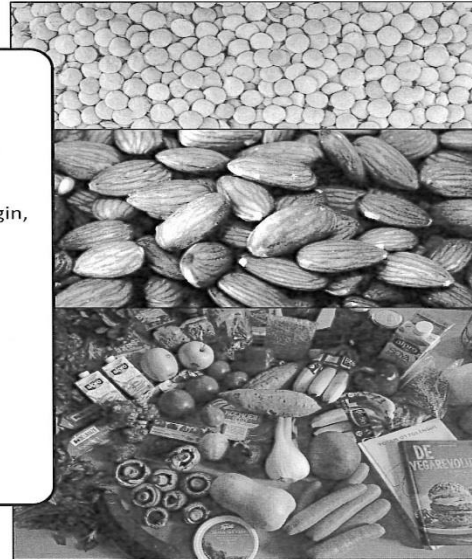
### Vegans

People who **do not eat any foods of animal origin**, such as meat, fish, milk and dairy, eggs, honey and butter.

Often avoid using other products of animal origin, such as leather clothing, fur, feathers, etc.

All foods are plant-based.

- + Rich in dietary fibre and most vitamins.
- May be low in protein.
- May lead to deficiency of vitamin B12.
- May lead to deficiency of iron, and subsequent anaemia.
- May be very monotonous as the choice of products is smaller.



## Physical Activity

People who are very active have higher energy needs and often need to consume additional macro- and micronutrients in order to remain healthy and support their stamina.

### Carbohydrates

Needed as an easily accessible source of energy.

**For whom?**  
Athletes and marathon runners.

### Electrolytes

Needed to maintain water balance in the body and prevent painful cramps.

**For whom?**  
All sportspeople.

### Proteins

Needed to build and repair muscles.

**For whom?**  
Weightlifters and swimmers.

### Fats

Needed to insulate the body and provide extra energy to maintain body temperature.

**For whom?**  
Those who train in the cold (e.g. winter sports, swimming).



## Religion

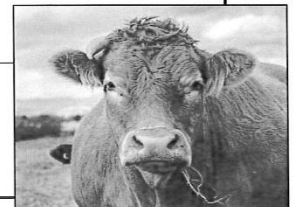
Religion often dictates nutritional regime, and indicates what foods can be eaten and when, and what foods should be avoided.

**Fasting** means that a person cannot eat any foods for a given period of time. Sometimes water and other beverages are permitted.

**Alcohol consumption is forbidden by most religions**



	Islam (Muslims)	Judaism (Jews)	Hinduism (Hindus)
<b>Eat</b>	<i>Halal</i> food only	<ul style="list-style-type: none"> <li>• <i>Kosher</i> food only</li> <li>• Only fish which have both fins and scales can be eaten</li> </ul>	<ul style="list-style-type: none"> <li>• Milk</li> <li>• Mainly vegetarian</li> </ul>
<b>Don't eat (or drink)</b>	<ul style="list-style-type: none"> <li>• Pork</li> <li>• Alcohol</li> <li>• Fish and shellfish without scales</li> </ul>	<ul style="list-style-type: none"> <li>• Shellfish</li> <li>• Pork</li> <li>• Meat with dairy</li> </ul>	<ul style="list-style-type: none"> <li>• Beef</li> <li>• Alcohol</li> </ul>
<b>Holidays or fasting periods</b>	<b>Ramadan</b> – month-long fasting period during which Muslims can eat only at night	<ul style="list-style-type: none"> <li>• <b>Passover</b> celebrates liberation of Jews from slavery in ancient Egypt</li> <li>• <b>Rosh Hashanah</b></li> <li>• <b>Yom Kippur</b></li> <li>• <b>Hanukkah</b></li> </ul>	<b>Diwali</b> – festival of lights
<b>Other info</b>	<ul style="list-style-type: none"> <li>• <i>Halal</i> means permitted, allowed.</li> <li>• To be <i>halal</i>, meat has to be produced in a special way, e.g. animals must be slaughtered in a ceremonious way where all blood is drained from them.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Kosher</i> means clean.</li> <li>• <i>Matza</i> is a special unleavened bread eaten during Passover.</li> <li>• The dietary laws of Judaism are known as <i>kashrut</i>.</li> </ul>	<ul style="list-style-type: none"> <li>• Cows are sacred animals and, therefore, their meat cannot be eaten.</li> <li>• During Diwali, sweets are given as gifts.</li> </ul>





# Energy Requirements of Individuals

Energy is the amount of calories you need every day to properly function and maintain your body mass. It differs for different people, depending on various factors.



**Lifestyle**  
People who have an active lifestyle will need more energy than those who lead a sedentary lifestyle



**Occupation**  
People who are physically active at work will need more energy than those who are not active

**Genetics**  
Genes control our body composition (how much muscle and fat tissue we have), the ratio of metabolism, etc.

**Sex**  
Males usually need more energy than females because they have more muscle tissue, which requires more energy to work than adipose tissue



## Factors Affecting Energy Needs

**Height and Weight**  
Taller and heavier people will need more energy than those who are short and thin, because there are less tissues to nourish



**Pregnancy and Lactation**  
Pregnant women need more energy to support the growth of the foetus, and then extra energy is needed to produce sufficient amount of milk for the baby

**Life Stage**  
Children and teenagers may need relatively more energy due to growth spurt

## BMR and PAL – Importance in Determining Energy Requirements

**BMR** (basal metabolic rate)  
Amount of energy needed to stay alive, e.g. keep heart beating, breathing and keeping stable body warmth.  
**Depends on:** age, weight, height and sex

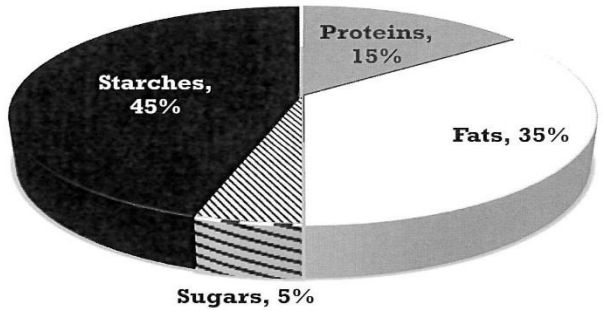
**PAL** (physical activity level)  
Amount of energy needed to perform all life activities, e.g. cleaning up, walking, shopping or swimming  
1.0–1.4 – low PAL  
1.5–1.8 – moderate PAL  
Over 1.8 – active PAL



$BMR \times PAL = \text{Total Energy Expenditure (TEE)}$   
(or how much energy a given person needs each day)

## Daily Energy Intake

To remain healthy, we need to ensure that the energy in our diet comes from various sources.



Energy is measured in kilocalories [kcal] or kilojoules [kJ]  
1 kcal = 4.184 kJ

**Sources of energy in a diet include:**

Proteins	4 kcal / 1 g
Carbohydrates	3.75 kcal / 1 g
Fats	9 kcal / 1 g
Alcohol	7 kcal / 1 g

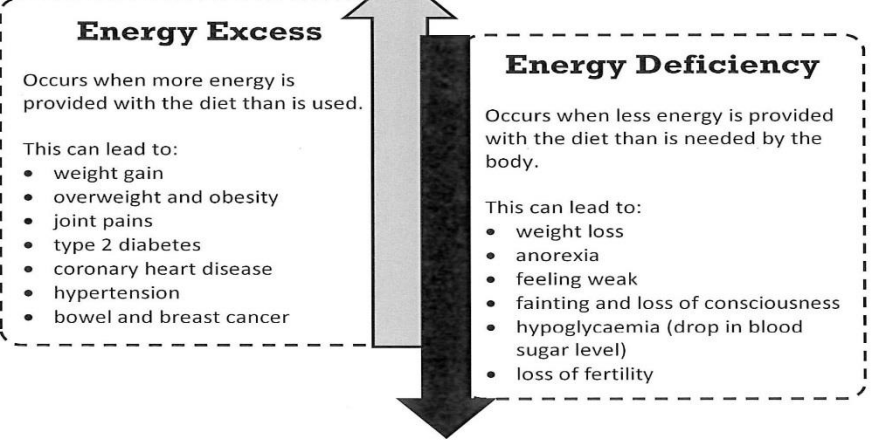
### Who needs more energy?

- Professional sportspeople and people with very active lifestyles.
- Women at the end of pregnancy and when breastfeeding.
- People suffering from certain diseases such as cystic fibrosis, and certain forms of cancer, or extensive burns.

## What Happens if Someone Eats Too Much or Too Little Energy?

**Energy balance** means that a person provides with food exactly as much energy as is needed to carry out all daily tasks and perform all bodily functions.

If there is too little or too much, the body begins to malfunction and symptoms of disease occur.

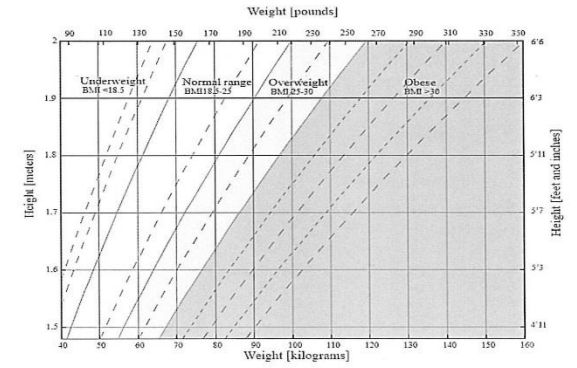


## BMI (Body Mass Index)

Indicates whether a person's weight is appropriate to their height

$$\frac{\text{body mass in kg}}{\text{height in m}^2}$$

- BMI < 18.5 – underweight
- BMI 18.5–25.0 healthy
- BMI 25.0–30.0 overweight
- BMI > 30.0 obese



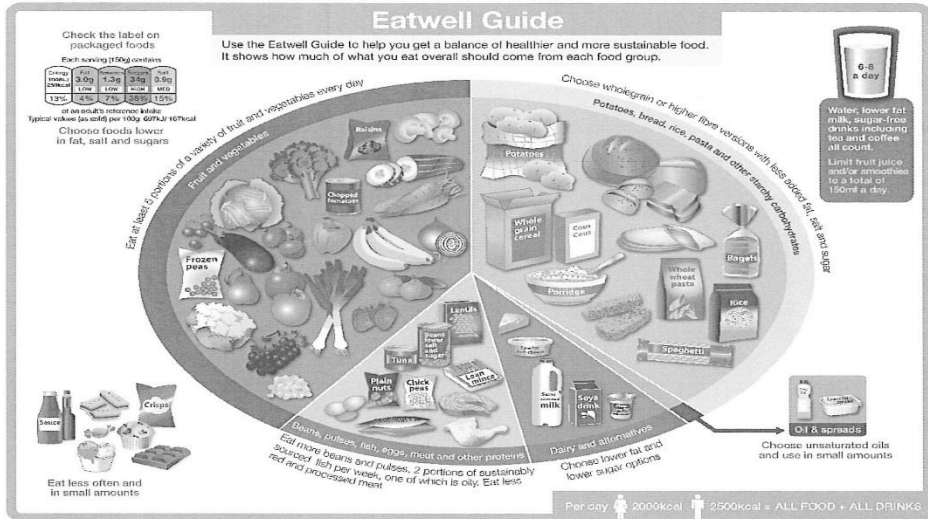
# Planning Balanced Diets 1

## Current Guidelines

Nutritional needs of people differ depending on:

- age, weight, height
- sex/gender
- physical activity levels
- state of health

However, general guidance can be taken from the **Eatwell Guide** (below):



Follow the **eight tips for healthy eating** (below) to ensure your diet is balanced!

**Base your meals on starchy carbohydrates.**

**Eat a lot of fruits and vegetables.**

**Eat more fish – and at least one portion of oily fish a week.**

**Limit the amount of saturated fats and sugars you eat.**

**Eat less salt – no more than 6 g a day.**

**Be active and try to maintain a healthy body weight.**

**Drink plenty of water.**

**Do not skip breakfast.**

**Portion Size and Costing When Planning a Meal**

- Eating correct **portion size** can help ensure that individuals' nutritional and energy needs are met.
- A portion** is the amount of food eaten in one meal.
- Planning ahead meals and shopping helps assess the cost and stay within the **family budget**.
- The family budget** is the amount of money intended to be spent on food or other goods.
- Children may be using **pester power** to force their parents into buying those sweets, toys or other things.

**How to Carry Out Nutritional Analysis**

Nutritional analysis allows you to measure the nutritional value of the food we eat. The following can be used to help you analyse foods:

- Food tables** – contain all data of all nutrients in a given food
- Nutritional analysis software** – helps plan a meal and/or diet for specific target groups or plan a balanced diet

This allows you to assess the **needs of the consumer**: their preferences, health conditions, age, etc. Providing proper amounts of nutrients can help **improve and maintain health**.

**Modifying Recipes**

You can modify your recipes to make a given meal more suitable for different groups or individuals through a number of ways:

- Substitute ingredients, e.g. *meat with soy chunks*
- Lower amount of sugar, salt, fat or other ingredients
- Replace ingredients with low-fat, low-protein or high-fibre ones
- Choose low-fat dressings and sauces, e.g. yoghurt instead of mayonnaise
- Substitute saturated fats with unsaturated ones if possible
- Change the consistency of the meal

For more info check p. 7

## How Nutritional Needs Vary Depending on Age

As we age, nutritional needs change for a number of reasons. It is important to adjust the diet to the individual requirements of a person.

**Toddlers (1–3)**

A diet for toddlers should follow a 5532 rule:

- 5 portions of starchy food
- 5 portions of vegetables and fruit
- 3 portions of milk and dairy
- 2 portions of protein-rich foods
- Vegetarian children should eat 3 portions of protein-rich foods.

**Young children (4–10)**

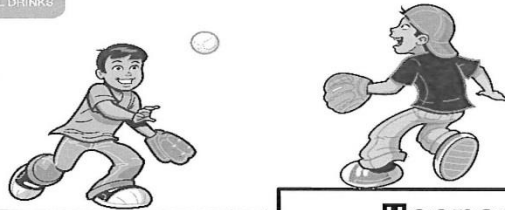
- Growth spurt** means young children require more protein, calcium and vitamin D.
- Teething** means they require more calcium, fluoride and vitamin D to build healthy new teeth.
- More vitamins and minerals are needed to support **forming of the immune system**.
- Sugary sweets and drinks should be avoided to prevent weight gain and tooth decay.

**Teenagers (11–18)**

- Again, **calcium and vitamin D** are needed to support growth spurts and help reach peak bone mass.
- Teenage **girls need more iron** to prevent anaemia from menstruation
- Eat regularly** to provide more energy for increased physical and intellectual activity.
- Limit consumption of sweets and sugary drinks**, do more physical activity and drink more water to prevent obesity and other health issues.

**Adults and Elderly (19+)**

- More dietary fibre** should be consumed to prevent obesity, diabetes and cancers.
- More vitamin D and calcium** is required to maintain strong bones.
- Limit sugary snacks and drinks** to prevent diabetes, coronary heart disease and obesity.
- Elderly are less active, so **less energy** is needed from **energy-dense foods**.
- More iron** to prevent anaemia and maintain healthy red blood cells.
- Less salt** should be consumed, **more physical activity** should be undertaken and **more water** should be drunk to reduce the risk of hypertension.
- Need **more vitamin B12** to prevent dementia.



# Planning Balanced Diets 2

Dietary Needs and Nutritional Deficiencies

Diet and nutrition have a large impact on health. An imbalanced diet may cause many diet-related diseases and conditions.

**Diet:** all food and eating habits of a person



**Nutrition:** macro- and micronutrients provided with diet



**Health:** state of physical, mental and social well-being, lack of illness

## Obesity

### Description:

- Condition in which fat is stored by the body in large amounts
- 25% of adults and 16% of children in the UK are obese

### Reasons why...

- imbalanced diet
- lack of physical activity
- hormonal issues



### Results in...

- × increased risk of CHD
- × hypertension
- × stroke
- × diabetes
- × cancer
- × depression
- × social isolation
- × high cholesterol levels
- × infertility
- × back and joint pains

### How diet should be changed to meet the needs...

Diet should be balanced, varied, low-fat, low-sugar, regular meals during the day.

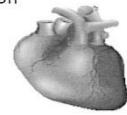
## Coronary Heart Disease

### Description:

- Condition in which blood vessels in the heart are narrowed by cholesterol plaque build-up
- CHD is the main cause of deaths in the UK

### Reasons why...

- imbalanced diet
- too much cholesterol
- obesity
- hypertension
- smoking



### Results in...

- × cholesterol plaque build-up in the heart blood vessels
- × increased risk of heart attack
- × chest pains (angina)

### How diet should be changed to meet the needs...

Diet should be balanced, varied, low-fat to reduce weight, low-cholesterol.

## Type 2 Diabetes

### Description:

- Chronic condition in which blood sugar levels are abnormally high



### Reasons why...

- imbalanced diet
- obesity
- improper secretion of insulin\*
- \**insulin* – hormone produced in the pancreas, which lowers sugar level in the blood by transporting it to the cells

### Results in...

- × damage to the nerves and blood vessels
- × eyesight loss
- × leg amputations
- × kidney failure
- × increased risk of heart attack and stroke

### How diet should be changed to meet the needs...

Diet should be balanced, varied, regular meals, no simple sugars, usually low-fat to reduce weight.

## Hypertension

### Description:

- Condition in which blood pressure is too high (above 90/140 mmHg)
- 25% of adults in the UK suffer from hypertension!

### Reasons why...

- imbalanced diet
- too much salt and cholesterol
- obesity
- impaired kidney performance
- smoking
- alcohol



### Results in...

- × cholesterol plaque builds up in the blood vessels (atherosclerosis) and increases the pressure, or liquids are not excreted properly from the body and the pressure rises
- × Hypertension increases the risk of heart failure, stroke and kidney disease

### How diet should be changed to meet the needs...

Diet should be low in salt/sodium, usually low-fat to lose weight.

## Iron-deficiency Anaemia

### Description:

- Condition caused by lack of iron in the diet or by impaired absorption in the gut
- Girls and women are at greater risk of developing iron-deficiency anaemia due to **menstruation** (monthly bleeding)

### Reasons why...

- iron is needed to build **haemoglobin**
- haemoglobin is the red pigment in the blood which binds oxygen and transports it around the body
- if there is not enough iron, red blood cells cannot be built and oxygen cannot be transported properly

### Results in...

- × pale skin
- × tiredness
- × short breath
- × heart palpitations
- × dizziness
- × fainting
- × immune system is weakened and infections are more likely to occur

### How diet should be changed to meet the needs:

Diet should be rich in iron and vitamin C, red meat, liver, eggs, broccoli, kale and spinach, beans and lentils, fortified cereals and bread. **Vitamin C increases iron absorption in the gut!**

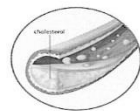
## Hypercholesterolemia

### Description:

- Condition in which blood cholesterol levels (total cholesterol and LDL cholesterol) are abnormally high

### Reasons why...

- imbalanced diet high in saturated fats
- obesity
- genetic factors
- smoking



### Results in...

- × cholesterol plaque builds up in the blood vessels (atherosclerosis) and increases the pressure, or liquids are not excreted properly from the body and the pressure rises
- × High cholesterol increases the risk of heart failure, stroke and kidney disease

### How diet should be changed to meet the needs:

Diet should be low in total fat / saturated fats, high in omega-3 fatty acids, high in dietary fibre, rich in plant sterols.

## Liver Disease

### Description:

- Chronic or acute inflammation of the liver

### Reasons why...

- alcohol abuse
- imbalanced diet
- obesity
- virus infection
- toxins



### Results in...

- × scarring of the liver
- × inability to produce bile, resulting in digestive issues
- × jaundice
- × abdominal pain

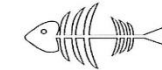
### How diet should be changed to meet the needs:

Diet should be based on starchy carbohydrates, very low in fats, controlled consumption of proteins, high in calories, limited salt consumption.

## Bone Health

### Description:

Group of diseases of the skeletal system caused by micronutrients' deficiency



### Reasons why...

- lack of calcium
- lack of vitamin D
- fluoride deficiency or excess of phosphorus
- excess sodium

### Results in...

- × **rickets** (occurs in children): Bones become soft, don't grow properly, often become curved and make movement impossible
- × **osteoporosis** (occurs in the elderly): Bones become porous, brittle and easy to break, bones heal slowly after breaking
- × **tooth decay** is a result of calcium, vitamin D and fluoride deficiency, as well as high-sugar diet and improper tooth hygiene

### How diet should be changed to meet the needs:

Diet should be high in calcium, vitamin D, fluoride, high in milk and dairy, fish and fish oils, low-sodium, and low-sugar.

## Dental Caries

### Description:

- Condition in which teeth are being damaged by bacteria in the mouth, leading to toothache and tooth loss

### Reasons why...

- diet high in simple sugars
- deficiency of calcium, vitamin D or fluoride
- improper mouth hygiene



### Results in...

- × damage to the teeth
- × toothache
- × Tooth loss
- × Untreated tooth decay may cause inflammation, which can then spread through blood vessels and nerves into the whole body

### How diet should be changed to meet the needs:

To prevent dental caries from (re)occurring, a diet must be low in simple sugars and provide sufficient amounts of vitamin D, calcium and fluoride. Proper mouth hygiene must be observed.

# Planning Balanced Diets 3

Dietary Needs and Nutritional Deficiencies

Diet and nutrition have a large impact on health. An imbalanced diet may cause many diet-related diseases and conditions.

## Coeliac Disease

Condition in which gluten cannot be broken down in the small intestine, causing inflammation and damage to the villi.

### Reasons for the condition:

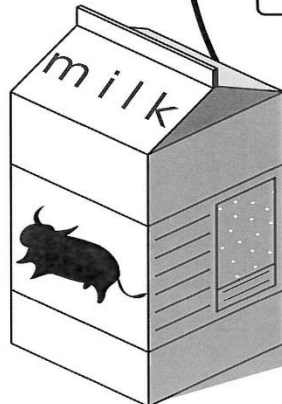
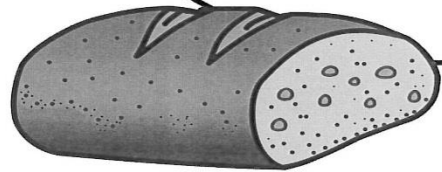
- occurs in people with genetic predisposition
- cannot be acquired or treated – coeliacs must follow a gluten-free diet from birth to the end of their lives

### Results in:

- × flattened, damaged villi
- × painful bloating, stomach ache, diarrhoea
- × inability to absorb nutrients, leading to deficiencies and weight loss

### How diet should be changed to meet needs:

Diet should be entirely gluten-free, i.e. foods containing wheat, barley or rye in any form must not be eaten.



## Lactose Intolerance

Condition in which lactose (milk sugar) cannot be broken down in the body. May be acquired (most often) and inborn (rarely).

### Reasons for the condition:

- lack of lactase enzyme in the small intestine
- risk of developing lactose intolerance increases with age

### Results in:

- × painful bloating
- × gases
- × diarrhoea after eating foods containing lactose

### How diet should be changed to meet needs:

Diet should be free from lactose, i.e. must not contain milk or unfermented dairy products. In most cases it is OK to eat fermented dairy products such as cheese and yoghurt.

## Food Allergies

Condition in which specific food ingredients are not tolerated by the body, leading to inflammation and reaction from the immune system. May occur for some period in life only and then disappear.

### Reasons for the condition:

- There are 14 major allergens: celery; cereals containing gluten; crustaceans; eggs; fish; lupin; milk; molluscs; mustard; nuts; peanuts; sesame seeds; soya; sulphur dioxide.
- It is not known why some people react allergically to certain foods.

### Results in:

- × rash
- × swelling of the mouth, tongue and throat
- × tingling in or itching of the mouth and tongue
- × stomach ache, diarrhoea, nausea, vomiting
- × dizziness, light-headedness
- × In most severe cases can cause **anaphylactic shock**. This includes wheezy breathing, swollen throat, severe drop in blood pressure, rapid heartbeat, loss of consciousness.

### How diet should be changed to meet needs:

People allergic to certain foods must avoid these foods in all forms, usually for a specific period of time only.





# The Effect of Cooking on Food




## Why food is cooked

Applying heat to food is advantageous for a number of reasons. It not only makes the food safe to eat, but also gives it the desired palatability and organoleptic qualities.

	Explanation	Example
<b>To Improve Digestion</b>	During cooking, proteins and carbohydrates, including fibre, undergo chemical processes which make them easier to break down in the human digestive tract.	Cooked meat is easily digested as the chemical bonds in the protein are already partially broken, so less work is needed from the gut to break it down entirely.
<b>To Improve Taste</b>	During cooking, chemicals undergo changes which alter their flavour. Also, addition of other ingredients, spices and herbs helps to obtain a variety of flavours.	Caramel has a different taste to sugar due to caramelisation. Marinades help to alter the flavour of meats and fish, making them more appealing.
<b>To Improve Texture</b>	Cooking includes processes such as caramelisation, dextrinisation and denaturation. These help to obtain the required texture of food.	Cakes rise, rice softens and increases in volume, bread has crispy skin and soft interior, meats become tender and easy to chew, sugar melts into caramel...
<b>To Improve Appearance</b>	During cooking, chemicals in food undergo a number of changes which change the appearance of food.	Bread becomes golden, caramel changes from yellow to brown to black, roast potatoes brown, green peas change from bright green to dull, greyish colour...
<b>To Avoid Contamination</b>	High temperature helps to kill most of the pathogenic bacteria which usually occur on various foods, making them safe to eat.	Salmonella in eggs and poultry, <i>Campylobacter</i> in meat, <i>Listeria</i> in milk.

## How Heat is Transferred

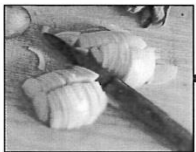
There are three methods of heat transference used in cooking.

	Conduction	Convection	Radiation
<b>How Does It Work?</b>	Direct transfer of heat from the saucepan to the food inside → Heat makes metal particles vibrate → Vibrations of the metal are transferred to the particles of food → Food particles vibrate and the meal heats up	Indirect transfer of the heat through water or air  Convection current makes the hot air/steam go up while the colder air falls	Indirect transfer of heat through heat waves → Microwaves send electromagnetic waves, which heat up water particles in the food → Water particles begin to vibrate and, therefore, heat up the whole meal → Infrared radiation is used in grills and barbecues
<b>Pattern</b>	Hob → pan → food	Hob → pan → water/air → food	Heat → waves → food
<b>Example</b>	<ul style="list-style-type: none"> <li>• Melting butter in a pan</li> <li>• Boiling water</li> <li>• Roasting meat</li> </ul> 	<ul style="list-style-type: none"> <li>• Steaming vegetables</li> <li>• Boiling eggs</li> <li>• Baking muffins</li> </ul> 	<ul style="list-style-type: none"> <li>• Grilling meat</li> <li>• Toasting bread</li> <li>• Microwaving soup</li> </ul> 

Most dishes require the use of various cooking methods to obtain the desired effect (texture, taste, appearance, etc.). For example:  
**baking** radiation → conduction → convection  
**braising** conduction → convection → conduction  
**steaming** conduction → convection

### Water-based Cooking Methods

<b>Steaming</b>	Helps preserve nutritional value of food, low-fat, softens vegetables.
<b>Boiling</b>	May cause vitamin loss, low-fat, softens vegetables, may cause meats to shrink and become tough.
<b>Simmering</b>	Long time required causes vitamin loss, helps to obtain tender meats and aromatic sauces.
<b>Blanching</b>	Prevents enzymatic browning and oxidation, preserves nutritional value, maintains crispy texture of vegetables.
<b>Poaching</b>	Ideal for preparing delicate ingredients, helps to maintain their tender texture. Low temperature helps to prevent vitamin loss.
<b>Braising</b>	Long time required causes vitamin loss. Helps to obtain tender meats and aromatic sauces. Creates an appealing brown finish.



During cooking, onion becomes brown, soft and sweet.



### Cooking Methods

Various cooking methods help to conserve or modify the nutritional value of food, and improve its palatability and appeal. Cooked foods can also be safely stored for longer.



#### Dry Methods

<b>Baking</b>	Long time required causes vitamin loss. Palatability is improved (cakes and other baked goods become sponge-like and often have crispy top). Causes cakes and breads to rise.
<b>Roasting</b>	Helps to reduce amount of fat in food. Long time required decreases vitamin content. Helps to obtain a crispy skin or surface.
<b>Grilling</b>	May create harmful substances. Usually low-fat. Creates appealing brown-black finish.
<b>Dry frying</b>	Reduces amount of fat in food. Helps to maintain nutritional value of food. Quick and fast. Very high temperature applied may cause food to burn easily.

In high temperatures, sugar and protein react with each other, producing brown compounds which affect the colour, taste and smell of foods such as cocoa or coffee. This is called **Maillard reaction**.



#### Oil-based Cooking Methods

<b>Deep Frying</b>	Foods become golden and crunchy, but their nutritional value is poor (loss of vitamins and high fat content). Usually very quick.
<b>Shallow Frying</b>	Seals the surface of food and helps to obtain crispy surface and juicy interior. Creates appealing golden-brown finish. The fat content of food may be increased.
<b>Stir Fry</b>	Low-fat. Helps to preserve nutritional value of food. Helps to maintain the crispy texture of vegetables and juiciness of meats.

# The Positive Use of Microorganisms

Various microorganisms and enzymes are commonly used in the production of foods. They help to alter the texture and flavour of food, often improving its digestibility and providing additional health benefits.

## Enzymes

Enzymes such as **rennet** break down chemical bonds between amino acids in proteins, changing the texture of food. They also affect the aroma and taste.

### Cheese

Different types of bacteria are used to alter the texture, e.g. produce soft cheese or produce large holes inside!



### Blue Cheese and Camembert

Moulds create the white coat on the outside and the blue/green veins on the inside of various cheeses, such as Devon blue, Roquefort and Brie.

## Moulds

Mould breaks down polysaccharides into shorter chains, which changes the taste of the food.



## Yeast

Yeast ferments sugars in food and produces carbon dioxide and alcohol.

### Marmite

Marmite is a by-product of beer brewing, to which a high amount of salt has been added to stop yeast activity and trigger its autolysis (process in which yeast cells break down).



### Sauerkraut and Pickled Vegetables

Probiotic bacteria produce acid, which makes the vegetables sour and keeps them crispy. Acid also prevents growth of pathogenic microorganisms.

### Soy Sauce

Cooked soy beans and roasted wheat or other cereals are mixed, and then mould and yeast are added. After the mixture has fermented, it is pressed to separate the liquid sauce from the solids, which are used as a fertiliser.

### How Yoghurt is Made

1. Milk is collected from farms and transported to factories.
2. Milk is **pasteurised** to remove harmful bacteria.
3. Milk is **homogenised** to ensure it doesn't split.
4. Milk is warmed up to 42 °C.
5. **Starter cultures** containing live **probiotic** bacteria are stirred into the milk.
6. Bacteria **ferment lactose** from milk and produce lactic acid.
7. Yoghurt becomes sour.
8. The protein in milk **denatures** due to high acid concentration.
9. Yoghurt becomes thick.
10. Yoghurt is cooled down.
11. Flavourings (e.g. fruit) are added.
12. Yoghurt is packaged and refrigerated.
13. Yoghurt is sent off to retailers.

### Yoghurt

Different types of bacteria are used to alter the texture and flavour of the yoghurt.

### Pickled Fish

One of the most popular pickled fish is herring. An example is Swedish surströmming.

### How Bread is Made

1. Flour, water, salt and yeast are mixed together.
2. The mixture is kneaded.
3. The mixture is left to rise in a warm place (**first proving**).
4. The mixture is kneaded again and cut into portions.
5. The portions are placed in tins and left to rise in a warm place (**second proving**).
6. The bread is baked.
7. The bread is cooled down and removed from tins.
8. The bread is sliced and packaged.
9. The bread is sent off to retailers.

### Bread

During production of bread, yeast is added to the dough. By fermenting sugars, it produces carbon dioxide, which causes the dough to rise.



### Sausages

- bacteria transform nitrates to nitrites, which means the meat remains bright pink
- bacteria produce acid, which denatures protein and improves the texture
- mould creates a white coat, which shields the sausage from other microorganisms in the air



### Alcoholic Drinks

During fermentation, yeasts transform sugars into alcohol and carbon dioxide. That's why beverages become alcoholic, dry and fizzy!



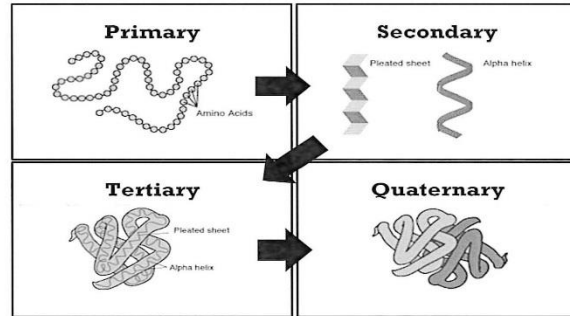
# Functional and Chemical Properties of Food 1

The chemical structure of food ingredients plays a vital role in how they can be used in cooking. Applying heat to proteins, carbohydrates and fats usually damages their structure, which helps to obtain the desired effect.


## Proteins

Macromolecules built of thousands of amino acids bonded together into long chains  
Amino acids → peptides → polypeptides (proteins)

### The structure of proteins:



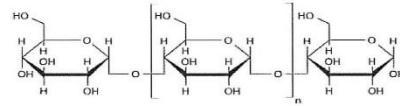
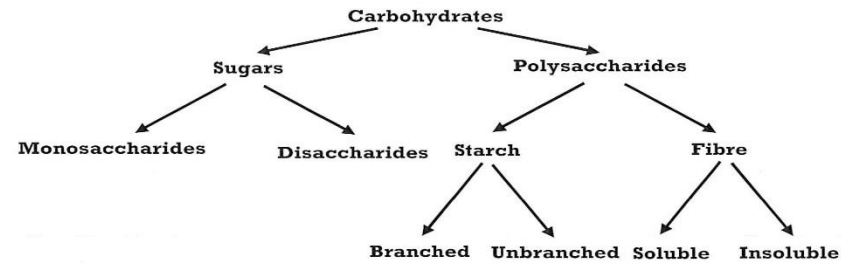
### Functional and chemical properties:

- Denaturation** – damage to the protein's structure caused by:
  - Heat** – during cooking, proteins vibrate quickly and as a result hydrogen bonds in them rupture
  - Acid** – because hydrogen atoms from the acid bind with nitrogen from the protein, preventing it from forming hydrogen bonds within protein molecule and so it cannot form a 3D structure
  - or **mechanical action (physical)** – during whisking, protein uncoils and exposes hydrophobic areas, which stick together and form a foam
- Coagulation** – aggregation of protein particles into larger lumps, causing it to set. Examples of protein coagulation include cheese becoming rubbery when overheated and egg whites becoming solid when cooked.
 

During cooking, the protein in eggs coagulates and denatures, and causes the eggs to set.
- Syneresis** – leakage of water from overcooked (and over-coagulated) proteins. Usually associated with eggs.
- Gluten formation** – complex, net-like protein built of glutenin and gliadin, simple proteins present in wheat, rye, barley and oats; the two proteins cross-link with each other, creating a net (as in a sweater) which can hold air bubbles during proving and baking of bread and bakery products  
glutenin + gliadin + water → gluten net → soft, springy texture
- Foam formation** – air bubbles trapped in a liquid (e.g. egg white). Whisking makes proteins unravel and denature.

## Carbohydrates

Macromolecules which include mono-, di- and polysaccharides (built of thousands of monosaccharides) bonded together

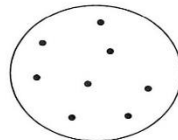


Amylose is an example of a polysaccharide built of thousands of glucose molecules.

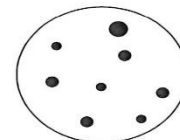
### Functional and chemical properties:

- Gelatinisation** – happens when starch granules absorb water, and swell and break during heating, so that mixtures thicken and form a gel when cooled; used to prepare sauces and puddings

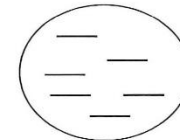
starch + water + heat → gelatinisation



Starch granules in cold water.



Starch granules absorb water when heated.



Starch granules burst and break and turn the liquid into gel.

- Dextrinisation** – happens when starch chains break down into shorter chains of dextrins; during the process molecules of water evaporate and carbon is left to give brown colour; occurs during baking and toasting bread and other baked goods

starch + heat → dextrinisation

- Caramelisation\*** – happens when sugar is heated in very high temperatures, causing it to liquidise and form a thick, brown syrup; during the process water evaporates and carbon is left to create a brown or black colour; occurs during roasting of vegetables, making caramel and fudge, etc.

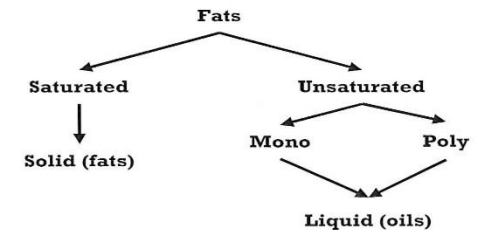
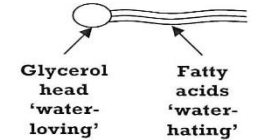
sugar + heat → caramelisation

\*Caramelisation is not required by the specification; however, it is an important reaction that occurs in food during cooking, causing changes in appearance, texture, taste and aroma.

## Fats and Oils

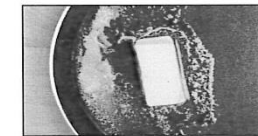
Macromolecules built of a glycerol head and fatty acid tail

Fat particles are **immiscible** – they are repelled by water molecules and separate from it, forming little droplets of oil in the mixture, and eventually creating a coat on top of it.



### Functional and chemical properties:

- Shortening** – when fat particles surround starch so that it cannot access water and, therefore, prevent gluten formation; technique used to obtain crunchy, crumbly pastry such as for biscuits
- Aeration** – trapping air bubbles in a fat mixture, e.g. cream or butter, to improve its texture
- Plasticity** – ability of fat to be easily spreadable and melt in various temperatures, dependent on the length of the fatty acids chains in the fat particle



Plasticity is increased when butter melts.

- Melting point** – temperature at which fat turns into oil
- Emulsion** – stable mixture of oil and water

Water-in-oil emulsion → butter

Oil-in-water emulsion → milk

To create a stable emulsion, **emulsifiers** need to be used, e.g. lecithin from egg yolk is used to make mayonnaise. Emulsifiers bind together molecules which normally wouldn't bind and prevent them from separating.



# Functional and Chemical Properties of Food 2

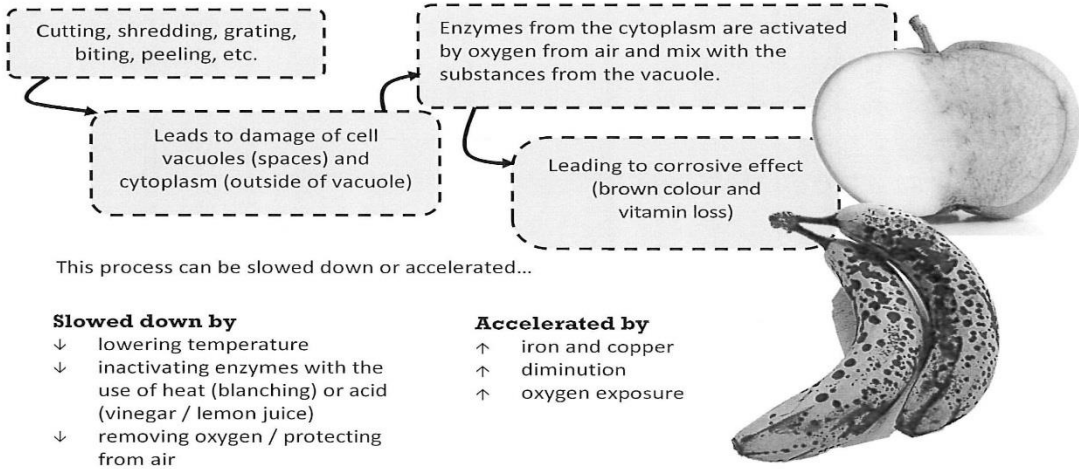
## Fruits and Vegetables

Cooking and food preparation may have a large impact on nutritional value, appearance, flavour and smell of food products.

Foods such as bananas, apples and tomatoes need time to ripen. This ripening process is caused by enzymes.

### Enzymatic Browning

Involves the discolouration of fruits and vegetables as a result of oxygen reacting with enzymes and plant cell substances.



#### Foods most prone to enzymatic browning:

- ⊃ Fruit: avocados, bananas, peaches, pears, apples, mangos, apricots, plums, grapes
- ⊃ Vegetables: aubergines, mushrooms, potatoes, lettuce

### Oxidation

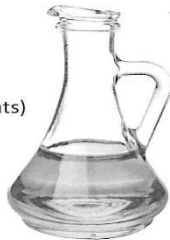
- The process when substances combine with oxygen
- Destruction of chemicals in food due to oxygen exposure
- Causes changes in the appearance, smell and nutritional value of food (e.g. rancidity in fats)

#### Slowed down by:

- ↓ covering food
- ↓ packing food in oxygen – free conditions
- ↓ covering food with sauces and dressings

#### Accelerated by:

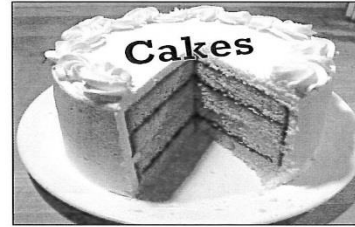
- ↑ diminution
- ↑ oxygen exposure



Leaving oil without a cover will cause it to become rancid.

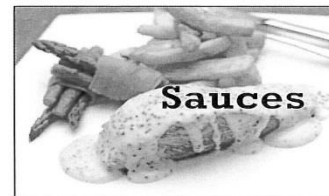
## Why Particular Results May Not Always be Achieved

In cooking, everything matters – from the consistency and temperature of ingredients, to their amount, to the order they are used in, cooking time and temperature.



### 'Why did my cake not turn out this good?'

- ★ **too much sugar was added**  
→ the cake has a hard crust  
→ the cake sunk in the middle
- ★ **the cake was too high up in the oven**  
→ the cake cracked on top  
→ the top is burnt  
→ the cake is underbaked and sinks
- ★ **too much flour was added**  
→ the cake is tough and dry
- ★ **not enough rising agent was used**  
→ the cake/dough did not rise
- ★ **wrong raising method was used**  
→ the cake did not rise  
→ the cake is tough and has a closed texture
- ★ **the tin was overfilled**  
→ the cake burnt on top  
→ the top has cracked  
→ the cake has overboiled
- ★ **the batter was too wet**  
→ the fruit sank



**the yeast used was too old (dead)**

→ the dough did not rise at all

**the temperature was too low**

→ the dough did not rise or was rising very slowly

**the temperature was too high**

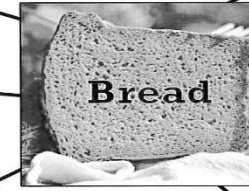
→ the yeast got killed and the dough did not rise

**wrong type of flour was used**

→ there was not enough gluten, so the bread has a closed, tough texture

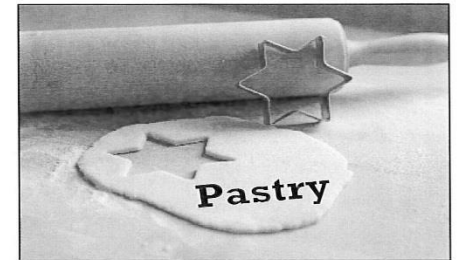
**too much or too little salt used**

→ yeast could not grow properly so the dough is tough and has a closed texture



**not enough time given to rise**

→ the bread has a closed texture



- ★ **soft fat was used**  
→ the pastry is sticky and difficult to handle  
→ the baked pastry is gooey and soft
- ★ **pastry was not left to relax**  
→ the pastry has shrunk during baking  
→ the filling has spilled out
- ★ **pastry was too high up in the oven**  
→ the pastry is burnt  
→ the pastry has risen unevenly
- ★ **your hands were too warm**  
→ the pastry is sticky and difficult to handle  
→ the baked pastry is gooey and soft
- ★ **pastry was baked for too short a time**  
→ the pastry looks wet and underdone  
→ the pastry is gooey  
→ the pastry is pale and bland

★ **sauce was not stirred during cooking**

→ the sauce is lumpy  
→ the sauce has burnt at the bottom

★ **cooking time was too short**

→ the sauce has a flour-like aftertaste  
→ the sauce is very pale  
→ the sauce has not thickened properly

★ **sauce was cooked for too long**

→ the sauce has burnt  
→ the sauce has thinned  
→ the fruit sank



# Food Spoilage

Food spoilage may be caused by many various microorganisms: by bacteria, yeast and moulds, as well as by enzymes naturally present in the food products. It is important to correctly store food and apply food safety principles to avoid spoilage and contamination of other products.

## Microorganisms

Tiny organisms visible only under a microscope  
Bacteria, yeast and mould

### Growth conditions

**Warmth** – ideally temperature between 5 and 63 °C

**Water** – microorganisms grow better in moist conditions

**Food** – ideally protein, but sometimes also sugar

**Time** – the longer, the more time microorganisms have to multiply

**pH** – most microorganisms will only grow in neutral pH

**Oxygen** – some bacteria may also require oxygen to grow; these are called aerobic bacteria

Most microorganisms will grow rapidly in **danger zone temperatures** (5–63 °C) but will not grow below or above that limit.

This is because enzymes necessary to replicate the cell become inactive at temperatures below 5 °C and over 63 °C.



Microorganisms' growth can be controlled by:

- ✓ storing food in proper conditions
- ✓ freezing or refrigerating fresh food
- ✓ cooking thoroughly before eating
- ✓ not refreezing once food is defrosted



### High-risk foods

Foods which have **optimal** conditions for microorganisms' growth.

Protein – rich, moist and usually raw  
Include meat and poultry, fish and seafood, eggs and milk

## Enzymes

- Biologically active protein-based molecules.
- They are catalysts, which means that they can speed up the tempo of chemical reactions.
- Enzymes are necessary for fruit to ripen.

Darkening of fruit and vegetables caused by enzymes is called **enzymatic browning** and should be avoided to preserve nutritional value of food.



Enzymatic action can be stopped by:

- **Blanching** vegetables before freezing. Blanching means that food is put into boiling water and immediately plunged into cold water or ice.
- **Use of acids** (lemon juice or vinegar) Acid denatures and deactivates enzymes, because they are built of protein.

Enzymes are also used in food production.



## Cross-contamination

- **Cross-contamination** means that bacteria, toxins or food particles were transferred to a food product.
- Cross-contamination can cause **food poisoning** and allergic reactions.
- **Anaphylactic shock** is a life-threatening reaction of the immune system to an allergen



**Food can become contaminated from:**

- ✗ waste food and rubbish
- ✗ pests and rodents
- ✗ the cook's hands
- ✗ work surfaces and equipment
- ✗ other contaminated foods, including high-risk foods

**Most common allergens:**

- Nuts
- Fish and seafood
- Milk
- Eggs



## Signs of Food Spoilage

Many species of microorganism and some enzymes can cause food spoilage or diseases.

	Bacteria	Yeast	Mould	Enzymes
<b>Food Spoilage</b>	<i>Clostridium botulinum</i> produces a toxin which causes meat preserves to bulge. Bacteria can also make meat products look slimy and green in colour.	Ferments sugar in juices and beverages, making them sour, fizzy and foamy.	Create green, white or black coat on food products such as bread, grapes, tomatoes and jams.	Turn bananas, apples, potatoes and other foods brown.

## Preservation Methods

Growth of microorganisms can be prevented by using correct preservation methods.

Method	Why is it effective?
<b>Jam making</b>	Sugar binds with water, so that it is not available for the microorganisms any more.
<b>Pickling</b>	Microorganisms do not grow in acidic conditions. That's because low pH and high concentration of salt causes water to be drawn from their cells.
<b>Freezing</b>	Low temperatures halt enzymatic action, so microorganisms cannot grow or carry out any life functions.
<b>Bottling</b>	High temperatures kill microorganisms and inactivate enzymes.
<b>Vacuum packing</b>	Lack of oxygen means that aerobic microorganisms cannot survive. However, this does not stop anaerobic microorganisms from growing.

**Faecal contamination** with *E. coli* may occur when people don't wash their hands after using the toilet or when human and animal body waste is used to fertilise crops.

## Food Poisoning

- Food poisoning is a disease caused by eating a spoiled or contaminated food. Such food may contain certain microorganisms, toxins or enzymes.
- Microorganisms which cause diseases are called pathogenic.
- A person who carries a pathogen but shows no symptom of a disease is called a carrier.



**Food poisoning bacteria and where to find them**

- ✗ *Campylobacter* → raw poultry and unpasteurised milk
- ✗ *E. coli* → undercooked beef, unwashed vegetables, dirty hands
- ✗ *Salmonella* → raw eggs, meat and poultry, unpasteurised milk
- ✗ *Staphylococcus aureus* → salads, ham, eggs, tuna, poultry, cream, hands of an infected person

**Cross-contamination and food poisoning may be avoided by:**

- ✓ Washing hands after dealing with high-risk foods or rubbish, or after using a toilet
- ✓ Properly cleaning work surfaces and utensils
- ✓ Using dedicated, colour-coded tools only
- ✓ Storing food in proper conditions
- ✓ Storing raw and cooked foods separately
- ✓ Cooking food thoroughly before eating
- ✓ Applying food safety standards and schemes, such as British Lion Scheme

**Symptoms of food poisoning:**

- ⊗ Stomach pains and cramps
- ⊗ Nausea and vomiting
- ⊗ Diarrhoea
- ⊗ Fever
- ⊗ Shivers



**British Lion Scheme**

Food safety mark which guarantees that eggs are produced in the UK and that all the hens were vaccinated against *Salmonella*



# Buying, Storing, Preparing and Cooking Food

Applying certain rules when buying, preparing and cooking foods, and properly storing food products, helps to avoid food spoilage and contamination, and lowers the risk of food poisoning or allergic reaction.

## Buying Food

When buying food it is important to ensure food's quality by:

- ✓ checking the date marks
- ✓ carrying out visual checks

### Date Marks

**Best before** – applies to food quality (look, flavour or colour) and it's relatively safe to eat the food after that date; it is used on dry, frozen or tinned foods and eggs

**Use by** – applies to food safety so it might be harmful to eat a food after that date; used on fresh foods such as milk and dairy

### Labelling

Foods are often labelled specifically to identify storage conditions and instructions for preparation. This helps to:

- enhance the shelf life of food
- ensure it's nutritious and safe to eat
- ensure it's prepared in a correct way to offer all nutritional and sensory values

More about labelling on p. 25



## Storing Food

Storing food in correct conditions is crucial in maintaining its quality, safety and nutritional value.

Fridge temperature: 0 to 5°C  
Freezer temperature: -18°C  
Fast-freeze button: -25°C

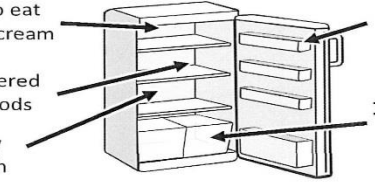
### Chilling and Freezing

Correct use of a fridge-freezer will ensure freshness and safety of food.

**Top shelf:** Ready to eat foods, dairy, yoghurt, cream

**Middle shelf:** Butter, covered cooked meats, packaged foods

**Bottom shelf:** Raw meat, poultry and fish in sealed boxes



**Door:** Eggs, condiments, sauces

**Drawers:** Fresh vegetables and salads

### Ambient Storage

Storing food at room temperature (usually around 20 °C)



### Important Storage Points

**Tainting** means that the smell of one food contaminated another one

Always keep food covered or sealed to avoid tainting!

**Freezer burn** involves dehydration and oxidation of food caused by improper freezing (i.e. inadequate packaging)

- Use special freezer bags to avoid freezer burn
- Do not overload to enable air circulation

### Food Covering and Packaging

1. Protects from light
2. Protects from air, oxygen and dust
3. Protects from pests and rodents
4. Prevents tainting

### Defrosting = thawing

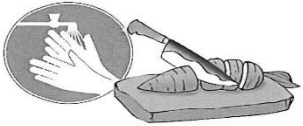
Defrost foods in a box or on a tray to catch any leaking liquids

**Never freeze defrosted food again!**  
The bacteria in food begin to multiply in defrosted food so it's best to use it straightaway to avoid the risk of food poisoning.

**STOP**

## Preparing Food

Applying these rules will help to prevent cross-contamination and food poisoning!



Personal Hygiene	Work Surfaces
<ul style="list-style-type: none"> <li>✓ Always wash hands before and after cooking and dry with disposable paper towels</li> <li>✓ Avoid touching your face or hair</li> <li>✓ Tie your hair back and cover with a hairnet</li> <li>✓ Avoid cooking when you're ill</li> <li>✓ Change clothes and use an apron</li> <li>✓ Cover any wounds with a waterproof plaster</li> <li>✓ Do not wear rings or other jewellery when cooking</li> </ul>	<ul style="list-style-type: none"> <li>✓ Clean thoroughly after dealing with high-risk foods</li> <li>✓ Use soapy hot water or antibacterial spray to clean any spills</li> <li>✓ Use a clean kitchen towel or disposable paper towels</li> </ul>
Separate Foods	Temperature Control
<ul style="list-style-type: none"> <li>✓ Separate raw and cooked foods, both when preparing and storing food</li> <li>✓ Cover prepared food and store in closed containers</li> <li>✓ Use dedicated, colour-coded utensils</li> <li>✓ Wash dishes straightaway in hot water to avoid pests and cross-contamination</li> </ul>	<ul style="list-style-type: none"> <li>✓ Make sure the temperature inside food reaches 75 °C both when cooking and reheating</li> <li>✓ Make sure the temperature of served food is above 63 °C</li> <li>✓ Do not put hot food straight into the fridge, let it cool for 90 minutes</li> <li>✓ Ensure correct cooking time to avoid cold spots</li> <li>✓ Defrost thoroughly to avoid cold spots</li> </ul>

## Cooking and Serving Food

To prevent food poisoning, one must take care when handling high-risk foods and control their temperature.

<b>Freezing</b>	-18 °C
<b>Chilling</b>	0 to 5 °C
<b>Cooking</b>	75 °C
<b>Reheating</b>	75 °C

### Temperature Danger Zone

Range of temperatures in which microorganisms grow the fastest, posing a risk of food spoilage and food poisoning

**5–63 °C**



### High-risk Foods

Foods which are ready to eat and do not require further cooking, posing good conditions for microorganisms' growth.

- ✓ Raw and cooked meat
- ✓ Raw and cooked poultry
- ✓ Raw and cooked fish and shellfish
- ✓ Milk and dairy
- ✓ Eggs
- ✓ Vegetables and fruit





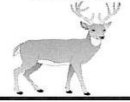
## Food Provenance

Where and how food is made depends on many factors, such as:

- climate
- soil quality
- availability of water and other resources
- availability of land suitable for growing plants and pastures
- the size of a population and how much food needs to be produced

Other factors, such as religion and ethical beliefs of local communities, also play an important role in deciding what foods will be made in the nearest area.

For example, more and more free-range eggs are produced in the UK nowadays due to popular belief that free-range hens are happier and produce better-quality eggs, but also to ensure animal welfare standards are kept.

Food Source Type	Where	Example	What for?
<b>Grown</b> 	Orchards	Apples, plums, avocados, cherries, nuts	Fruit, nuts, animal feed
	Fields	Root vegetables, grains, seeds, legumes	Food, animal feed, fertilisers, bioenergy
	Polytunnels	Lettuce, radish, strawberries	To ensure availability all year long
<b>Reared</b> 	Sheds, barns	Cattle, pigs, horses, poultry	Meat, milk, leather, feathers, eggs, work, bioenergy
	Fish farms	Fish, seafood	Food, animal feed
<b>Caught</b> 	Open spaces and forests	Wild animals, game and venison	Food, enjoyment
	Oceans and seas	Wild fish, seafood	Food

## Farming

A farm is an agriculture establishment in which crops are grown and livestock is reared for profit. The main ways of farming include:

### Organic Farming

- ✓ No chemicals
- ✓ Few or no pesticides
- ✓ No artificial fertilisers
- ✓ No herbicides
- ✓ No GM feed or seeds
- ✓ Antibiotics are only used when necessary
- ✓ Crop rotation may be applied to preserve soil quality
- ✓ Animal welfare standards are kept

### Intensive Farming

- Chemicals such as pesticides, herbicides and artificial fertilisers are used to prevent crop failure
- Antibiotics used to prevent diseases in livestock, not to cure them
- GM feed and seeds are used to obtain high-yield crops
- Animal welfare standards are often violated

### Genetically Modified (GM)

- Means that genes of a plant or animal have been engineered and altered to obtain specific, desirable features of the given ingredient
- GM seeds or feed is not allowed in production of organic foods

## Sustainable Fishing

Rearing fish and seafood in fish farms for meat, caviar, pearls, animal feed or other reasons. Sustainable fishing means that fishing in natural fisheries is allowed only for certain period of time so that the shoal of fish has the chance to reproduce and restore itself.

### Advantages of Fish Farms:

- ✓ Protecting natural ecosystems
- ✓ Preventing overexploitation of fisheries
- ✓ Keeping animal welfare standards
- ✓ Protecting wild species diversity
- ✓ Preventing by-catch



**By-catch:** accidental catch of a sea organism which wasn't the primary goal of the fishing.

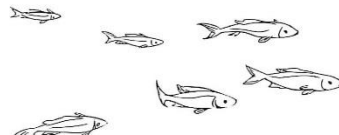
### Disadvantages of Fish Farms:

- ✗ The fish tanks are often overcrowded
- ✗ Fish might be fed low-quality feed which affects their flavour and nutritional value
- ✗ Fish might be fed antibiotics, increasing the risk of antibiotic resistance

Sustainable fishing policy is set by the Marine Stewardship Council.

### Methods of Fishing:

- **Purse seining:** fishing with the use of a large net in which fish and other sea organisms are trapped
- **Longlining:** fishing with the use of a long line to which other lines are attached, each of which ends with a hook
- **Bottom trawling:** pulling a large net along the sea bottom, used to catch shrimp and bottom-dwelling fish



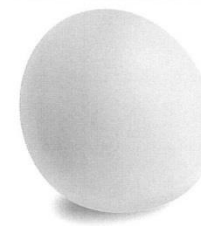
## Where and How Food is Made

The way food is grown, reared and caught affects its quality, safety and amount. Modern technologies help to obtain high amount of food while ensuring it's safe to eat and nutritious.

## Egg Production

Symbol	Name	Conditions
0	organic	Birds are fed only organic feed, animal welfare standards are applied
1	free range	Hens are let outside the barn during the day to enjoy most natural conditions possible
2	barn	Birds can move freely around the barn, but may have trimmed beaks to prevent them fighting between themselves
3	cage	Hens are kept in tight cages, without possibility of moving

**Red Lion Scheme** is a quality mark which ensures that all hens were vaccinated against salmonella so the eggs are safe to eat.



## Local and Seasonal Foods

Characteristic for countries or regions, as well as for certain seasons of the year.



- fresher
- more nutritious
- tastier
- empowers local farmers
- supports local communities
- may be cheaper than imported foods
- supports biodiversity of species



- limited offer / small variety of foods offered
- limited availability / short time for purchase
- depends on weather conditions and local climate
- may be more expensive than imported foods

### Some seasonal foods include:

- **Spring:** asparagus, spring onions, radish, rhubarb
- **Summer:** berries, aubergines, courgettes, tomatoes, cucumbers
- **Autumn:** apples, pears, plums, apples, grapes
- **Winter:** potatoes, cabbage, oranges, cranberries, carrots

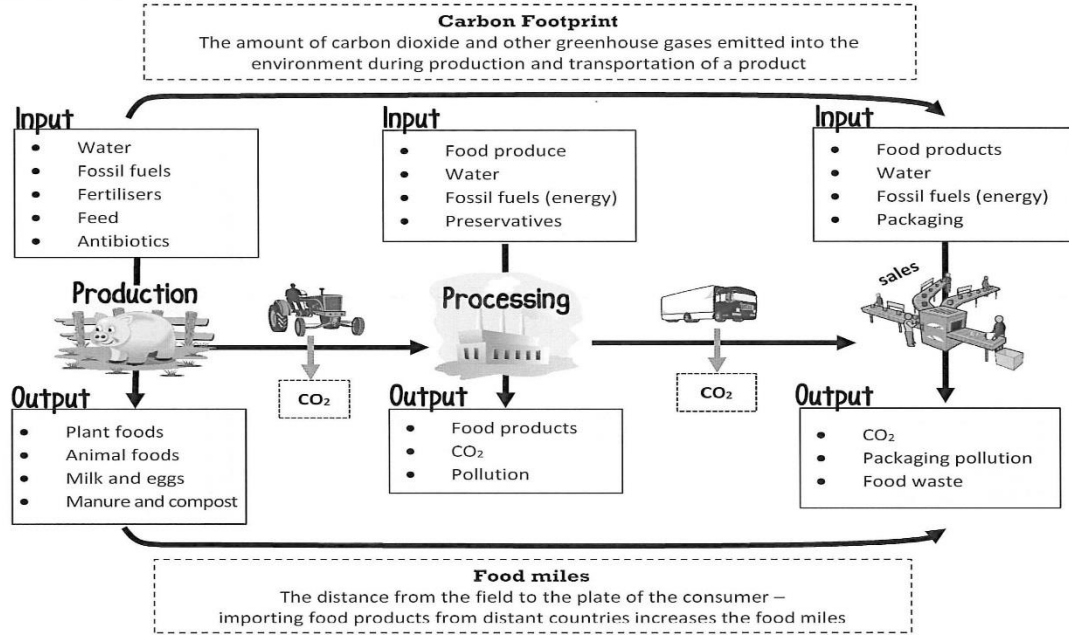


# Food and the Environment

Each step of food production has a huge impact on the environment. Overexploitation of natural resources, such as water, soil and fossil fuels, together with transportation and packaging of the food, largely contribute to climate change.

## Why Carbon Dioxide is So Dangerous

Food production, at each of its stages, emits large amounts of carbon dioxide. Carbon dioxide creates an impermeable coat around the earth. When warmth is reflected from the surface of the earth, it is caught by that coat and bounced back. As an effect, the average temperature on Earth rises, and that affects plant and animal species...

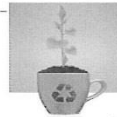


## How Food Production Affects the Environment and Communities

Food production has direct and indirect effects on the environment by creating levels of pollution or deforestation. The way we produce and transport food is also meaningful to those who produce it: farmers, farmworkers, and even people working in your local store.

### Packaging

- Fossil fuels used to produce.
- Tonnes of used packaging are thrown every day.
- Non-recyclable packaging creates pollution.
- Animals, birds and fish swallow the debris and die.
- Some materials used for packaging NEVER decompose!
- + Protects the food from damage.
- + Protects the food from sunlight, oxygen, bacteria and dirt.
- + Provides information about the food inside.



### Fairtrade

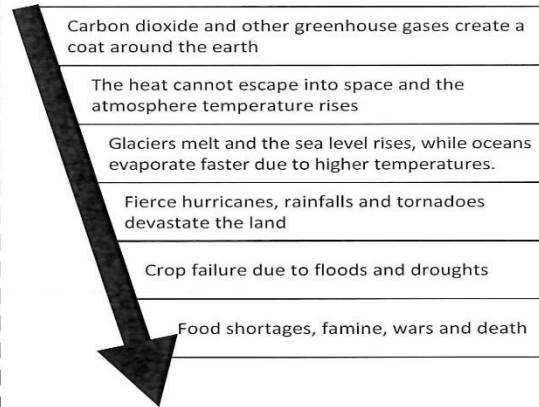
A foundation and ethical movement focused on supporting farmers and sustainability of food.

#### Advantages of Fairtrade:

- ✓ Ensures fair wages and prices
- ✓ Improves working conditions
- ✓ Empowers local communities, farmers and workers
- ✓ Supports education and growth in poor countries
- ✓ Helps to protect the environment

## Climate Change

... the effect of that process is known as global warming. Global warming means that climate conditions change and plants cannot grow any more because they are not used to the new conditions. Also, as it is warmer, oceans evaporate faster, and that leads to severe hurricanes and massive rainfalls, which damage even more crops by causing floods.



### Greenhouse gases

Vapour, CO<sub>2</sub>, nitrous oxide, methane, ozone, CFCs absorb infrared radiation and trap heat

### Global warming

Rise in average temperature on Earth due to extravagant release of greenhouse gases



## Food Availability

Climate change affects food availability. Droughts caused by faster evaporating of waters, and floods caused by massive rainfalls, are causes of crop failure around the world. Crop failure means that there are no plants to eat, and there is no feed for animals.

**Food security** – when all people, at any time, have access to nutritious, healthy food in sufficient amount

### Food availability may be increased by:

- ✓ The use of GM seeds and organisms to produce more food
- ✓ Modern technologies to store food for longer
- ✓ Transportation of the food around the world, also to those who famish

### Food availability may be decreased by:

- x Climate change and global warming effects
- x Insufficient land for growing food
- x Growing world population which requires more food
- x Overexploitation of soil and fisheries
- x Limited resources of water and fossil fuels

## Food poverty

Situation when a person or a family doesn't have enough money to buy sufficient amounts of quality (healthy and nutritious) food.

### Causes of food poverty:

- ✓ lack of money (low wages, lack of job)
- ✓ high prices (no purchase power)
- ✓ unavailability of food (no food produced)
- ✓ long distance to a shop/farm

### Effects of food poverty:

- ✓ malnutrition, weight loss/gain, poor bone and tooth health
- ✓ inability to focus
- ✓ loss of immunity, mineral and vitamin deficiencies
- ✓ muscle loss, weakness
- ✓ stress, social exclusion, depression

## Food waste

### Reasons:

- Buy and cook too much
- Don't eat the food before it goes off

### Effects:

- Waste of money, pollution, carbon footprint increase

### Methods of prevention:

- Plan shopping, don't go shopping when hungry
- Only cook as much food as needed
- Eat all you have on the plate or store leftovers for later
- Reuse food products to make new meals
- Store food correctly to avoid spoilage
- Use peels and scraps to make compost

**Cuisine** is a style of cooking characteristic for a given region or country, which uses specific ingredients, dishes, preparation and cooking methods.

# British Cuisine

Cuisine may be affected by many different factors, such as climate, type of soil available for growing plants, or history.

Immigrants and conquerors in the past have brought many new meals, ingredients, spices and cooking methods not previously known in the UK.



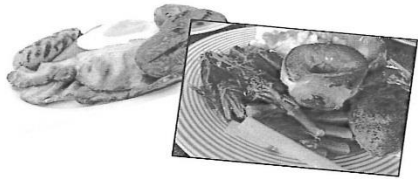
## Distinctive features and characteristics of cooking

Main ingredients used, traditional dishes and other factors which distinguish the cuisine from others.

### Traditional ingredients:

- Beef, lamb, pork, poultry, bacon and ham
- Potatoes, onions, leeks, peas, beans, swede
- Milk and cheese (e.g. Cheddar, Stilton)
- Herbs, such as mint and sage

Traditional meals and dishes differ depending on the region (see below).



## Equipment and cooking methods

Kitchen utensils, dishes and cooking methods specific to a given cuisine.

### Equipment:

- Open fire for roasting, now replaced with ovens
- Thick ceramic dishes used for stews, soups and sauces
- Tins and moulds for making puddings, pies and tarts

### Cooking methods:

- Stewing, simmering and braising
- Roasting and baking
- Grilling and barbecuing
- Poaching
- Frying



## Eating patterns

The meals during the day vary between countries, both in the time they are eaten at and the meals that are served. This is changing dynamically due to busy lifestyles.

- **Breakfast** – eaten in the early morning, traditionally very filling, nowadays more healthy, may consist of toast with coffee or a bowl of cereal
- **Elevenes** – small, usually sweet snacks eaten around 11am with a cup of tea or coffee
- **Brunch** – eaten before noon instead of breakfast and lunch, usually at weekends or during business meetings
- **Lunch** – midday meal consisting of a sandwich, salad or soup; traditionally, a Sunday lunch is more filling and consists of roasted meat, vegetables, Yorkshire pudding and gravy
- **Afternoon tea** – eaten in the afternoon, consists of a pot of tea or coffee with a range of small snacks, sandwiches, biscuits and cakes
- **Dinner** – hot meal eaten in the early evening, the main meal of the day
- **Supper** – consumed a bit later than dinner, usually replaces it

## Presentation styles

How the food is served, how it appeals to appetites and tastes of the consumers.

- Presentation is usually simple, some garnish or sauce may be used to make the food more appetising.
- Meat or fish is served accompanied by potatoes, vegetables and gravy
- Puddings are also served with sauces, e.g. custard
- Desserts are served in individual portions rather than in large dishes to share

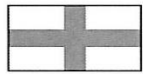


## Traditional and modern variations of recipes

Traditional recipes can be modified due to busy lifestyles, healthy eating patterns or medical conditions. They help to make the meal faster, easier and cheaper to cook.

- Meats, sausage and bacon can be exchanged for low-fat or low-salt products, or substituted with protein alternatives, such as soy chunks or tofu
- Traditional breakfast is replaced with more healthy, lighter options, such as toast with jam and orange juice or a bowl of cereal
- Instead of frying, people may choose to roast, grill or dry-fry the food to make it healthier and less fatty
- Lard and suet may be exchanged for vegetable oils and spreads
- New ingredients are introduced to meals as importing allows higher variety of foods

## Traditional Foods in Great Britain



### England

- Cornish pasty
- Yorkshire pudding
- Lancashire hotpot – lamb and vegetable stew topped with mashed potatoes
- Clotted cream, cream tea
- Fish and chips
- English breakfast – rich and high in calories; contains bacon, sausages, baked beans, buttered toast, hash browns, fried mushrooms and tomatoes
- Sandwiches
- Sunday roast
- Beer and cider



### Wales

- Cawl – meaty broth served with bacon or lamb and vegetables
- Welsh rarebit – spiced melted cheese served in toast
- Glamorgan sausage
- Welsh cakes
- Bara brith – rich yeast bread with dried fruit
- Laver bread – stewed laver weed
- Tatwps popty – potatoes baked with onion under a thick layer of cheese



### Northern Ireland

- Colcannon – mashed potatoes with kale and cabbage
- Soda bread
- Black pudding – sausage made of pork fat, blood and oatmeal
- Shepherd's pie
- Irish stew
- Oatmeal
- Irish cream
- Whiskey and beer



### Scotland









- Porridge
- Scotch broth
- Dunlop cheese
- Kippers – smoked herring
- Tatties and herring
- Haggis – sausage made of sheep offal and barley
- Scotch pie – pie with mutton meat filling
- Oatcakes, scones
- Shortbread
- Neeps and tatties – potatoes with suede (turnip)
- Whisky and ale beer



# International Cuisines



The cuisine depends on a region: its culture, religion, climate and weather conditions, and even plant and animal species that live there. For centuries, countries and regions have created a variety of meals, cooking dishes and methods, and even serving and eating patterns, which are characteristic only for them.

		Distinctive features and characteristics of cooking	Equipment and cooking methods	Eating patterns	Presentation styles	Traditional and modern variations of recipes
Asian cuisine	Mediterranean cuisine	<p>Main ingredients used, traditional dishes and other factors which distinguish the cuisine from others.</p> <p><b>Includes:</b> Italy, France, Spain, Greece, Northern Africa, Turkey</p> <p><b>Ingredients:</b> olives and olive oil, grapes and wine, fish and seafood, tomatoes, aubergines, courgettes, wheat (e.g. in couscous, pasta, semolina), bell peppers, citrus fruits, apricots, herbs (e.g. saffron, thyme, oregano, marjoram), garlic and onion, beans and lentils, milk and dairy</p> <p><b>Typical meals:</b></p> <ul style="list-style-type: none"> <li>Italian: risotto, pizza, spaghetti, mozzarella, ricotta</li> <li>French: casserole, ratatouille, fish soup bouillabaisse, selection of cheeses, croissants, crepes</li> <li>Spanish: paella, cured and dried ham, omelette, gazpacho</li> <li>Greek: moussaka, tzatziki, feta, filo pastry</li> <li>Morocco: tabbouleh, hummus, bulgur, couscous, tagine, harissa</li> <li>Turkish: börek, pilav, kebab, sheep cheese, baklava, halva</li> </ul>	<p>Kitchen utensils, dishes and cooking methods specific for a given cuisine.</p> <p><b>Equipment:</b></p> <ul style="list-style-type: none"> <li>Clay ovens used for baking, now exchanged with electric ovens</li> <li>Thick ceramic dishes for stews</li> <li>Paellera – shallow frying pan used to make paella</li> <li>Tagine – a dome-shaped clay dish used to prepare tagines in Arabic countries</li> </ul> <p><b>Cooking methods:</b></p> <ul style="list-style-type: none"> <li>Baking</li> <li>Frying</li> <li>Simmering and stewing</li> <li>Grilling</li> <li>Steaming and boiling</li> </ul> 	<p>The meals during the day vary between countries, both in the time they are eaten at and the meals that are served. This is changing dynamically due to busy lifestyles.</p> <ul style="list-style-type: none"> <li>In Italy and France, especially on large occasions, meals can have many courses (usually a starter, soup, main dish, salad, cheese and dessert), usually accompanied by wine</li> <li>Breakfast might be rather small and sweet, e.g. croissants with jam and coffee</li> <li>In Spain, a siesta (short nap) is taken after the midday meal</li> <li>In Spain and Greece, dinner (vradino) is eaten quite late – after 9pm.</li> <li>In Morocco and other Arabic countries, meals are celebrated and a long time is spent eating</li> <li>In Turkey, hands and mouth are washed before and after eating; traditionally it was acceptable to belch and lick fingers during eating, nowadays it may be considered rude</li> </ul>	<p>How the food is served, how it appeals to appetites and tastes of the consumers.</p> <ul style="list-style-type: none"> <li>Most meals are quite simple, consisting of 4–8 ingredients only, but they are usually very colourful</li> <li>A sauce may be splashed on top to make it more appetising, e.g. cream on top of a soup, carbonara sauce with pasta</li> <li>Dishes might be garnished with fresh herbs, such as coriander or parsley</li> <li>In Morocco, meals are often served in large clay dishes so people may eat from one dish</li> </ul> 	<p>Traditional recipes can be modified due to busy lifestyles, healthy eating patterns or medical conditions. They help to make the meal faster, easier and cheaper to cook.</p> <ul style="list-style-type: none"> <li>Traditional meals are quite time-consuming to prepare, so are often exchanged with more modern, faster to cook meals</li> <li>People often choose to eat out or order takeaway</li> <li>Thick sauces based on fat and cream may be exchanged with lighter versions, e.g. yoghurt</li> <li>People more often choose healthy, natural, organic foods</li> <li>In Morocco, more modern cooking includes the use of less spices, eating more raw vegetables</li> <li>Culinary shows make cooking more trendy and inspire people to cook at home more often</li> </ul>
	China	<p>Each canton in China has its own, regional cuisine and uses different ingredients and spices (e.g. Szechuan and Cantonese)</p> <p><b>Ingredients:</b> noodles and rice, pork, duck, chicken, Chinese cabbage, water chestnuts, bamboo shoots, mushrooms, beansprouts, soy, soy sauce, lychee fruit, fish and seafood, eggs, ginger, garlic, sesame and peanut oil</p> <p><b>Traditional meals:</b> steamed or fried rice, chicken soup with noodles, tofu and stinky tofu, moon cake, spring rolls, wontons, dumplings, chow mein, sweet and sour pork</p>	<p><b>Equipment:</b></p> <ul style="list-style-type: none"> <li>Wok – deep, rounded pan</li> <li>Chopsticks – used instead of cutlery</li> <li>Bamboo strainers – used to drain wontons and dumplings</li> <li>Cleaver – large, heavy-duty knife used by chefs</li> <li>Brightly coloured lacquerware and porcelain dishes used to serve foods</li> </ul> <p><b>Cooking methods:</b></p> <ul style="list-style-type: none"> <li>Stir-frying and deep-frying</li> <li>Steaming and boiling</li> <li>Red stewing</li> </ul> 	<ul style="list-style-type: none"> <li>Breakfast is rather light, may consist of soy milk, noodles or soup</li> <li>Lunch is usually eaten in a nearby canteen or ordered in, rather light, consists of rice or noodles with meat and vegetables</li> <li>Dinner is large and often eaten in a restaurant, with a broad selection of meats and vegetables</li> <li>Soup is eaten throughout a meal, not only at the beginning</li> </ul>	<ul style="list-style-type: none"> <li>Very colourful dishes</li> <li>Served in many small bowls for people to share</li> <li>May be garnished with spring onions or herbs</li> <li>Chopsticks are provided instead of cutlery</li> <li>The use of a knife may be seen as offensive</li> </ul> 	<ul style="list-style-type: none"> <li>Traditionally meals were served in individual dishes, nowadays they are placed in the middle of the table for people to share and try all of them</li> <li>Talking is now allowed during the meal – in the past people rarely spoke during eating</li> <li>Modern lifestyle has caused a drastic increase in obesity rates in China</li> <li>International cuisines gain popularity, e.g. pizza</li> </ul>
	Japan	<p><b>Ingredients:</b> rice, soya, fish and seafood, noodles, seaweed, eggs, seasonal foods, green tea, wasabi</p> <p><b>Traditional meals:</b> sushi, tempura, donburi, udon noodles, miso soup, sashimi</p>	<p><b>Equipment:</b></p> <ul style="list-style-type: none"> <li>Chopsticks – used instead of cutlery</li> <li>Knives – famous for their sharpness</li> </ul> <p><b>Cooking methods:</b></p> <ul style="list-style-type: none"> <li>Deep-frying, grilling and steaming</li> <li>Eating raw fish, vinegared dishes</li> </ul> 	<ul style="list-style-type: none"> <li>Typically three meals during the day</li> <li>Early breakfast, might contain boiled white rice with various sides</li> <li>Lunch may be substituted with light snacks</li> <li>Dinner, usually shared with family or friends</li> </ul>	<ul style="list-style-type: none"> <li>Food is often served and eaten on the floor, while consumers kneel</li> <li>A hot towel may be provided to clean hands before eating</li> <li>Soy sauce is provided for dipping food in</li> </ul> 	<ul style="list-style-type: none"> <li>Foreign meals are eaten more often, such as American burgers, Korean kimchi, Hawaiian spam musubi, Chinese ramen</li> <li>Meat consumption increased during the last 50 years</li> <li>Meals can be skipped or replaced with light snacks</li> </ul>
India	<p>Also differs from region to region Shaped by colonialism and development of trade</p> <p><b>Ingredients:</b> pearl millet, rice, lentils, chickpeas, beans, peanut oil, coconut milk, ghee butter, paneer cheese, many rich spices</p> <p><b>Traditional meals:</b> fired paneer, vindaloo curry, rogan josh, korma, bhaji, tandoori chicken</p>	<p><b>Equipment:</b></p> <ul style="list-style-type: none"> <li>Tandoor oven – cylindrical clay oven used to roast and bake, typical for India and Central Asia</li> <li>Handi – deep, wide metal cooking dish</li> </ul> <p><b>Cooking methods:</b></p> <ul style="list-style-type: none"> <li>Deep-frying, frying, roasting</li> <li>Stewing, steaming</li> </ul> 	<ul style="list-style-type: none"> <li>Rich, filling breakfast is important to provide energy for the whole day</li> <li>Betel leaves may be eaten after the meal to support digestion</li> <li>Evening meal is usually eaten with the whole family, it is the most important meal of the day</li> </ul>	<ul style="list-style-type: none"> <li>Foods are often served with rich thick sauce, e.g. curry</li> <li>A selection of dishes is served for dinner to share</li> <li>Traditionally eaten on low stools or cushions</li> <li>Food is traditionally eaten with hands, not cutlery</li> <li>Food may be also served on banana leaves</li> </ul> 	<ul style="list-style-type: none"> <li>People more often use cutlery to eat, especially middle classes</li> <li>The use of many nuts may need replacement, especially for allergic people</li> <li>The cuisine is mainly vegetarian</li> <li>The use of many various spices may also pose a risk for allergic people, as well as for people who don't enjoy spicy foods</li> <li>People more often choose to eat out than to cook at home</li> </ul>	

\*This provides two cuisines, however schools or colleges/students can select any two different cuisines



# Food Production and Processing

Various methods of food production and processing help to obtain a variety of food products, but can also affect the nutritional value of food.

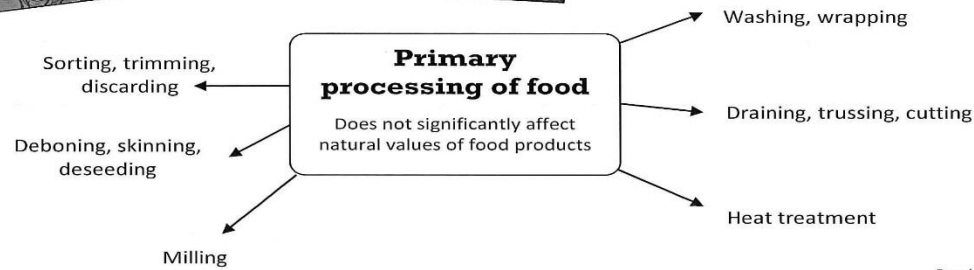
## Primary Sources of Food

Foods in their natural, raw state, e.g. milk, wheat grains, apples



Issues related to transportation of food are covered on p. 17

Where and how foods are grown, reared and caught (point of origin) on p. 16

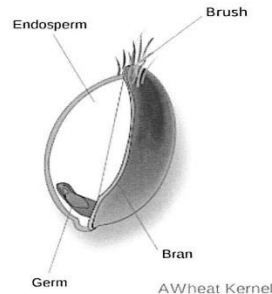


### The Making of Flour

1. Harvesting and transporting to the factory/mill
2. Separating from dirt, stones, pieces of metal and other pollution
3. Washing and drying to easily separate the bran
4. Milling
5. Sieving to separate the bran

**Bran:** the outer layer of a grain

**Milling:** the process of grinding and purifying grains to obtain flour



### Heat Treatment of Milk

**Pasteurisation:** warming the milk up to 72 °C for 15 seconds to kill most of the pathogenic bacteria

**Ultra heat treatment:** heating the milk up to 135 °C for 1–2 seconds to kill all bacteria and spores

**Micro filtration:** pushing the milk through very fine membranes to remove bacteria and other pollution

**Homogenisation:** pushing the milk under pressure through very fine membranes to reduce the size of fat droplets and prevent formation of cream

**Sterilisation:** heating the milk up to over 110 °C for 30 minutes to kill bacteria and spores

Sterilisation of milk leads to change in colour, flavour and nutritional value of milk. During the process, milk proteins react with lactose, creating brown pigments which also affect the flavour of milk. High temperature decreases the amount of vitamins in the milk, especially B1 and B12.

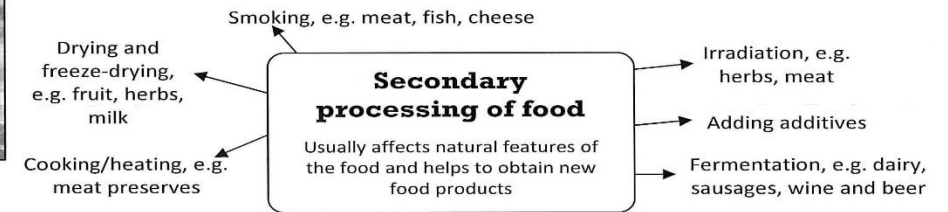
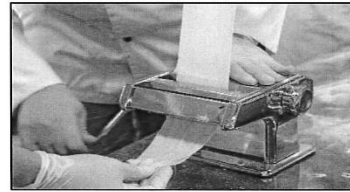
**Drying:** process in which milk is first condensed, and then dried. The temperatures used during the process may lead to a fall in vitamin B1 and B12 amount in the powdered milk.

## Secondary Sources of Food

Foods that have been changed, e.g. yoghurt, flour, jam

Water-soluble vitamins are especially fragile to such factors as light and temperature. Heating can lead to a loss of approximately 70% of folates, 55% of thiamine and 50% of vitamins C, B6 and B12.

During curing, meat becomes more tender and digestible, but the amount of sodium in it increases greatly, making it unsuitable for many people.



### The making of Pasta

1. Harvesting the cereals and transportation to the mill
2. Milling and transportation to the factory
3. Mixing flour with warm water
4. Kneading and gluten formation
5. Adding flavourings and colourants
6. Rolling and pressing
7. Pasteurisation with steam
8. Cutting the pasta into chosen shape
9. Drying
10. Packaging

To see how bread is made check p. 10

### The Making of Jam

1. Harvesting the fruit
2. Washing and crushing/cutting
3. Adding water and sugar
4. Simmering
5. Pouring into jars

**Pectin:** natural gelling agent present in fruit.

It is released from fruit in presence of heat and acid.

**Acid:** may be naturally occurring in fruit or may be added to the mixture to help release the pectin.

**Jelly:** set product made of fruit juice, sugar and a gelling agent.



### The Making of Yoghurt

1. Milking cows and transporting to the factory
2. Pasteurisation and homogenisation
3. Warming up to 42 °C
4. Adding starter cultures
5. Fermentation (ripening)
6. Cooling
7. Adding flavourings
8. Packaging

**Starter cultures:** probiotic bacteria added to milk during yoghurt and cheese production to begin the process of fermentation.

**Fermentation:** changing lactose into lactic acid by bacteria. This changes the pH of milk and leads to protein coagulation/denaturation and thickening of the mixture.

### The Making of Cheese

1. Milking cows and transporting to the factory
2. Pasteurisation and homogenisation
3. Adding starter cultures
4. Fermentation (ripening)
5. Adding rennet
6. Cutting the curd and separating from whey
7. Cheddaring
8. Adding salt
9. Pressing into cheese hoops
10. Ageing

**Rennet:** enzyme which coagulates milk and increases curdling

**Whey:** liquid by-product of cheese production

# Technological Developments that Claim to Support Better Health and Food Production

Modern technologies not only help to obtain high-yield crops, but also help to better preserve and improve nutritional value of food to support healthy living.

## Supporting Health



What we eat has a huge impact on health. Eating too little may lead to deficiency of a given nutrient. This is important since processing of food often leads to decrease of its nutritional value – higher calorie content, but lower vitamin and mineral amount, etc.

Governments and producers strive to make food safe and healthy for the consumers by adding substances which are beneficial for health.

### Cholesterol-lowering spreads

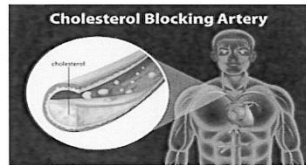
**Cholesterol:** fatty substance necessary to correctly transport fats around the body. It is found in many animal-derived foods, such as meat, cheese and eggs. Cholesterol does not occur in plant-derived foods.

- LDL is 'bad' cholesterol because it increases its amount in blood
- HDL is 'good' cholesterol because it transports it to the liver and lowers its amount in the blood

### Health outcomes of increased cholesterol levels and excessive fat consumption:

- In excess, cholesterol may deposit in the blood vessels, creating atherosclerotic plaque
- This increases the risk of hypertension, CHD, heart failure and stroke

Some fat spreads are enriched in **plant sterols** and **plant stanols**. These substances have proved to be effective in lowering blood cholesterol level and preventing atherosclerosis.



## Food Fortification

During processing, many food products lose their nutritional value.

The function of food fortification is to:

- restore nutritional value of foods
- improve nutritional value of foods
- make food more suitable for certain groups of consumers
- prevent diseases caused by malnutrition

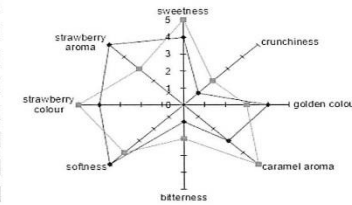
Some foods are fortified by law:

Wheat flour and bread	Thiamine	To prevent beriberi disease, help release energy from food
	Niacin	To prevent pellagra, help release energy from food
	Calcium	To prevent rickets and osteoporosis
	Iron	To prevent iron deficiency anaemia
Vegetable fat spreads	Vitamin A	To prevent growth and eyesight issues, such as night blindness
	Vitamin D	To prevent rickets and osteoporosis
Semi-skimmed and skimmed milk	Vitamin A	To prevent growth and eyesight issues, such as night blindness

Other foods, such as cereals or fruit juices, are fortified **voluntarily**.

60% Wholegrain Rolled Oats, 38% Wholegrain Oat Flour, Calcium, Niacin, Iron, Riboflavin B2, Vitamin B6, Thiamin B1, Folic Acid, Vitamin D, Vitamin B12.

## Supporting Food Production



Sensory analysis is crucial in the process of food production. It helps to compare various products, identify their good and bad sides, and identify areas for improvement.

### Computer-aided Design (CAD)

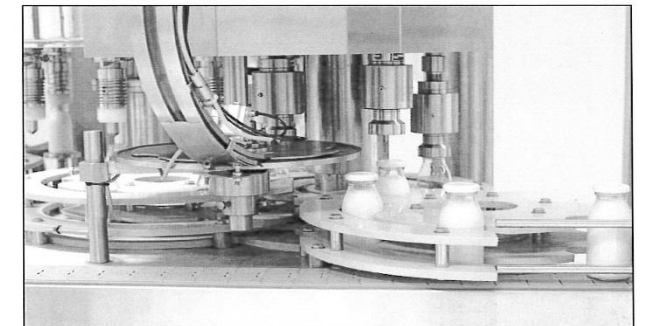
can be used to:

- ✓ design the appearance of a product
- ✓ design the label and packaging
- ✓ calculate ratio of ingredients, portion size and costs
- ✓ calculate the nutritional value of a food
- ✓ construct star profiles and analyse data from research (e.g. sensory analysis)
- ✓ calculate the shelf life of food
- ✓ research other similar products and look for improvements

### Computer-aided Manufacturing (CAM)

can be used to:

- ✓ plan the production
- ✓ measure and weigh ingredients
- ✓ control the production
- ✓ control the time, temperature and speed of each process
- ✓ transport the product in the chain
- ✓ monitor the production
- ✓ control portion size
- ✓ check for physical contamination, e.g. with metal

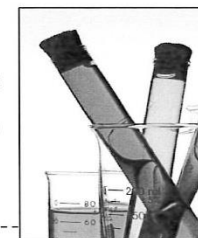


## Food Additives

All food additives are carefully tested before they may be used in food products. They are listed on the food label along with their E number and their function.

	Advantages	Disadvantages
<b>Colourings</b>	<ul style="list-style-type: none"> <li>• Improve the look of food</li> <li>• Make food more appetising</li> </ul>	<ul style="list-style-type: none"> <li>• May be used to hide poor quality of food</li> <li>• May cause hyperactivity in children</li> </ul>
<b>Emulsifiers and stabilisers</b>	<ul style="list-style-type: none"> <li>• Prevent the ingredients from separating</li> <li>• Maintain the texture of food</li> </ul>	<ul style="list-style-type: none"> <li>• Flatulence and bloating</li> <li>• May be used to hide poor quality of ingredients used</li> </ul>
<b>Flavourings</b>	<ul style="list-style-type: none"> <li>• Improve the taste and smell of food</li> <li>• Make food more appetising</li> </ul>	<ul style="list-style-type: none"> <li>• May be used to hide poor quality of ingredients used</li> <li>• Increase appetite and make people eat more than they need</li> </ul>
<b>Preservatives</b>	<ul style="list-style-type: none"> <li>• Enhance shelf life of food</li> <li>• Prevent oxidation and spoilage</li> </ul>	<ul style="list-style-type: none"> <li>• May cause allergy response and anaphylactic shock</li> <li>• Nitrates may contribute to cancer development</li> </ul>

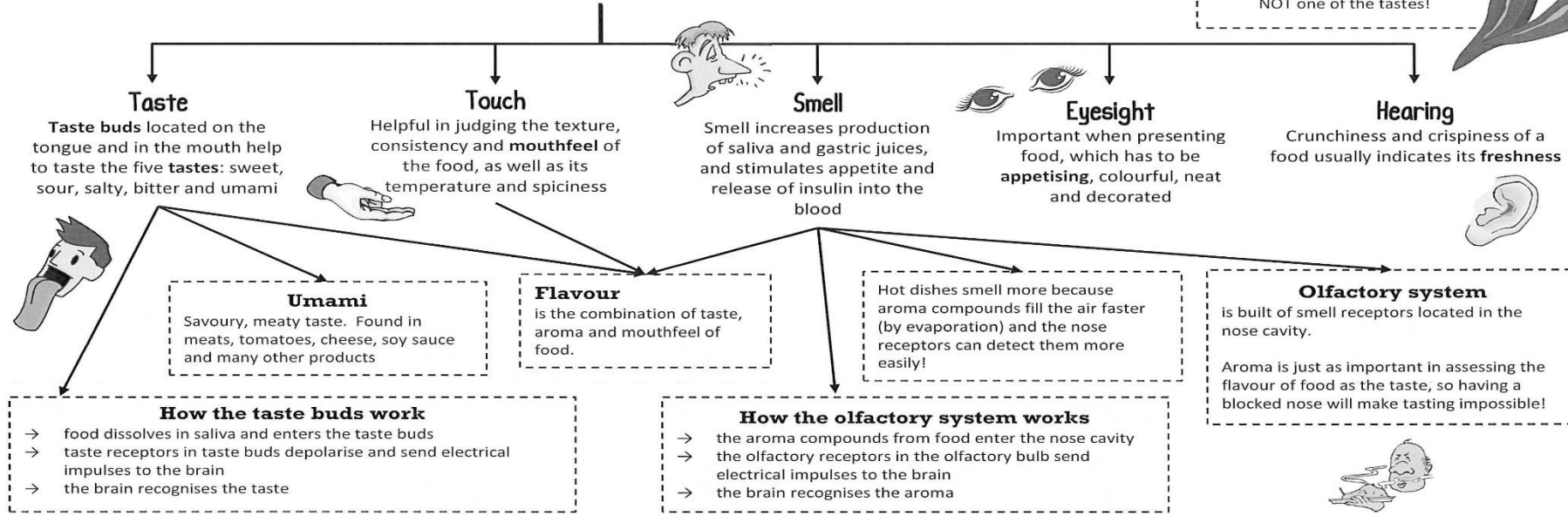
Food additives may be both natural (e.g. beetroot extract used as a colouring agent) and synthetic (e.g. citric acid).





# Sensory Perception

Helps to ensure the quality, consistency in time and acceptability of food by consumers by the use of the five senses:



## How to Set Up a Taste Panel

**Taste panel** – group of tests performed to assess the organoleptic qualities of a food product. Taste panel should be conducted under **controlled conditions**.

### Room conditions:

- Remove potential distractions to help the tasters focus on the task, e.g. noises, strange smells, other tasters
- Lighting should be adjusted so that differences in the look of food samples aren't visible
- Individual boxes or rooms for each taster should be provided, so that tasters are separated from each other and cannot communicate

### Tasters:

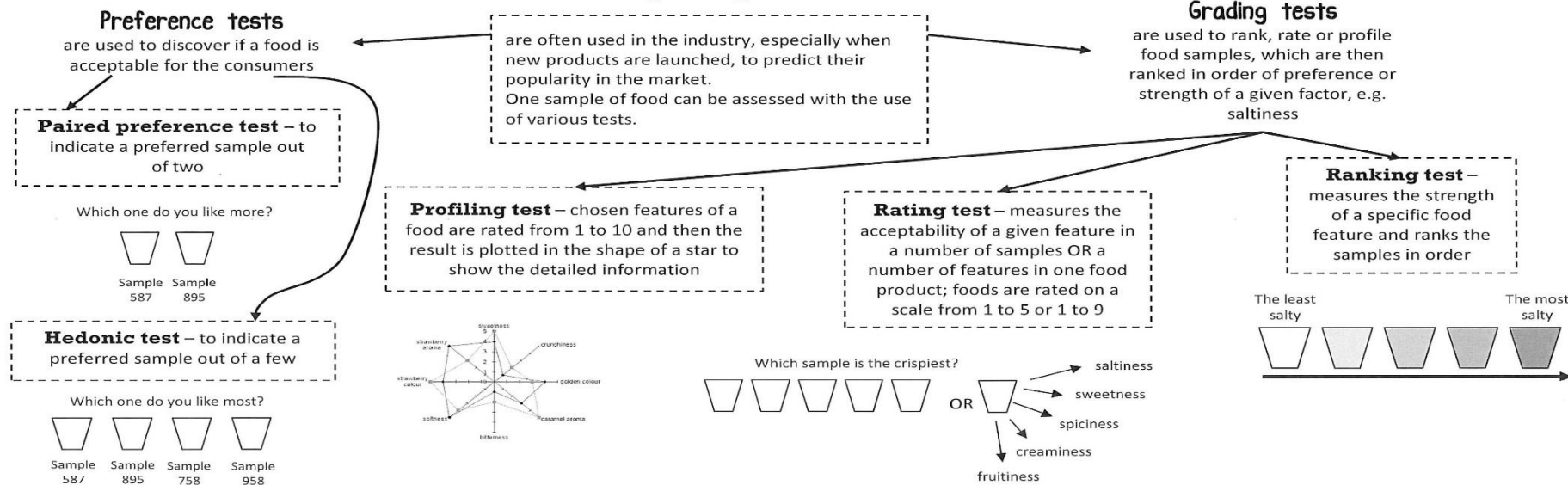
- Instructions should be given to tasters so that they know how to proceed, e.g. rinse your mouth after trying each sample
- Charts should be given to tasters so that the results can be compared and summarised
- Water should be provided to rinse the mouth between trying different samples of food

### Food samples:

- Food samples should be coded randomly, so that only the person who is setting the panel knows what's in each sample; this also helps to ensure that the tasters' opinion isn't based on the number of the sample
- Samples should have the same size and temperature
- Samples should be served on white or black plates to avoid distraction
- If a food carrier is used, it has to be neutral in taste so that it cannot alter the taste of the tested food sample
- The temperature of food samples has to be controlled, as some foods have to be served cold (e.g. ice creams), and some have to be served hot (e.g. soup) – this supports a fair assessment of the texture, mouthfeel and taste

**Remember: the more tasters, the more valuable the outcome!**

## Sensory Analysis Tests



# Factors Influencing Food Choices

Food choices are driven by many various factors, which are very important when planning diets, meals and menus.

### Physical Activity Level

Amount of energy needed to perform all daily tasks, i.e. waking up, showering, jogging, working, shopping, etc.

The more active the person, the more energy needed.

If you eat more than you need (your PAL is low), you are likely to gain weight.

If you do not eat enough or you are very active (your PAL is high) then you are likely to lose weight.

Keep your diet **balanced** to maintain weight!



### Healthy Eating

A balanced and varied diet is a key to a long life!

Healthy foods and snacks may be:

- Low – fat
- Low – sugar
- High – fibre
- Low – calorie
- Low – salt

or a combination of these.

Reasons for choosing them usually include the need to lose weight or maintain health.



### Lifestyle

The way in which people live

- busy schedules
- no time for shopping and cooking
- no time for eating

Healthy lifestyle should include home-cooked food and regular meals during the day. There is a variety of **healthy snacks** and foods which are ready to eat:

- Portioned fruit and vegetables
- Protein shakes and smoothies
- Sandwiches, salads and soups



### Food Availability

The amount and variety of food depends on:

- food production possibilities
- food storage
- transportation and import from other countries

Seasonal foods might be cheaper in their harvesting season, but still available all year round.



### Seasonality

Some foods may be unavailable, or more expensive, beyond their harvesting season.

People may prefer seasonal foods for various reasons:

- Locally grown, cheaper, fresher, tastier
- Want to decrease the environmental impact – food miles and carbon footprint

### Cost of Food

The price of food products varies depending on:

- quality
- quantity in a package
- brand
- place you're shopping in

Supermarkets usually have lower prices on most products than convenience stores.

Food may be cheaper if you look out for special offers, meal deals and discounts.



### Income

Disposable income is the amount of money a family can spend on goods such as food and rent.

Amount of money determines the quality, quantity and variety of food that can be purchased.

Low-income families may choose high-fat and high-sugar products since they are usually cheaper than healthy foods such as fruit or vegetables.



### Preferences

Some people have a 'sweet tooth' and tend to choose more sugary foods, while others prefer savoury and will tend to buy salty or more bitter foods.

### Enjoyment

Similarly to celebrations, people like to eat certain foods for enjoyment.

That includes popcorn and soda in the cinema, ice creams or candy floss in an amusement park, or toffee apples at Halloween.

These foods also tend to be more fatty and sugary than everyday food.



### Time Available to Prepare Food

- Busy schedules and lack of time
- People choose ready-to-eat foods, order in or eat outside more often
- People choose simple recipes which don't take too long to cook

### Time of Day (in the UK)

- Breakfast: sandwiches, cereals, more filling meals are served on weekends or holidays
- Lunch: pasta, salads, sandwiches or eat out
- Dinner: more demanding foods, soups, stir-fry, curry, pie, order in or eat out

### Celebration

Food plays a large roles during various occasions. To celebrate, people eat:

- more food
- special festive food
- more fatty or sugary foods than usual

People celebrate with food on various occasions:

- birthdays
- weddings
- anniversaries
- special events
- religious events



### Culture

The place you grow up in has a huge impact on your food choices, including when you observe holidays and what foods are eaten on a daily basis. Culture often develops in relationship to religion.

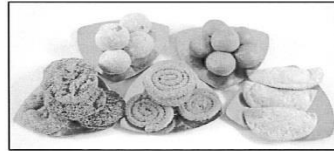
# Food Choices

## Religion

- Often dictates nutritional regime, indicates what foods can be eaten and when, and what foods should be avoided
- Each religion has a number of celebratory foods and eating habits
- Some religions require foods to be prepared in a specific way
- Religions can also decide when certain food can or cannot be eaten (fasting periods)



Jews prepare a Seder plate for the night of Passover. Each food on the plate has its own symbolic meaning.



Various sweets and confectionery are an important part of Diwali in Hindu tradition.

More information on how religion affects food choices on p. 6



During Ramadan, food can be eaten only during night-time (from dusk to dawn). It is, however, very rich and filling.

## Medical Conditions

Many people cannot eat certain products because they would cause harm to their bodies.

### Food intolerances

May force people to avoid certain food products or only eat them in small amounts.

### Food allergies

Force people to avoid certain foods as they could pose a threat to their health and even life.

### Diet-related diseases

Force people to desist from eating certain foods and decrease or increase consumption of certain nutrients.

For example, a person with hypertension should cut down on sodium and saturated fats, while a person suffering from type 2 diabetes may need to avoid sugary foods and beverages.



More information on how medical conditions affect food choices on pp. 8 and 9

## Ethical Beliefs

People may choose to eat, or avoid eating, certain products because of their ethical or moral beliefs.

These may be based on:

- whether animals or people suffer during food production
- how food is made
- how food production affects the environment

### Fairtrade

Global movement focused on ensuring fair working conditions, prices and wages for farmers and workers in the developing countries.

- Improves working and living conditions
- Supports education and development
- Empowers farmers and their families



### Animal welfare

Movement focused on ensuring well-being and humane conditions for rearing animals.

- How animals are treated
- How they are nursed or protected from diseases
- How they are slaughtered
- What their living conditions are



### Organic foods

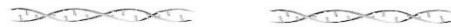
Plants and animals are grown and reared in the most natural way possible.

- No chemicals
- No pesticides, herbicides
- No antibiotics
- No GM feed or fertilisers



### GM foods

Plants or animals whose DNA was altered.



### DNA

Carrier of all information about a living organism, in a form of a double helix tightly packed in a cell's nucleus.

### Gene

Part of a DNA strand, which carries specific information.

- Improved immunity, less need for pesticides
- Higher crops and smaller risk of food shortage
- More nutrients (e.g. golden rice)
- Unknown health effects
- Probably cause morbid obesity
- Potentially cause cancer



### Local produce

- Fresher, tastier, cheaper food products
- Fewer food miles and lower carbon emission
- Support for local farmers and societies
- No need for long-distance transportation

### Food miles

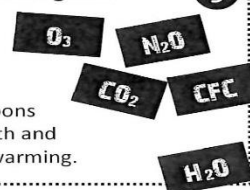
Distance from a farm to the plate

### Carbon footprint

Indicates how much carbon dioxide and other greenhouse gases were emitted during production and transportation of a given product

### Greenhouse gases

- Carbon dioxide
  - Water vapour
  - Nitrous oxide
  - Ozone
  - Chlorofluorocarbons
- Trap heat around Earth and contribute to global warming.



## How to Make Informed Choices about Food and Drink

It is important that people pay attention to what they eat as it may have a large impact on their health and well-being

### Always read the label on the food

It includes important information on the ingredients and nutritional value

### Consider the cost of ingredients

Choose cheaper substitutes, especially when cooking on a budget

### Adjust the portion size to individual needs

It will help to ensure nobody leaves hungry and will prevent food waste

### Ensure the food suits individual needs

For example, halal meat should be used in dishes for Muslims and no animal produce should be used in dishes for vegans



# Food Labelling

Proper labelling of food products is important to ensure food safety (e.g. for allergic people) and nutritional education (e.g. for those who wish to lead a healthy lifestyle).

- 1 **Name of the food** is important so that people know what is inside the package, e.g. butter or butter-like spread
- 2 **Use by** – applies to food safety; it may be harmful to eat food after that date; used on fresh, perishable foods such as milk, dairy or fresh meat
- 3 **Quantity** is given so that it is easier to compare prices between products, and so that the consumer knows how many portions of food his package contains
- 4 **Warnings** are given as necessary, e.g. may contain nuts, source of phenylalanine
- 5 **List of ingredients** is shown in *descending order*, from the one which is used in the largest amount to the one which is used only in a tiny amount
- 6 **Name of the company** is important to track where the food comes from in case of food spoilage, anaphylactic reactions, pieces of glass inside, etc.
- 7 **The lot number** is useful in case of a food spoilage or contamination, when it is easier to track the whole lot and remove it from the market
- 8 **Storage conditions** are given if needed, e.g. refrigerate after opening, suitable for freezing
- 9 **Instruction for preparation** helps people to properly prepare and enjoy the food without poisoning themselves
- 10 **Country of origin** is important to track in case of food poisoning, but also for people who prefer to eat locally

## Food Legislation Authorities



European Parliament and the Council



Food Standards Agency

### Food label: mandatory information

1. Name of the food
2. Date marks
3. Quantity, e.g. in litres, grams or pieces
4. Warnings
5. List of ingredients
6. Name and address of the producing, packing or selling company
7. The lot number
8. Special storage conditions
9. Necessary instructions for use or preparation
10. Country of origin
11. Allergens
12. Nutrition declaration

## 11 Allergens – ingredients which may cause allergic reaction (are shown in bold)

### List of allergens which HAVE to be indicated on the label

1. Cereals containing gluten: wheat, rye, barley, oats
2. Peanuts
3. Nuts: almond, hazelnut, walnut, cashew, pecan, Brazil, pistachio, macadamia, Queensland nut, e.g. **flavourings (almond)**
4. Mustard
5. Sesame, e.g. **tahini (sesame)**
6. Soybeans, e.g. **tofu (soya)**
7. Fish, e.g. **cod (fish)**, **salmon (fish)**
8. Crustaceans: prawns, crayfish, lobster, shrimp
9. Molluscs: oyster, squid, cockles, mussels, winkles, scallops, snails, e.g. **oyster sauce (molluscs)**
10. Lupin
11. Eggs, e.g. **powdered yolk (eggs)**
12. Celery
13. Milk, e.g. **cheddar cheese (from milk)**
14. Sulphur dioxide or sulphites, e.g. **preservative (sulphur dioxide)**

12 **Nutrition declaration** informs consumers of the amount of certain nutrients per 100 g or portion of product and % of GDA it provides.

**Traffic light label** may be used to indicate low (green), medium (amber) or high (red) amounts of sugar, fats, saturated fats, and salt in a portion of a food product.

Protein	8.8g	0.6g	1%	50g
Salt	1.55g	0.10g	2%	6g

Energy	172kJ	41kcal	2%
Fat	1.8g		3%
Saturates	0.8g		4%
Sugars	1.8g		2%
Salt	0.1g		2%

**GDA** – Guideline Daily Amount – amount of a nutrient a person should eat each day to remain healthy and avoid under/overnutrition

### Nutritional claim

Statement regarding nutrient content, e.g. *low energy, low fat, sugar free, source of vitamin C*

### Health claim

Statement suggesting potential health benefits of eating given product, e.g. *Calcium is needed for the maintenance of normal teeth and bones*

### Non-mandatory information

Some food labels may include non-mandatory information, such as a picture of the food, health and nutritional claims or serving suggestions.

# Marketing Influences

Various techniques and methods which aim at increasing sales and maximising profit.

## Meal Deal

Type of a special offer in which the price of buying two or more indicated products is lower than when buying them separately.

## BOGOF

Special offer in which by buying one item of a product, another pack of the same product will be for free.

Other versions include 'buy one get second 50% cheaper' or 'buy two get third free'.



## Advertising

Posters, TV spots, newspaper publications and other actions taken to promote a product and make it desirable for the consumers.



## Special Offer

Usually special offers include discounts when buying larger amounts of given products, free gifts, vouchers, etc. A specific type of a special offer is selling food shortly before its 'best before' / 'use by' date.



## Media Influences

The television, radio or newspapers may have a large impact on food choices by using a technique called 'product placement'.

A food product is used by favourite actors, movie characters or in popular sitcoms to make the food look 'desirable', 'fashionable' and 'cool'.

## Peer Pressure

This applies especially to children and teenagers, as they tend to follow what's 'cool' in their age group, e.g. smoking.



## Points of Sale

Food stands located near checkouts, usually containing relatively expensive items such as chewing gums, chocolate bars and other sweets.

People tend to buy these products more often if they spend a lot of time standing in a queue.

## Pester Power

The ability of children to force their parents to buy them sweets, toys or other things.

Food packages are often colourful and eye-catching to make them desirable for children. This technique uses pester power to increase sales.

