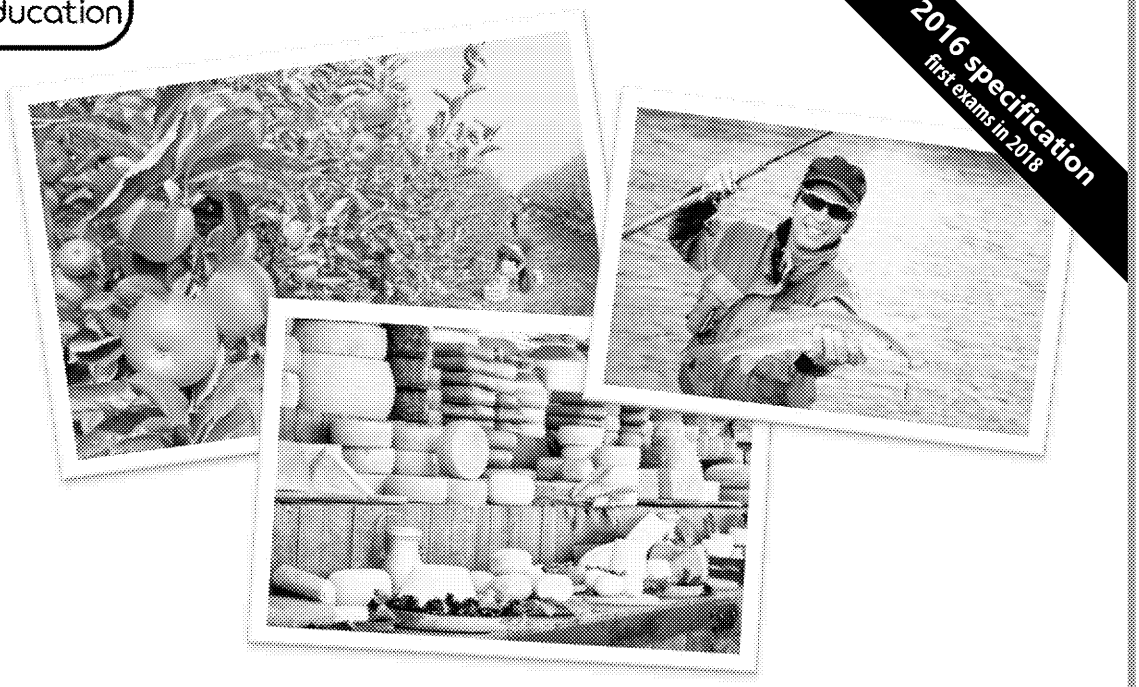
Zig Zag Education

Food and Nutrition GCSE (9–1) | OCR | J309

2016 specification
first exams in 2018



Course Companion

For GCSE (9–1) OCR Food Preparation and Nutrition

Section B: Food Provenance and Food Choice

OCR
Oxford Cambridge and RSA

An OCR endorsed textbook

zigzageducation.co.uk POD 8227

Contents

Teacher's Introduction

This resource is designed to meet the Food provenance and food choice (Section B) element of the GCSE OCR Food Preparation and Nutrition qualification.

What it covers

The resource comprises six chapters covering the following:

Chapter 1: Food provenance
- Where food is grown, reared and caught
- How food is grown, reared and caught

Chapter 2: Food processing and production
- Food processing
- Food preservation methods

Chapter 3: Food security
- Moral and ethical issues
- Environmental issues

Chapter 4: Technological developments to support better health and food production
- Fortification of foods
- Additives in foods
- New and emerging foods

Chapter 5: Development of culinary traditions
- British cuisine
- International cuisines

Chapter 6: Factors influencing food choice
- Personal, social and economic factors affecting food choice
- Medical reasons (intolerances and allergies)
- Consumer information
- Religious and cultural beliefs
- Ethical and moral beliefs

How to use this resource

The resource covers all aspects of food safety and is designed to increase knowledge of the topic and enable learners to test their understanding and skills through a variety of assessment methods.

Learning Outcomes enable the learner to clearly see what they are expected to know at the end of each chapter. The **Overview** provides a brief summary of what will be covered in the chapter and the **Key Terms** provides information on key terms within the resource (key terms are emboldened within the chapter text).

Did you know?	These boxes contain handy tips.
Things to think about	These boxes provide learners with a chance to develop cognitive skills, do some research (books, Internet, people) and take part in a discussion.
Apply	These boxes provide the learner with the opportunity to further their skills, either through cognitive or practical application.
Qs	These test learners' knowledge and understanding through quick Y/N questions.
Revision tip	Useful tips to help the learner concentrate on important aspects of the text that may appear in the final assessment.
Check your understanding	A combination of multiple-choice questions and practice questions appear at the end of each section to test knowledge and understanding.
Quiz-ine	A crossword-style quiz at the end of each chapter to test learners' understanding of key terms used in the resource. The shaded squares spell out a word associated with the chapter text.
Answers	Answers to questions are provided at the end of the resource.

Chapter 1: Food provena
(Food Source and Supp

Overview

In this chapter you will explore how foods are grown, reared and caught. You will learn to recognise various types of fruit, vegetables, meats and fish and begin to classify them in terms of how they are sourced. You will also begin to discover various methods of farming along with their advantages and disadvantages.

Learning outcomes

After studying this chapter, you should be able

- ❑ know and distinguish between grown, re produce
- ❑ classify fruit, vegetables, meats and fish
- ❑ understand the advantages and disadva foods
- ❑ ide[illegible] the advantages and disadva

Key Te[illegible]s

Factory farming	Type of agriculture focused on intensifying food produc numbers of animals in small areas of land, to increase p eggs and to minimise potential costs
Fish farms	Tanks or enclosed sea areas in which fish or seafood is re
Free-range	Farming method in which animals and birds are allowed for at least part of the day
Game	The meat of hunted animals and birds
Intensive farming	Type of agriculture focused on intensifying food produc herbicides, GM crops and other methods
Livestock	All animals domesticated and reared to provide food, w
Local food	Food produced locally, in a given region
Orchard	Enclosed area of land used to grow fruit or nut trees
Organic	Grown or reared with restricted use of any chemicals, p or GM feed and GM organisms, under strict conditions
Polytunnel	Tunnel frame covered with polyethylene, used to grow
Poultry	The meat of farmed birds, e.g. chicken and turkey
Seasonal food	Food characteristic of a given season of the year
Tuber	Part of the plant which grows und round on the root
Venison	The meat of a deer

Where food is grown, reared and

For a long time, people were hunter-gatherers, which means that their diet was ba
their surroundings. This included wild animal meat, fish, and some fruit and herbs
was invented and started to revolutionise humans' diet. Today, most of our food i
modern technologies; only a small amount of the food we eat is still gathered or ca

Let's take a look at how foods are grown, reared and caught.

Grown foods

Foods may be grown in fields, orchards or polytunnels

The most traditional way of growing fo des fields and **orchards**. These are large areas in which ts nes and trees are grown to produce vegetables, fr t, and seeds. They are kept under the open sky, v ec that they are susceptible to all weather changes, low and hig eratures, droughts and floods, soil overexploitation, pests, rodents, wild animals and birds. Managing a field or an orchard in a certain region also involves deciding what plants are actually capable of living in given conditions. All these factors mean that crops from fields and orchards are very unpredictable and require various treatments to overcome all possible dangers. To increase crops and prevent possible damage, most farmers decide to use pesticides, herbicides and many other chemicals.

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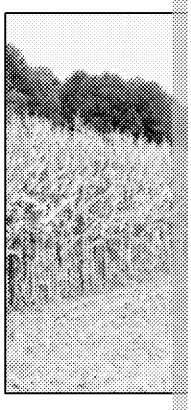
Picking apples in an orchard



Field

Polytunnels were invented in the 1940's to enable the gr t of tropical plants. They are long, plastic tunnels cre ten n ensure the warmth and humidity necessary for pr er v lopment of such plants. Thanks to polytunnels u ca njoy strawberries, cucumbers and lettuce all year lon yt nels protect the plants from external hazards su ea her changes or insects, and, therefore, it is easier to pr ow much food will be produced.

Where food is grown	What food is grown there	
Field	grains	cereals su oats
	oil plants	flax seed,
	root vegetables, cruciferous plants and brassicas	potatoes,
	sugar plants	sugar bee
Orchard	mostly hard fruit and nuts	apples, ch olives, wa
Polytunnel	mainly soft fruit	strawber tomatoes
	vegetables	lettuces,
	mushrooms	white mu mushroo

Did you know?

Some vegetables such as lettuce, basil, tomatoes, peppers, cucumbers and wasa using hydroponics. This means that they are not planted in soil, but their roots in water.

Research

Find out what plants can be grown hydroponically at **zzed.uk/8227-grow-hy**

Hydroponic farming

The region in which people live often determines what can be grown and, therefore, decides their diet. This usually is embodied in national dishes; for example, Mexican cuisine uses a lot of sweetcorn because maize grows in Mexico, but traditional British cuisine doesn't have any sweetcorn in it because the grain was introduced to the UK only at the end of the fifteenth century, and for a long time couldn't even be grown here because of the climate.

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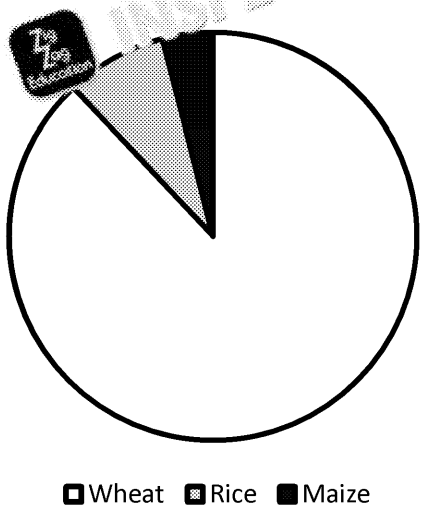
The charts below illustrate the main three grains consumed around the world – w

Notice how consumption patterns change with the region and climate of each co
certain produce. According to *National Geographic*, the m popular foods in th
consumption) and wheat (18% of total consumpti). N , there are vegetable

United



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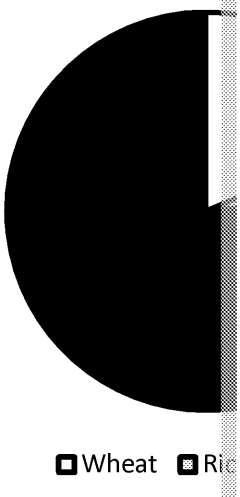
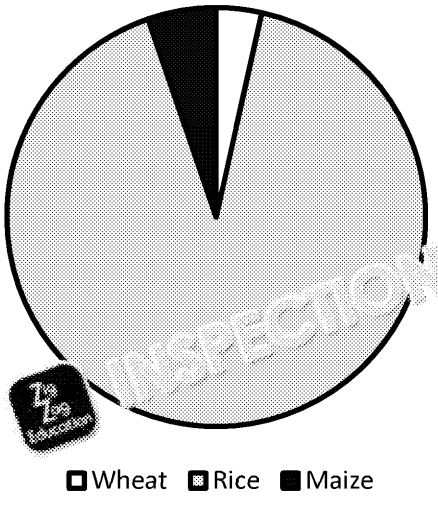


Vietnam



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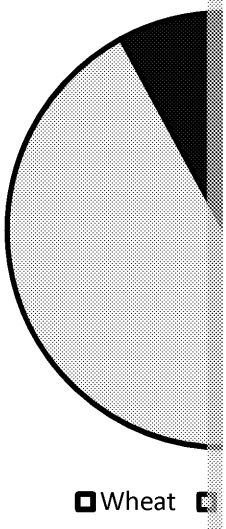
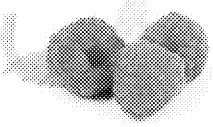


Classification of fruit and vegetables

Botanically, fruits are plant parts which develop from fertilised flowers. They usually carry one or more seeds, which allow the reproduction of the plant. Due to the development of technology, it is possible to produce fruit which are seedless. Generally, fruit consist of a seed or seeds surrounded by a pericarp (the soft or hard fleshy part) and covered with skin. An exception is the strawberry, which has its seeds on the outside.

Fruit can be classified depending on how many flowers they are developed from. This means we can differentiate between simple fruit (developed from one ovary in a flower), multiple fruit (developed from multiple flowers gathered into a mass) and aggregate fruit (developed from multiple ovaries of a single flower).



Raspberries are multiple fruit

Fruit can also be classified according to their type / culinary use:

Tree fruit	grow on trees, have an edible skin and firm texture	app
Stone fruit	have a hard stone in the middle, usually surrounded by soft, fleshy pericarp	plu
Berries / soft fruit	soft texture and small pips	stra
Dry fruit	their skin becomes dry once they reach maturity	pop
Exotic fruit	characteristic of tropical countries, not grown in the UK	ban
Citrus fruit	surrounded by tough, aromatic skin, have a juice texture	ora

Vegetables can be classified depending on which part of the plant they come fro

Fruits	ingredients which are botanically fruit, but are used as vegetables in cooking	courgette, cu melon, auber
Seeds	those which grow in pods (which are also sometimes eaten)	green peas, b
Flowers	the edible flowers	artichoke, bro
Leaves	made of the leaves	lettuce, kale,
Stems	the edible stem which constitutes the main part of the vegetable	asparagus, ce
Roots	usually long or round-shaped	carrot, parsni beetroot, sug
Bulbs	grow just below the surface of the ground and are built of many layers	garlic, onion, l
Tubers	grow underground on the root of the plant	potato, yam,
Fungi	mushrooms can grow both above and under the ground	Portobello, bu truffle

Cereals can be generally classified as starchy cereals (e.g. wheat, barley, oats, ric rapeseed).

Things to think about (1.1)

Discuss the advantages and disadvantages of growing foods in fields

Reared foods

People have learnt to rear a number of species to satisfy the needs of growing po
(among others) cattle, goats, sheep, pigs, rabbits and poultry. Animals are reare
and wool, and for their muscle power (for example, horses are still used as work
in some countries). Also their excrement is used to produce energy or as a fertili
local habits or requests, people can rear camels, reindeer or even snails.

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The need to maintain economic growth and produce more and more food has led to the development of **factory farms**. These are usually large enterprises, rearing hundreds or often thousands of live stock. This applies especially to cows (dairy farms), pigs (reared mainly for pork) and hens (reared for eggs or meat). Factory farms often apply the rules of **intensive farming**, to increase production and the profit it brings.

The following table gives a summary of what animals people rear and why.

What people rear...	... and why
Cattle	Leather, beef, milk and dairy, ene
Poultry	Meat, eggs, feathers
Horses	Meat, entertainment, muscl
Pigs	Pork, leather, fertilise

Sturg

Also, some fish are considered reared foods. These include salmon, trout, cod, carp, catfish and some shellfish raised on **fish farms** that were created especially for human needs. In fish farms, fish are kept in large containers (fish tanks), which are sometimes seriously overcrowded.

Although this might be ethically dubious, fish farms help to prevent and avoid overfishing of the seas and oceans, and help to preserve naturally occurring species. The fish in fish farms is reared for meat and caviar, and leftovers or non-edible parts are used to produce animal feed.

Research

Read more about fish farming in the UK at **zzed.uk/8227-farming-fish** and d
steps in fish production. Do fish farms use organic or conventional farming me

Poultry, such as hens, ducks, geese and turkeys, are reared around the world for
animals are usually kept in henhouses. These may be kept in tight cages, or m
around the henhouse and even be allowed to go outside. The way is which poult
meat and eggs produced. Also, **organic farming** rules may apply here – this is wh
feed, are not given antibiotics if not necessary, etc. (organic farming will be discu
this chapter).

Nowadays, it is more and more popular to rear animals which were traditionally
boar.

You may sometimes meet ecologists or animal welfare activists who are protesti
of the conditions the animals are kept in or the way they are treated.

An example of this is rearing geese in France using a method in which feed is forced into their stomachs via tubes to increase the growth of liver and fat tissue, for the production of foie gras. This method of rearing has been labelled as cruel and, therefore, banned in the UK, although it is legal to buy foie gras.

Force-fee
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Another example is squeezing many animals in tight boxes placed on top of each other, as is the case in battery farms (these have been banned in the UK). The hens can also have their wings cut to prevent them from moving too much and their beaks trimmed to prevent them from fighting with each other.

Other concerns regarding rearing of the ani[illegible] include:

- keeping animals in closed [illegible] without access to natural sunlight
- cramming in ani[illegible] can't turn around or move (e.g. cows in fee
- usin[illegible] prevent diseases and speed up the growth of animals, resi[illegible] in microorganisms (which, in the near future, may lead to crea
- genetically manipulating DNA of animals to produce more muscle tissue, animals would
- overexploiting animals, which shortens their life (an intensely reared cow compared to around 20 for one living in the wild)
- transport conditions – when animals are finally transported to slaughter trucks and often spend a couple of days without food or water before the
- slaughtering conditions, in which animals' throats are slit open and the an alive

Classification of meat and poultry

Meat is the muscle tissue of animals. Usually it can be divided into:

- lamb (meat from sheep younger than 12 months)
- beef and veal
- pork (from pigs)
- poultry (from chickens, ducks, turkeys, geese, etc.)
- game (both from mammals and birds – see caught foods for more information)
- offal (the edible internal organs of the animal)

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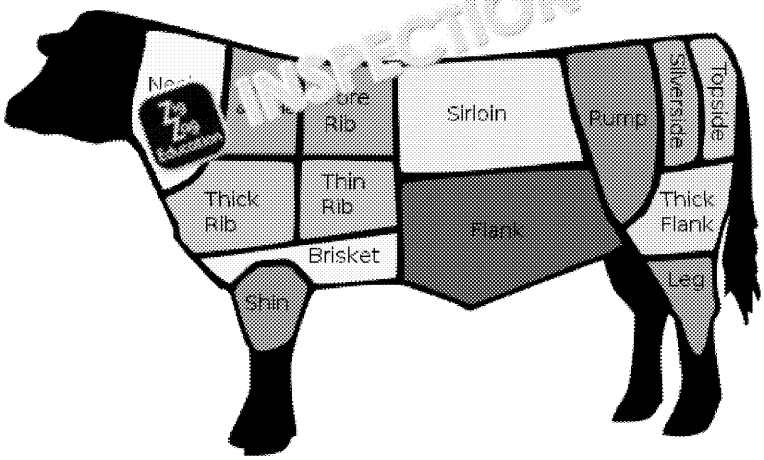
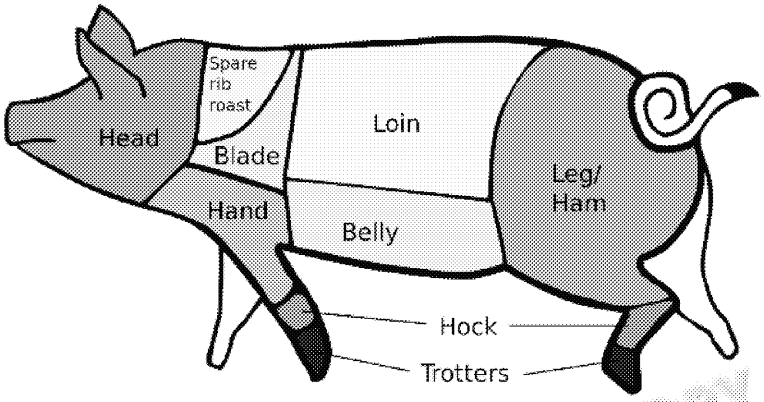
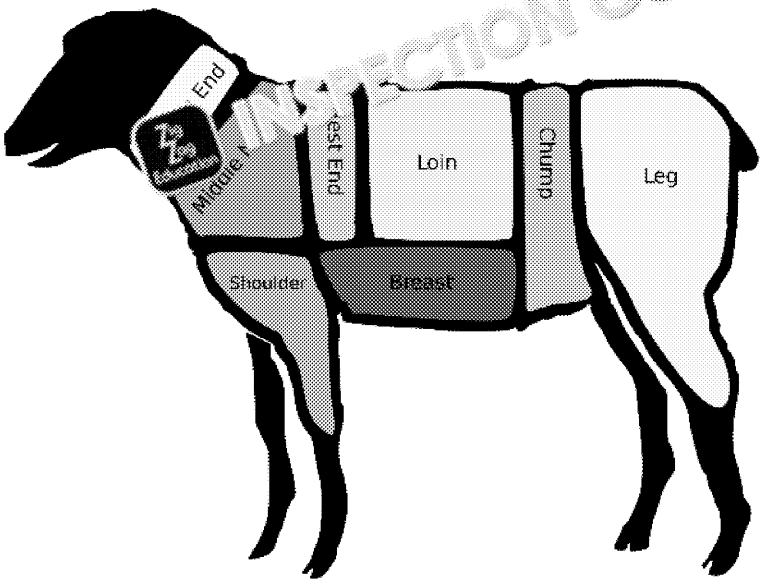
The origin of meat and the way the animal was reared determine its quality, flav
different cuts of beef, pork and lamb, and their culinary uses, are shown in the d



Chuck and braising
Fore rib – r
Sirloin – st
also used i
Rump – sti
Silverside a
Flank (skirt)
Leg and sh
Thin rib – r
Thick rib –
Brisket – n



- **Head** – slo
- **Spare rib** –
- **Blade** – slo
- **Loin** – grill
- **Leg (ham)** – braising, ro
- **Belly** – bac roasting, b
- **Hand** – slo
- **Hocks and**



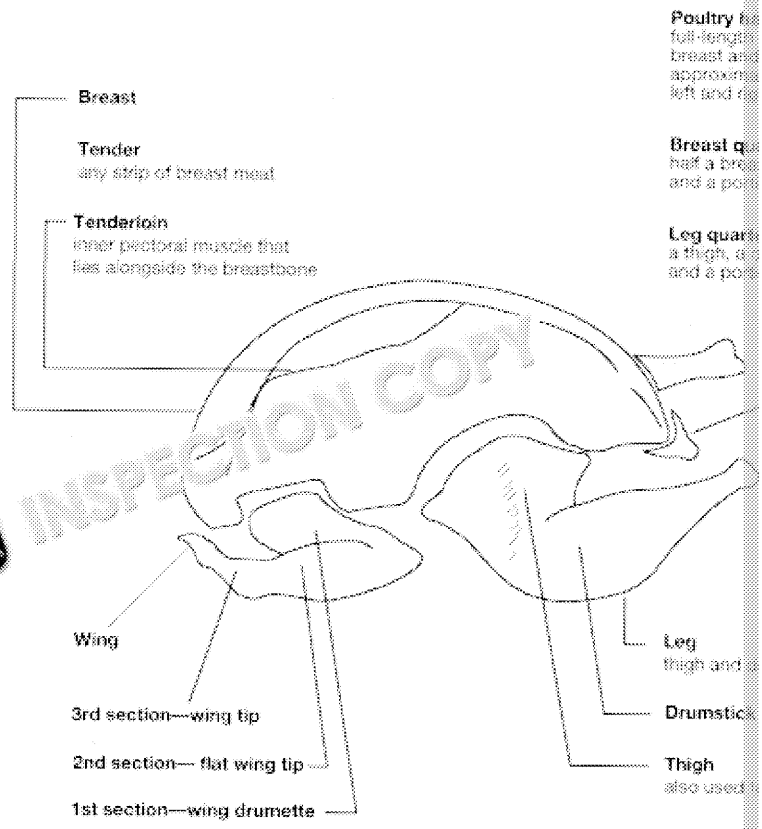
- **Scrag end a** braising, ro
- **Best end (r**
- **Loin** – grilli
- **Chump** – g
- **Leg** – roast
- **Breast** – ro
- **Shoulder** – slow cooki

Meat can also be divided into fatty and lean, depending on the amount of fat in it bacon, while tenderloin is an example of lean meat.

Research

Go to **zzed.uk/8227-meat-clasification** to see how lamb, beef and pork are

Poultry includes the meat of domesticated fowls, such as chickens, turkeys, duck
shows the main cuts of poultry carcass.



The breast is usually the most tender part, which requires short cooking. The wi
makes them a suitable base for preparing aspic (savoury jelly). After marinating,
steamed, stewed, fried or roasted. The carcass that is left after portioning (consi
and tail) can be used as a base for preparing soups and stocks. It is important to
accumulates mainly under the skin, so removing it is a good way of reducing the

Caught foods

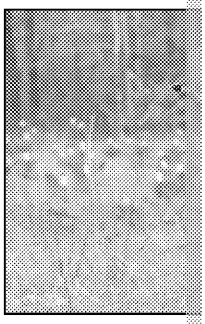
Caught foods include all wild animals that can be hunted and eaten. This includes game and wild fish that live in the seas and oceans (such as tuna, mackerel, herring and shellfish).

In the United Kingdom, game (or quarry) is defined by the Game Act of 1831 and the Deer Act of 1991. The name applies to such animal species as grouse, ducks, geese, pheasants, hares, rabbits and deer. The deer meat can be also called *venison*.

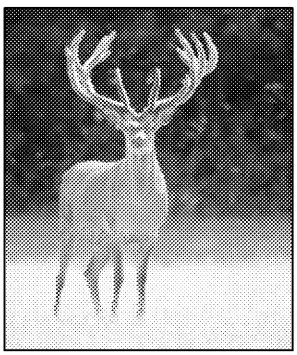
People have been hunting animals for centuries – either for food, horns and antlers, sport or entertainment. Since this has led to the extinction of many species, it is now often either forbidden to hunt certain species or it is allowed in certain seasons only.

Some wild animals – especially those high in numbers and causing damage to crops – can be hunted all year long with a permit. This applies to wild boar, for example.

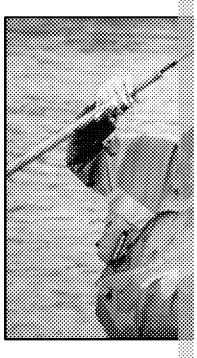
Pheasant is often hunted for its delicate meat



Certain breeds of



Some species, such as deer, can only be hunted outside the breeding season. This is to protect the species and prevent its extinction.



A man showing

Classification of fish and game

Caught animals can be divided into:

- small birds, e.g. thrush, quail
- winged game, e.g. pheasant, wild goose, woodcock, grouse, partridge
- ground game, e.g. hare, rabbit
- big game, e.g. deer, wild boar, moose, caribou

Since these animals live in the wild, we have no control over what they may have could carry. For that reason, it is advisable to have them checked by a vet before they could carry parasites such as *Trichinella spiralis*.

Fish for culinary purposes can be divided into subgroups depending on:

- their natural environment – saltwater fish or freshwater fish
- their shape – flatfish or roundfish
- their fat content – lean fish (less than 5% fat), mid-fat fish and oily fish (m

The examples of each are shown in the table below.

Criterion	Type of fish	Ex
origin	Saltwater fish	Cod, Mackerel, S
	Freshwater fish	Carp,
shape	Flatfish	Sea brea
	Roundfish	Carp, Sa
fat content	Lean fish	Cod, Se
	Mid-fat fish	Halibu
	Oily fish	Herring,

Nowadays, more and more animals that have traditionally been classified as caug farms, e.g. oyster farms. This helps to control their quality and safety, as well as t amount is produced. It also helps to preserve the environment and protect wild a

Did you know?

In some countries and communities, gathering foods is still popular. T gathering herbs, mushrooms, wild berries and roots.

Herbs such as stinging nettles may then be used for production of herb certain kinds of cheese, medicines and dietary supplements, cosmetics animal feed. Mushroom picking is popular especially in Eastern Europe where various kinds of mushroom are picked from early May (e.g. cha late October (e.g. boletus).

Check your understandin
Where food is grown, reared and

1. Cattle are reared for…
   a. meat ☐ b. milk ☐
   c. biofuel ☐ d. all of the above ☐

2. Oily fish do NOT include…
   a. mackerel ☐ b. trout ☐
   c. cod ☐ d. salmon ☐

3. Kiwi is an example of…
   a. exotic fruit ☐ b. citrus fruit ☐
   c. berry ☐ d. stone fruit ☐

4. Give two examples of each type of the vegetables shown in the table.

leaves	
roots	
fruit	

5. Give two reasons for rearing fish in fish farms.

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6. Evaluate the factors for and against growing plants in polytunnels.

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All food ingredients can be grown or reared in various ways. Most commonly us
and **factory farming**, although in the past decade **organic** farming has been gaini
you will learn about various methods of food production, including various meth
production.

Conventional farming

Conventional (or **intensive**) farming is a kind of agriculture in which the main tar
To achieve that, farmers may choose to use:

- pesticides
- herbicides
- GM seeds which are resistant to bo weather conditions
- artificial fertilisers
- *or all of the*

Conventional ing usually leads to deterioration in soil quality, which means
cannot be used for growing any more. Conventional farming may also lead to lo
compromised ecosystems, since so many chemicals are introduced. Since conve
agriculture) allows the use of fertilisers, pesticides, chemicals and GM organisms
yield crops and, therefore, produce a larger amount of food for a greater numbe
more and more often since it increases production and raises the profits.

Studies have shown that various pesticides and chemicals used in conventional farming may be harmful for human health. Also, intensive farming includes the choice of certain breeds to increase crops, which may lead to some species extinction. For example, genetically modified seeds are more resistant to water, so will survive during a flood, while naturally occuring seeds will rot. Also, choosing to rear just one breed of cow because it produces more muscle tissue for meat means that all the other breeds will not be reared any more.

Did you

The use of ant
has led to antib
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help people fig

Factory farming

Factory farming is an agriculture method in which a large amount of **livestock** is
increase production of meat, milk or eggs, and to lower possible costs and invest
profit is the most important consideration, factory far n choose to rear certa
biodiversity) and use antibiotics to prevent pote ial ases. Other practices m
include cutting birds' wings or beaks t e them fighting with each other, w
welfare activists and organisat s.

Organic farming

As opposed to conventional and factory farming, organic farming is focused on producing food while maintaining soil quality, ecosystems, natural resources and biodiversity. Organic farming is subject to many legal restrictions; it can only use very restricted chemicals – not including artificial fertilisers, pesticides, herbicides – and cannot use preventive antibiotics, **genetically modified (GM)** crops or animal feed made with the use of GM crops (you will learn more about genetically modified food later on in this course). Farmers can sustain their crops by the use rotation and natural fertilisers (e.g. manure) to support soil health. Antibiotics ca (to cure it, not to prevent it).

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refer
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Revision Tip

'Organic' means:

- f es
- n ial colours or preservatives
- the highest standards of animal welfare
- no routine use of antibiotics
- GM-free

The way we grow and rear our food
and environmental reasons.

Organic farming means that fewer f
(under restrictions), and that are na

It is believed that organic food is hea
requires more resources and, therefo
conventional foods. Organic farmers
way of preserving nutrients in the so
plants to fertilise the crops and fight
allows maintenance of species divers
plant many different species to ensu
Also, as naturally occurring plants have various requirements for minerals, water
around the world have to use different varieties, as others would simply not surv

Research

Find out more about organic food at **zzed.uk/8227-organic-food**

Soil Association organic symbo

EU organic log

Organic far in the United Kingdom is promoted by the Soil Association, whic
standards a certification body for farmers. Specific and detailed restriction
Union (EU) to ensure standards are met around the continent.

Sustainable farming

Sustainable farming allows the use of modern technologies but under the conditi ability to maintain their populations. It is especially important in fishing, since ex countries and corporations have put many wild fish species at risk of extinction (e Sustainable farming means that eco-friendly rules are applied in order to maintai animal welfare and quality of life are maintained, and various resources (such as

It is worth noting that sustainable farming and intensive farming can work togeth the maintenance of high-yield crops, and keep soil healthy and nutritious for futu

Other forms of sustainable agriculture include the use of such methods as nitroge amendment or soil steaming. They allow the mainten ... of high-yield crops as necessary for the proper growth of plants.

The best-known example of s... farming is fish farms.

Sustain... fishing

Fish is a source of high biological value (HBV) proteins, omega-3 fatty acids and vitamins A and D. Fish should, therefore, be a part of a healthy diet. Unfortunately, the growing need for them and illegal fishing have led to a situation where 90% of natural fisheries are overexploited. This is not only because a large number of fish have been caught, but also because destructive catching methods were being used. For example, bottom trawling includes dragging the fishing net along the sea floor, which disrupts the ecosystem. Another method is pair trawling, in which a fishing net is stretched between two boats. This leads to a by-catch, which means catching unwanted fish, seaweed and other sea creatures. Also, the size of fishing nets plays a role, as using openings which are too small will lead to the catching of very small fish, which won't be used for food and also won't be able to grow and rebuild the population.

For this reason, the Common Fisheries Policy was implemented. It states the way (especially in wild fisheries) and at what rate – this is important to avoid extinctio them to regrow their population.

Sustainable fish farms should implement two general rules: ensure the health of the catching method. Fish farms help to protect wild fish and other species that producing enough food to feed the growing population.

Fish farms allow producers to rear fish and seafood for their flesh, or for caviar, p reasons.

Fish can also be sustainably obtai... wild fisheries (those naturally occurri There are various methods of fishing – some of them more destructive than othe

- **Purse seining** means fishing with the use of a large net in which fish and this leads to by-catch.
- **Long...ing** means fishing with the use of a long line to which other lines are attached, each of which ends with a hook; this is not a sustainable method of fishing as it often attracts unwanted species of fish and other sea animals (e.g. turtles) leading to a significant by-catch.
- **Bottom trawling** means pulling a large net along the sea bottom, used to catch shrimp and bottom-dwelling fish; this can damage the fish habitats and permanently affect the fish population.

Did

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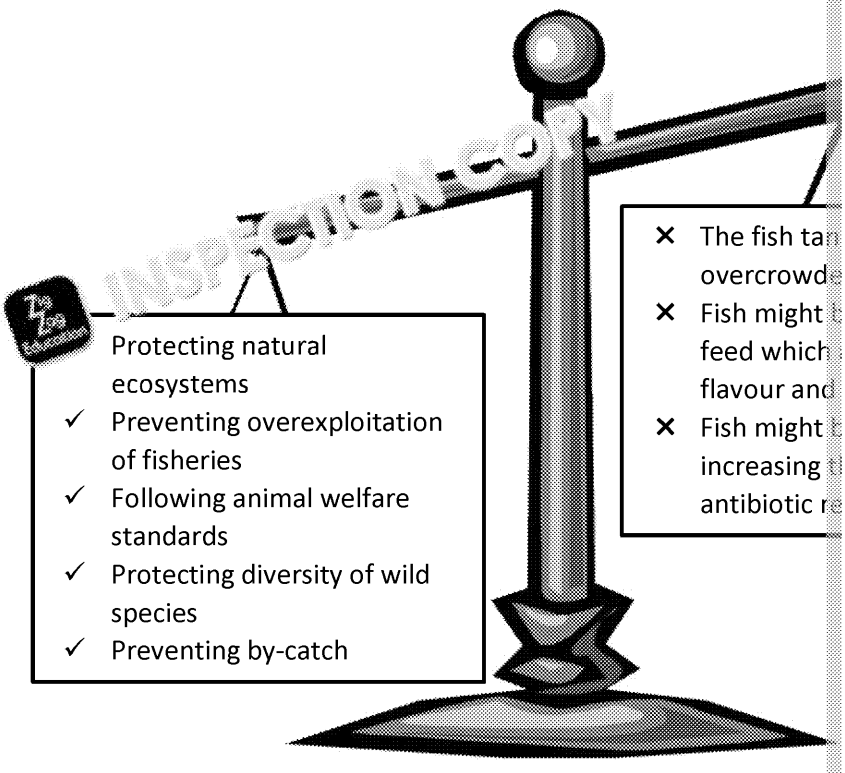
- **Harpooning** means using harpoons, which are thrown at individual fish; t
method since only the intended fish are caught (no by-catch).
- **Floating traps** in which traps and weirs are suspended in water, attractin
trapped inside a box, but is not harmed; once the box is removed from t
may be released back to the sea if it wasn't the intended fish or shellfish

The advantages and disadvantages of sustainable fishing are shown below.



Research

Visit the website **zzed.uk/8227-sustainable-seafood** and list fish species wh
endangered due to overfishing. Then try to research fish species which are sus

Seasonal and locally produced foods

Before the development of modern technologies, people had to eat what was av
environment. This forced them to eat only seasonally growing, **local foods** (for e
no lemons or oranges). Today, some people are turning back to the idea, claimin

There are four main seasons of the year, and each can be characterised by differ

- In spring, most plants start to bloom and produce their first shoots. As Ju
become available.
- Summer is usually very rich in various fruit and vegetables, because sunlight, warmth and moisture provide them with excellent growth conditions.
- In autumn, most root vegetables are harve[illegible]. So, while the crops last, fruit and vegetables [illegible] are produced for the winter.
- In winter very few [illegible] produce any food, and, therefore, the di[illegible] b[illegible] whatever was preserved or kept during the whole ye
full[illegible] fruit!

Did

This is
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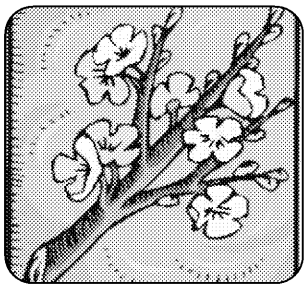
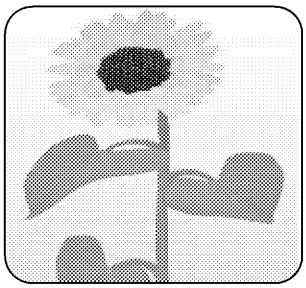
season



Spring



Summer

Autumn

Spring	Summer	Autumn
sprouts	peas	aubergines
rhubarb	berries	apples
leeks	courgettes	pears
cauliflowers	cucumbers	plums
lettuces	cherries	pumpkins
kale	peaches	celery
spring onions	apricots	cabbages

*Plant foods characteristic of each **season***

The development of transportation, increasing im[illegible]ort[illegible] and new technologies have allowed people to b[illegible]as[illegible]se rules. Thanks to these developments, tomatoes[illegible]for e[illegible]ple, can be produced in polytunnels and orange[illegible]o[illegible]rought from overseas, and some fruit and vegeta[illegible]ic[illegible]strawberries) are available all year long!

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Seasonality applies also to non-plant foods. It may just as well be linked to fish, meat, poultry and eggs. This is based on the natural cycles of animals' lives – from birth, through growth to maturity and breeding.

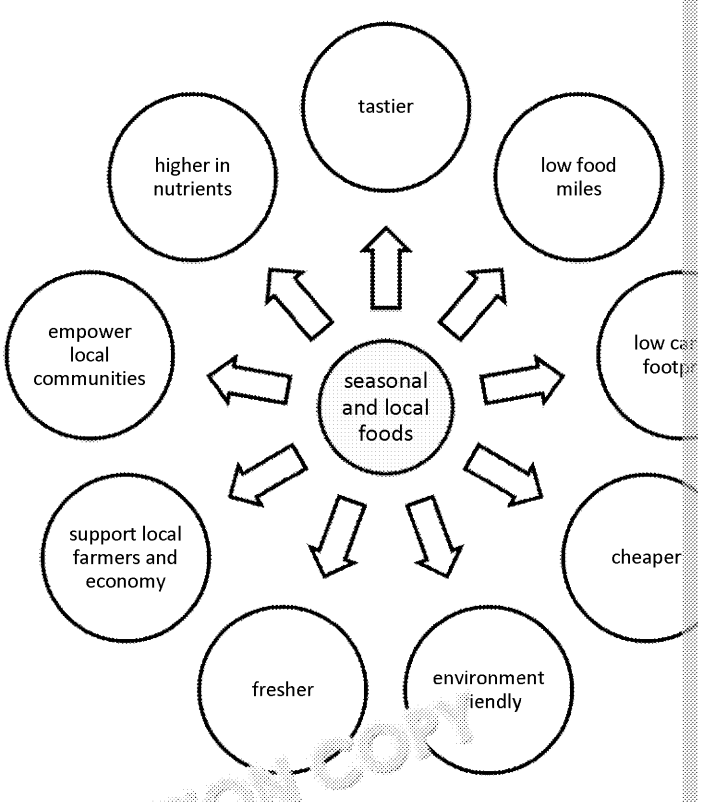
Also, cheese production has, for hundreds of years, been linked to the lactation p
cows and sheep produce milk between March and October only and, therefore, t
is tastier then. However, intensive farming methods allow production of milk all
enjoy tasty, fresh cheese whenever we wish.

Examples of seasonal animal-based foods are shown in the table below.

Month	Food available
January	Duck, turkey, haddock, halibut, lobster, oysters
February	Hare, partridge, venison, lemon sole, scallops, turbot
March	Mussels, oysters, salmon, mackerel
April	Lamb, wood pigeon, crab, plaice, sea trout
May	Lamb, prawns, sardines, shrimps
June	Scallops, coley, herring
July	Rabbit, pollock, whitebait
August	Beef, lamb, rabbit, venison, monkfish, pilchard
September	Beef, duck, grouse, guinea fowl, crab
October	Goose, venison, mackerel, oysters
November	Mallard, pheasant, turkey, skate, winkles
December	Goose, rabbit, turkey, venison, cod, Dover sole, queen scallops

Advantages and disadvantages of local and seasonal foods

As with anything, seasonal and local foods have their benefits and downsides.



Advantages of seasonal and local foods

It is believed that **seasonal foods** are higher in nutrients – that's because they were grown in their natural conditions with access to water, nutrient-rich soil and natural sunlight. As a result, they are often produced locally and, therefore, there is no need to pick them prematurely to ripen in warmer places.

For this reason, the foods are fresher, because there is no need to store them for long periods of time because they don't have to travel long distances from producer to customer. Because they are allowed to ripen naturally, they are higher in sugars and other substances that make them taste better. They are environmentally friendly because it reduces the food miles and lowers the carbon footprint (as discussed in Chapter 3). Low transport costs is a factor that affects the final price of the food.

Buying locally also enables economic growth, supports local communities and en
local farmers.

The disadvantages of seasonal and local food include:

- narrow choice – because only certain foods can be produced on an area o
  especially to plants)
- lack of diversity
- unpredictability – weather changes, floods or droughts and vermin may le
  quantities of crops, which may result in food shortage or food waste and t
  for storage)
- loss of convenience – because you can eat or cook only what's just growin
  have sushi for dinner (unless there are rice crops n
- need for creativity – so that your meals aren't boring (after all, you only hav

Research

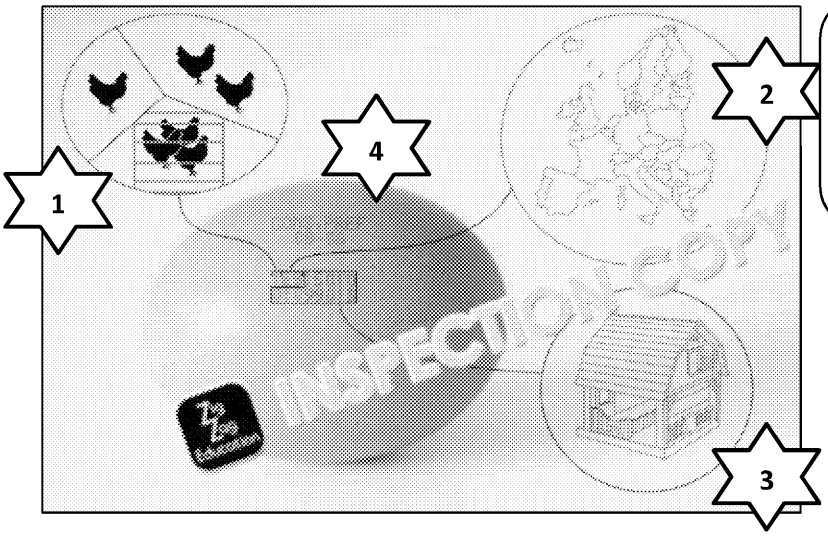
Visit the **.uk/ 8227-seasonal-food** to list the foods which are c
current s Are any of them produced in your area?

Apply

Design a dinner which consists of seasonal foods only.

Egg production – cage, barn, free-range and organi

The way eggs are produced affects their safety and nutritional value. In the Euro
label eggs with a stamp that contains certain information about their origin and
this may change in the UK as a result of laws changing because of Brexit.



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The stamp on the eggs has to contain the following information: 1) method of pr
producer's ID; 4) date marks.

1. The first information in the code is **method of production**. That refers to th
shows whether they were kept in cages, allowed to move around the barn o

The details of egg production methods are specified in the table below.

Method of production	Description
Enriched cage	• Hens are kept in tight cages placed on top of each other • Hens cannot move around the barn • Hens often have cut wings to minimise movement • Hens may have trimmed beaks to avoid fights • The most popular method in Great Britain • Very cost-effective
Barn	• Hens can move freely around the barn • Hens can have cut wings to prevent them from flying • Hens may have trimmed beaks to avoid fights • Their activity–sleep time is regulated by artificial lights
Free-range	• Hens are let outside for at [illegible] of the day • Space per bird is [illegible] stocking density is nine hens p • Perching [illegible] for each hen • [illegible] access natural sunlight for at least part of th • [illegible]cond most popular method in Great Britain
Organic	• Has to respect all criteria for free-range rearing • Birds have to be fed organic feed only • Flock sizes are smaller • Birds have more opportunity to roam outside and from a

In the United Kingdom, animal welfare can be ensured by following the standard
Prevention of Cruelty to Animals (RSPCA). The logo can be found on foods where
This applies to meat and poultry.

The code on the label also indicates the following:

2. The country of origin is indicated by the letters following method of product and uses commonly recognised country symbols; for example, UK means Un Kingdom, ES means Spain, DE stands for Germany and NL is the Netherlands

3. The farm ID allows you to trace which farm produced the egg; this is especia important if food poisoning occurs, because it can help stop further spread o disease.

4. Best before date.

Some people prefer to buy eggs directly from local farm[illegible]his may affect the s they often do not perform antimicrobial tests [illegible]on to wash the eggs, for examp risk of spreading *Salmonella*. Spreading of bacteria is prevented in the UK by following the rules of the Britis[illegible]on Quality scheme.

Did you know?

In 2015, there were 10.02 billion eggs produced in the UK. An additional 2.1 billion eggs we imported.

Apply

While shopping labels on eggs and about their origin a production. Which most popular?

Research

Visit the website **zzed.uk/8227-egg-info** and find out differences in the qualit

Check your understandin
How food is grown, reared and

1. Which of the following statements about organic farming is TRUE?
   a. It allows the use of artificial herbicides. ☐ b. It allows rou
   c. It allows the use of GM feed. ☐ d. None of the

2. Which of the following is TRUE about free-range hens?
   a. They live in cages. ☐ b. They are allo
   c. They live in barns. ☐ d. They only ea

3. Which of the following is FALSE?
   a. Locally produced [illegible] to decrease emission of greenhous
   b. Locally [illegible] foods are always organic.
   c. Sea[illegible]ds are often more nutritious than non-seasonal foo
   d. [illegible]easonal foods are usually less expensive than non-seasonal foo

4. Compare organic and intensive farming methods.

Organic farming	Inten

5. State two benefits of sustainable farming.

   1 .....

   2 .....

6. Assess the impact various farming methods have on the quality and sa

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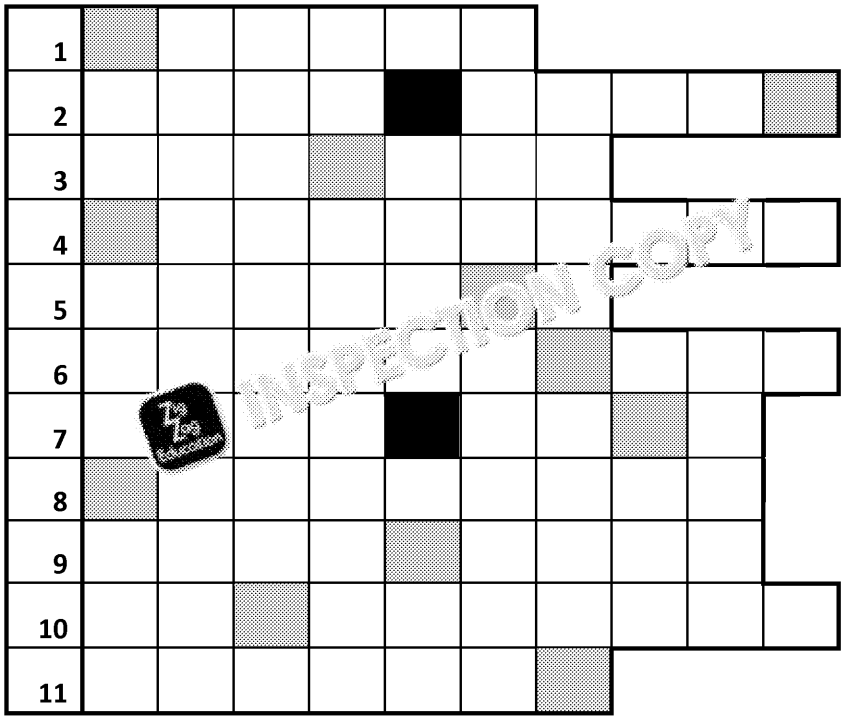
Quiz-ine

Fill in the answers to the questions below to reveal a word relevant to food prov
(the black squares are spaces between words).



1. Oily fish caught for its characteristic pink flesh. (6)
2. Farmed animals and birds which are allowed to roam outside. (4-5)
3. Ingredients and foods produced without any artificial substances. (7)
4. The only fruit which has its seeds on the outside. (10)
5. The meat of a deer. (7)
6. This allows year-round availability of vegetables and herbs. (10)
7. Greasy pate made of goose liver. (4, 4)
8. Animals reared to provide food or other goods. (9)
9. Chemical used to kill weeds. (9)
10. Drug used in conventional farming to prevent dis_ _ _ _ (10)
11. Meat of a chicken or turkey is classifi_ _ _ _ (_)

The shade_ ar_ _ _eal this word: _ _ _ _ _ _

Chapter 2: Food processing and

Overview

In this chapter you will learn what primary and secondary processes foods go through before finding their way to your plate. You will also learn how the processing affects nutritional and sensory features of the foods you eat. Lastly, you will discover various methods of food preservation, both domestic and industrial, that allow our foods to last much longer.

Learning outcomes

After studying this chapter you should be ab

- ❑ describe the difference between prima processes
- ❑ distinguish between processed and un
- ❑ explain how processing affects the nut value of foods
- ❑ explain how various preservation meth

Key Terms

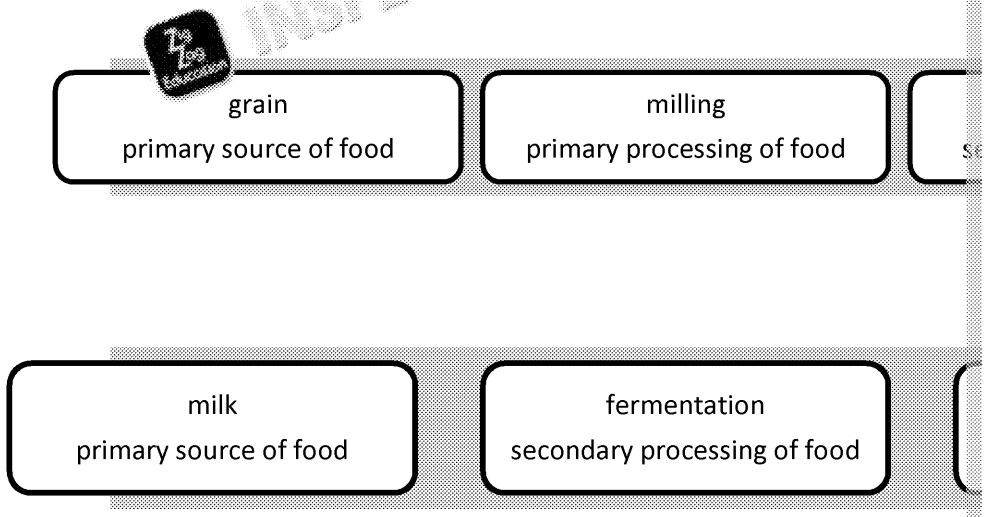
AFD	Accelerated freeze-drying; processing method during frozen under pressure to enable sublimation of wate without the liquid stage) and removal of moisture fr
Bran	Outer layer of a grain
CAP	Controlled atmosphere packaging; storage method i of air (amount of various gases, humidity and tempe
Coagulation	A process by which proteins aggregate together and yoghurt and cheese
Curd	Coagulated milk, a stage in cheese production
Fermentation	A process in which sugar is turned into lactic acid or conducted by bacteria and yeast
Homogenisation	The process of breaking down fat molecules to make them more evenly throughout the mixture
Lactose	Milk sugar
MAP	Modified atmosphere packaging; packaging method various gases inside a package of food is altered
Pasteurisation	A process in which product is heated to 72 °C to kill b shelf life
Primary processing	All actions applied to food that do not change its fea significantly
Probiotic	Bacteria species that are beneficial for health
Rennet	An enzyme found in calves' stomachs, used in cheese
Secondary processing	Actions applied to food which change its features sig
Sterilisation	A process in which a food is heated to high temperat microorganisms and spores and enhance shelf life (e
Trans fa	Harmful fats generated as an effect of partial (incom unsaturated fats
Whey	A milky liquid by-product of cheese production

Food processing

Food production is the process of growing crops and rearing animals, and then ci
appetising meals. Many raw products are edible, but still have to go through som
they can be actually eaten; for example, strawberries have to be washed and pot
processed to ensure it's safe to eat, lengthen its shelf life, maintain its nutritiona
use, and assure its variety and affordability. Food processing includes two main s

1. **Primary processing**, which makes the food usable
2. **Secondary processing**, to make food more convenient to use and length

The foods in their natural state are called primary sou[illegible] of food – they include
eggs in their natural, raw state. If they are pro[illegible] in any way, they are called
can see examples of primary and sec[illegible] sources of food on the diagram belo



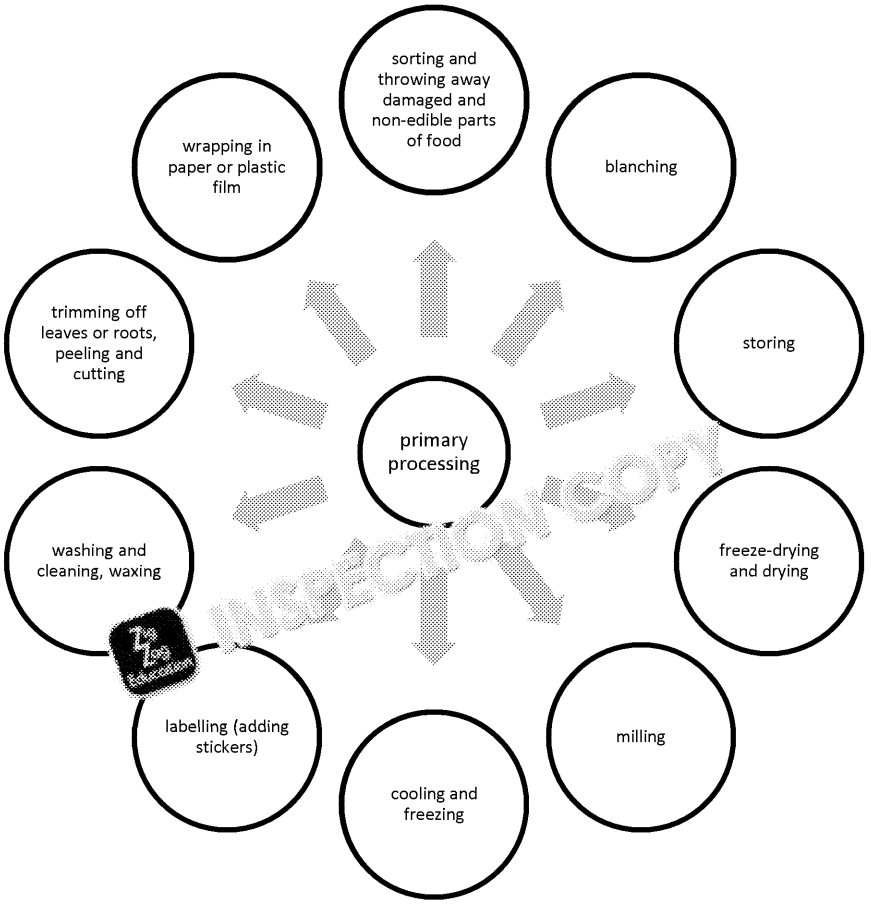
Primary processing of food

Primary processing of food consists of all actions taken to make raw produce rea
does not affect the features of nutritional value of food products in a significant

Primary processing of plant-derived foods

That includes actions taken after the produce has been harvested or picked, such
slicing, bagging, labelling and many other actions taken t[illegible]e sure the plant-de
eaten or used for further processing.

Primary processed fruit and vege[illegible]s are usually sold raw, dried or frozen, eithe
primary processes applie[illegible] to plant derived foods are shown in the diagram on th



The first few steps of primary processing are pretty straightforward – the food ha
and sand, trimmed to remove inedible parts, and sorted to separate it from miss
can be either prepared for sale (e.g. by waxing and adding stickers) or processed
convenient or safer to use. These stages could include one or more of the follow

Blanching is the process in which fruit or vegetables are immersed into boiling w
around two minutes) and then plunged into ice-cold water. The process is mainl
would otherwise be susceptible to enzymic browning, such as apples or potatoes
some fruit and vegetables before freezing. Blanching prevents the food from be
preserves its nutritional value.

Cooling includes refrigeration and freezing foods – all the way from the factory t
point of this is to slow down the growth of microorganisms which could spoil the
value.

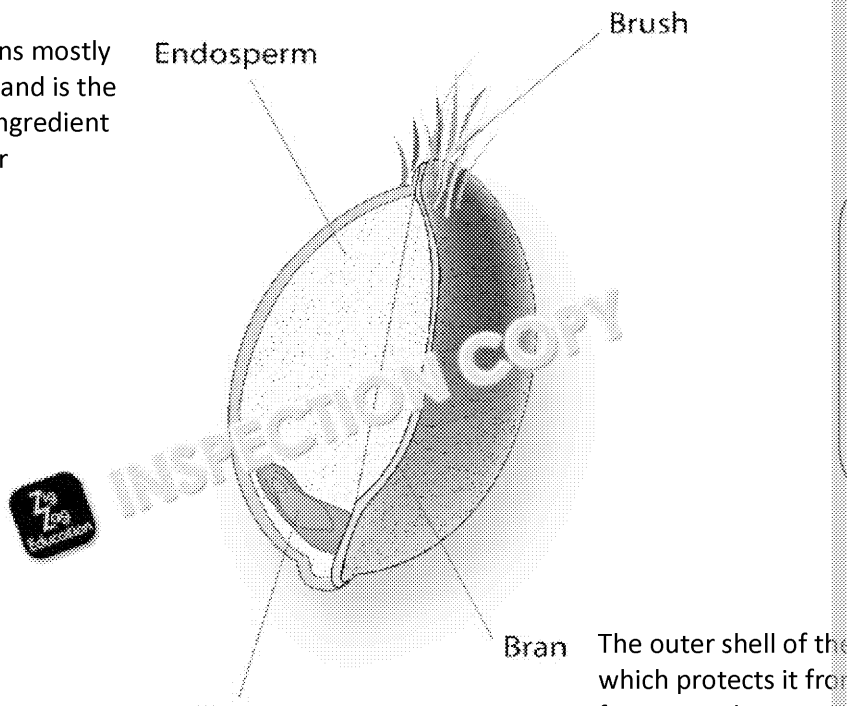
Drying is a process in which most of the water in fo[illegible] e[illegible]porated at high tempe
less prone to microorganism growth and, th[illegible]re, extends its shelf life. Drying c
resistant to heat, and helps obtain [illegible]ucts as powdered milk, cereals, potat

Storing the f[illegible]us[illegible] ans keeping it in coolers, fridges, freezers or other ki
prolonged p[illegible]f time. Storage conditions are very important and
have to be ta[illegible]ed to fit a particular product. During storage, the proper
temperature, lighting, air quality and protection from pests have to be
ensured, as otherwise the food could be spoiled and lose its nutritional
value, as well as other features.

Primary processing also includes **milling** – turning grains into flour, which
then can be used to make other foods during secondary processing –
refining of sugar or extraction of corn kernels from the cob.

How wheat is milled and processed to produce flour

Flour is a powder obtained as a result of milling grains, such as wheat, barley, rye,



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After the grains have been harvested, they are sieved to separate dirt, stones, little pieces of metal and other possible contaminants. That stage is called 'purification'.

After the grain has been purified, it is washed in warm water and dried in a centrifuge. This usually increases the amount of water in the grain and makes it easier to peel.

Afterwards, the grain is ground – it goes through breaker rolls, which open it and from the **bran**. As a result, a 'first break flour', semolina and large pieces of whea

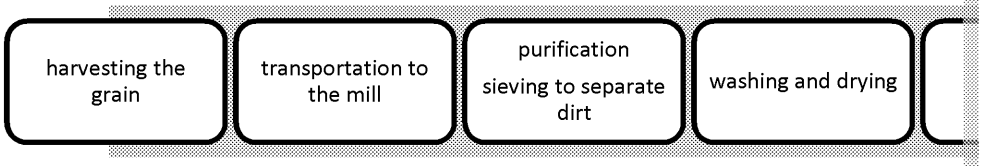
The 'first break flour' is then removed and semolina and large pieces of wheat grain are rolled repeatedly a few times (usually up to five) to produce fine flour.

After each roll, the flour goes through metal sieves, which sort the final product into plain flour and germ. If the flour is not separated, it is called wholemeal flour.

Since most of the micronutrients in grains are located close to the bran, white wheat flour is fairly poor in them, and, therefore, is obligatorily fortified in iron, thiamine, nicotinic acid (a form of niacin) and calcium carbonate (another form of calcium).

The germ that's left from milling can be used to produce wholemeal flour, bran c
edible plates!

The main stages of flour production are presented in the diagram below.



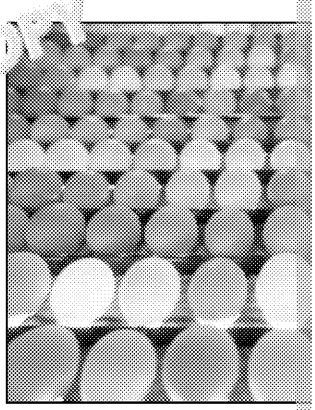
There are r ri es of flour available on the market – many of them are ma
other kinds r. They differ in gluten content, micronutrient content and us

Type of flour	Description and
Strong flour	As it is high in gluten, it is best for making
Plain flour	Low in gluten, it is best for shortcrust and in baking (biscuits, cakes, scones, doughn
Self-raising flour	Contains a raising agent, so can be used v scones and biscuits
Wholemeal flour	High in fibre; usually added to bread to in
Semolina	Coarse flour used to make pasta
Gluten-free flour (e.g. cornstarch)	As it has no gluten, it is not ideal for maki and crumbly) but can be used as a thicker free pasta
Rye flour	High in gluten; can be used to prepare a s

Primary processing of animal-derived foods

Primary processing of animal foods includes all actions taken to prepare the rear for further processing, such as draining blood from killed animals, skinning, remo of the carcases (which can also be left whole), plucking feathers, filleting, or rem raw animal foods edible, eggs are washed (and labelled) and milk is pasteurised.

Feathers are plucked and chicken is portioned



Eggs are washed and sor through quality control b pack

Heat treatment of milk

After the milk has been collected from cows, it is transported to dairy factories, w
sterilised, **homogenised** and even turned into other products such as yoghurt or

1. **Pasteurisation** of milk is a process in which the milk is heated to 72 °C for 15 seconds and then cooled. This process kills harmful bacteria and extends shelf life. It doesn't usually affect nutritional value or any other features of the milk.
2. Ultra-high temperature (UHT) processing of milk is a process in which milk is quickly heated to 135 °C for one second and immediately cooled. As a result, all the bacteria are killed (also the good on a very long time in ambient temperature. Since th ss is very short, it value or other features of milk in a significan wa
3. Milk is an emulsion in which fat s and other nutrients are suspende from separating, milk is through **homogenisation**. Homogenisation pressure through openings. Consequently, fat molecules become very s stable, mixture, ready to drink or use. Homogenisation doesn't affe but can improve its colour since fat molecules are dispersed more evenly in light more efficiently (thus, milk can look whiter).
4. **Sterilisation** is a process designed to kill all microorganisms present in raw m heated to 110 °C for 30 minutes. Sterilisation inactivates enzymes and dam temperature also causes complex reactions to happen between molecules o a result, brown pigments and aromatic agents are produced. Therefore, ste flavour, colour or smell. Also, the temperature and length of sterilisation wi B vitamins in milk.
5. Milk can also be microfiltered. During microfiltration, milk passes under low fine membranes, which collect bacteria and some fat. For that reason, micro amount of fat in milk in order to obtain semi-skimmed or skimmed milk. Se be poorer in fat-soluble vitamins, since they are removed, together with the change the flavour of the milk, which may become more watery and provide a different mouthfeel from whole milk. Microfiltration helps to extend milk's shelf life by up to 45 days.

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Depending on the amount of fat in milk, it can be labelled blue (full fat), green (semi-skimmed) or red (skimmed)

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Research

Visit the website **zzed.uk/8227-surprising-facts** to discover how much milk consumed in Great Britain.

Further Reading:

Primary processing of meat

Meat is obtained from the muscle tissue of animals, such as cows, lambs, pigs a
is built of:

- two types of proteins (myosin and actin) which make the muscle fibres
  contract and stretch; during cooking, the protein in meat will denature,
  causing the whole piece of meat to become smaller and leak some mea
- connective tissue (made of collagen and elastin) which surrounds the fi
  attaches it to the bones, forming tendons.
  - When the meat is cooked, the collagen dissolves and softens, an
    extracted and used to set savoury and sweet dishes.
  - The elastin builds mainly the tendons and ligaments which join t
    tough even after cookin
- fatty tissue, which is located both in the muscle structure (intramuscula
  around it (visible fat), during cooking, the fat will melt and make the m

After the a has been killed, it has to be shaved or plucked, skinned and di
differ between countries).

The animals are cut into various pieces depending on the muscle structure and
more tender parts, such as sirloin, are low in connective tissue and usually requ
sirloin can be used for steaks). Tougher cuts are high in connective tissue and r
brisket. Some parts, such as the hocks and trotters of the pig, are very high in e
prepare aspic (a savoury jelly made with meat and vegetables). The less-popul
offal, are usually minced to produce various kinds of sausages.

You already learnt about the different cuts of beef, pork and lamb, and their cu

After being killed, the body of an animal goes through many chemical changes.
improve the tenderness of the meat, it can be hung. Hanging requires low tem
and a certain length of time (at least seven days for red meat, around two days
the proteins in the meat relax and are partially broken down by the enzymes p
the meat softer and easier to digest. Also, during that time, certain aromatic c
colour of the meat becomes dark red.

Primary processing of fish

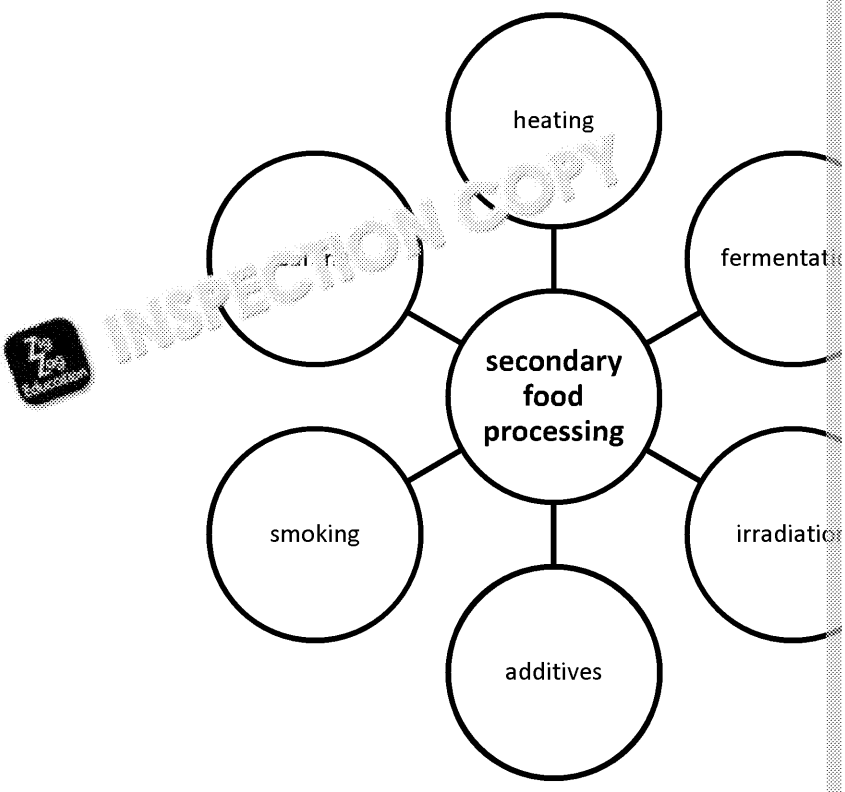
The primary processes applied to fish differ depending on various factors, such
- whether the fish is to be sold fresh, frozen, smoked, or canned
- whether the fish is to be sold whole, in fillets or pieces

The muscles of fish are built of short fib separated by connective tissue built
collagen are very thin, it softens and dissolves quickly during cooking – for this
cooking time. Collagen from the connective tissue and bones releases some ge
used to pr as

Secondary processing of food

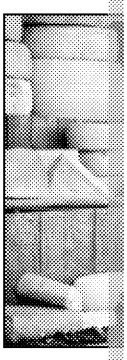
Secondary processing of food allows it to be used to make new products, which a
the ingredients they were made from. This may be turning flour and eggs into a c
turning milk into yoghurt.

The main methods of secondary food processing include:



Heating is about cooking food in order to kill pathogenic microbes, changing its te
more convenient and appealing to consumers. Heating increases the shelf life of
package remains closed. Heating also includes **pasteurisation** and **sterilisation** o
meat and vegetable preserves. You will learn more about these processes later o

Fermentation is a process in which microorganisms – such as bacteria, mould or yeast – turn sugars into carbon dioxide and other substances, such as lactic acid or alcohol. Fermentation is used to obtain yoghurt, kefir, cheese, wine, beer, bread, and even cold cuts such as salami.



Chee

The addition of food **additives** changes its flavour, colour, and/or texture and extends shelf life. This will be discussed in more detail in Chapter 4.

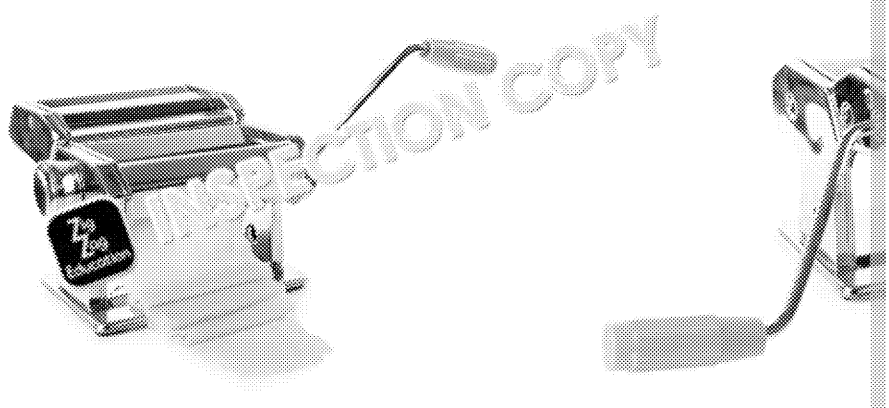
Did you know?

Another way of preserving the nutritional value of foods and extending their sh
process, ionising radiation is applied to foods in order to kill harmful bacteria a
preservatives. In the United Kingdom, irradiation of seven food groups is legal
cereals, bulbs and tubers, spices and condiments, fish and shellfish, and poultry
appropriate information on the packaging if the food or any of its ingredients w
Currently, no company holds a licence to carry out irradiation of food in the U

How flour is used to produce pasta

Flour is a product of primary processing of grains. It can be used later to produce bread, pasta, cakes, shortbread, pizza, sauces, waffles, muffins and pancakes.

The basic recipe for pasta includes flour and warm water. To change the flavour, eggs, spices and colourants (natural or artificial) can be also added. First, flour is other ingredients are added (such as eggs, colourants and herbs). Once the dou is pressed between large cylinders, changing the dough into a thin sheet, which i microorganisms and pasteurise the dough. Afterwards, the sheet can be cut into pasta can then be cooked, refrigerated, frozen or dried.



A pasta maker can be used for both pressing and cutting the dough – and the width of

How flour is used to make bread

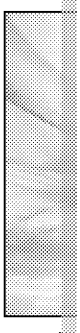
Bread, in many different forms, is known in various countries all around the worl bread is most popular in many countries such as Great Britain or the USA, more a breads from different cuisines, such as naan bread from India or South American

The main ingredients of bread include flour, water and salt. Depending on the c be sourdough or yeast.

Flour is necessary to make the structure and bulk of the bread. When the flour i in it combine and form gluten. Gluten has the form of a net, which creates the s The quality of the flour plays a vital role in the final texture and taste of the brea

Water helps to develop gluten in the dough.

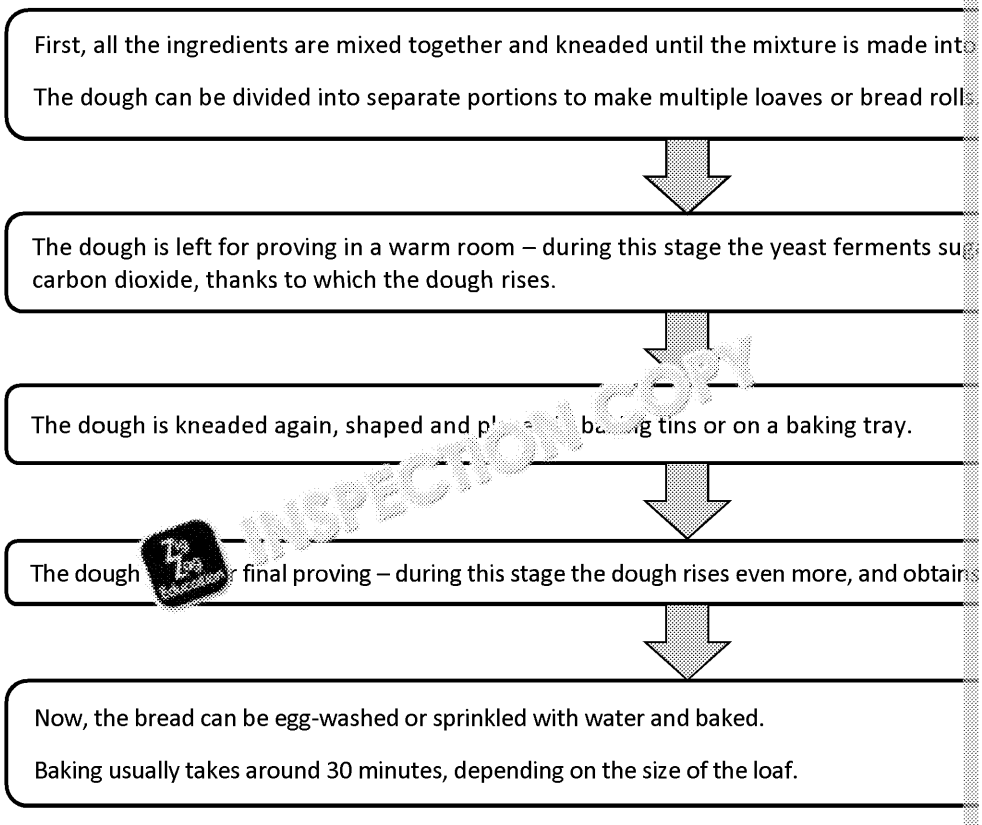
Salt is used for many reasons. It improves the flavour of the bread, strengthens the gluten, slows down the growth of microorganisms and prevents the dough from overgrowing. Since it comp vit sugars from flour for water, it also helps to make th rd vn st during baking, as the sugars caramelise.



Bak

The last ingredient – sourdough or yeast – is used in bread as a leavening a n the presence of warmth, water and food (sugar), the microorgani ment the sugar and produce carbon dioxide. The gas expands and rises, and is trapped in the gluten net, which helps to obtain the final structure and volume of the bread.

The stages of bread making are shown in the diagram below.



Various producers may also choose to add:

- seeds, nuts, herbs or spices – to improve the taste, aroma and nutritiona of the bread; they can be both added to the dough and sprinkled on top
- vinegar – to preserve the bread and extend its shelf life
- vegetable fat – to make the dough lighter due to aeration and to extend shelf life

How milk is processed to make yoghurt

Yoghurt is a result of milk **fermentation**, conducted by the **probiotic** bacteria. D turned into lactic acid. Depending on the species of bacteria and fat content in t thicker or more liquid, and will have a tangy or more delicate flavour. Ready-to-eat yoghurt should contain live bacteria, which are advantageous for health.

Did

The b
yoghu
specie
Bifido
Strep

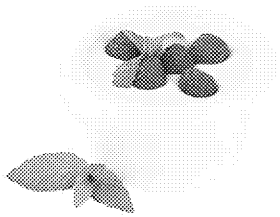
First, milk has to be **pasteurised** to kill all the harmful bacteria and protect it from spoilage. It is also filtered and **homoge** obtain a smooth texture. Next, bacteria are adde ar stirred into the milk, which then spends some tim conditions – around 40 °C – to allow the bacteria t ow process the sugar to produce lactic acid. Since acid c p teins to denature and coagulate, yoghurt is much thick m and has a sour taste.

Once the yoghurt is set, various **additives** may be added to it – most popular yoghurts contain fruits or jams, cereals, sugar, coffee extracts or toffee sauce.

There are various types of yoghurt available, depending on the quality of ingredi
production process.

Yoghurt type	Description
Natural full-fat yoghurt	Made of whole milk with the use of **probiotic** bacteria The most basic type of yoghurt Creamy and tangy
Low-fat yoghurt	Made of semi-skimmed or skimmed milk Usually runnier than full-fat yoghurt Can contain starch, gelatine or other thickening agents
Greek yoghurt	Thick and creamy High in fat **Whey** is drain[illegible] production
Live yoghurt (bio yoghurt)	Less [illegible] normal' yoghurt [illegible] various bacteria types to support the work of

Yoghurt is a [illegible] of **probiotic** bacteria and high biological value proteins. Since
it can also be considered as part of a diet for lactose-intolerant people.



Did you know

Probiotic bacteria ar

- They limit the g
  bacteria in the g
- They boost the i
- They regulate b
- They help fight o
  constipation.
- They improve th
  absorption of m
  micronutrients.
- They produce vi

Apply

You can make yoghurt yourself!

1. Heat up 1 litre of milk until it reaches 80 °C.
2. Cool it down to 42 °C.
3. Add 60 g of natural yoghurt with live bacteria (c
   label!) and stir.
4. Keep the contain[illegible]rm conditions for a co
   hours.
5. O[illegible]e yoghurt is ready, put it in the fridge a
   [illegible] a few days!

How milk is processed to make cheese

Cheese is a nutrient-rich product made of milk. Its look, flavour, smell, nutritional value and other features depend on many factors, such as:

- what kind of milk was used to make the cheese
- what type of coagulant was used to process the milk (bacteria, mould, rennet…)
- whether any additives were added, such as herbs or leaves
- how long the cheese was processed
- what the processing conditions were
- and even what the cow (or sheep, or goat, or buffalo…) ate

D

Th ch

So htt

Cheese can be made from either raw or pasteurised milk … that also affects i… factories is always pasteurised, but the milk in sm… production doesn't h…

Once milk arrives … factory, it is pasteurised (… have to be) and … to the temperature of 30 °C. This is to kill harmful bacteria and provide the conditions necessary for the growth of the good ones.

→ The next step involves … bacteria starter cult… which begin fermentat… lower the pH of the …

↓

After 30 minutes, rennet is added. **Rennet** is an enzyme derived from calves' stomachs, which causes the milk to coagulate. Coagulated milk is called curd.

→ The **curd** is then cut with cheese knives (kind of metal nets) and warmed up to separate it from the whey (a milky liquid).

↓

The whey is drained, and the **curd** is formed into smaller or bigger balls. They are then left for some time and turned from one side to the other to drain off the remaining liquid. At this stage, the **fermentation** and **coagulation** proceed, until the cheese reaches its desired pH.

→ La… ei…

↓

Now, the blocks of … are formed by … them into … he… hoops.

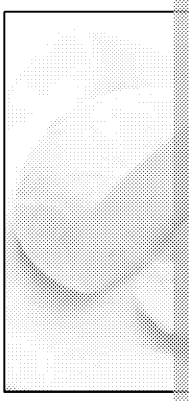
→ The cheese is then stored in … conditions – either in cooled ro… even natural caves – to ma… Usually, the longer the cheese … the more mature it becom…

There are many various types of cheese – soft, firm, hard, fresh and smoked. The … texture or have big holes inside. All these features depend on the bacteria speci… sometimes mould such as *Penicillium* is added too (usually to obtain blue- or gre… in milk include *Lactococcus*, *Lactobacillus*, *Streptococcus*, *Propionobacterium* and…

Cheese is an important source of calcium, phosphorus, proteins, fats and fat-soluble vitamins. It is an important part of cuisines in various countries all around the world.

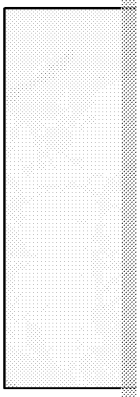
Since the **lactose** in it is usually processed by the microorganisms, it can also be eaten by lactose-intolerant people.

Various types of cheese



Mozzarella i

Cottage cheese can be eaten on toast, in pancakes, or can be used to make a cheesecake



The white

Research

Learn more about cheese at:

www.youtube.com/watch?v=y9wLhRrj5Ug

How milk is processed to produce cream

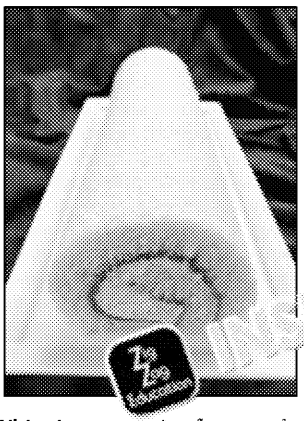
Cream is the milk fat which has been skimmed off the milk's surface. The amoun
the animal's breed and diet. So how is cream made?

1. First, milk is pasteurised to kill the pathogenic bacteria.
2. Then, it is either left out to naturally separate (this method is characteristic for domestic and small business production) or poured into a large container called centrifugal cream separator. In the separator, the milk is whirred at high speed so that the centrifugal force breaks it up and causes it to separate.
3. In the next step, milk is drained off and the cream is standardised to obtain the desired fat content – this process is crucial as it makes it possible to obtain various types of cream.
4. After that, the cream is homogenised to increase its viscosity, and sometimes pasteurised (especially if raw milk was used).
5. At this point, the cream is ready to use and pour into pots – but some produc adding probiotic cultures, which will ferment it (this allows for the productio rarely) thicken it with the use of modified starch.

Nacl

The different types of cream available in the UK and their culinary uses are show

Type of cream	Description and culinary u
single cream	fat content 18%; usually liquid; used to pour over desse sauces
double cream	fat content 48%; can be liquid or very thick (extra-thick d can be poured over desserts or fruit, or piped for decora sweet and/or savoury dishes
whipping cream	fat content 36%; thick liquid consistency; can be whippe fruit, or to fill pastries
soured cream	fat content 18%; acidic taste; adds taste to soups, sauce
crème fraiche	fat content around 48%; slightly acidic taste; fit for whip sweet or savoury foods
clotted cream	fat content minimum 55%; thick and creamy texture; it is over a low heat to evaporate most of the water; most co



Whipping cream is often used to fill roulades...

... and choux buns

Things to think about (2.1)

Discuss whether it would be possible to make cream from homoge

How milk is processed to produce butter

According to CMO Regulation (European Council regulation)[1], butter is a dairy product which contains between 80% and 90% milk fat (so there is no such thing as 'low-fat' butter), and a maximum of 16% water. During production of butter, milk or cream is churned in order to break up its structure and separate fat from liquid (buttermilk). The liquid is then drained off and the remaining fat is washed to remove traces of protein and other substances – this improves its flavour and enhances the shelf life.

Butter can be made either from fresh or soured milk/cream. In the UK, we can enjoy a variety of types of butter, such as:

- **unsalted butter** – made from fresh or soured cream without any other ingredients
- **salted butter** – with the addition of salt or coarse sea salt
- **clarified butter / ghee** – during production, it is melted so that impurities remove traces of protein from it; as a result, clarified butter has a higher smoking point and is better for frying

Did

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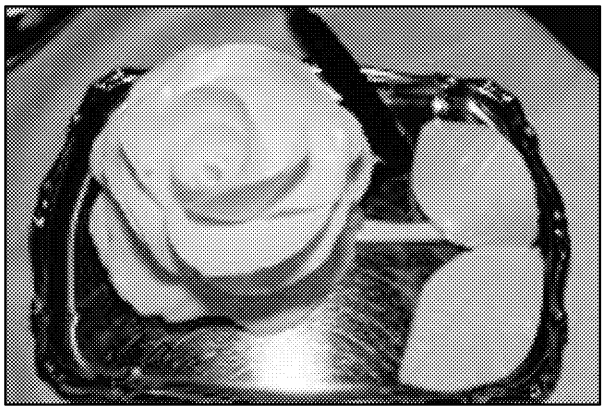
butter

Butter can be used in many sweet and savoury dishes. It is used to make a roux, pastry, and many other foods.



Rose decoration made of buttercream

Apply

During sh
the labels of
spreads to s
contain any
much).

Things to think about (2.2)

Discuss how primary and secondary food processing has a negative of foods, and consider ways of preventing this.

[1] The requirements for butter, as for other food products, may change in the UK after Br

Check your understanding: Food p

1. Primary processing does not include…
   a. trimming off leaves ☐ b. milling flour
   c. cheese production ☐ d. milk pasteurisatio

2. Processing of foods extends shelf life because…
   a. it kills microorganisms ☐ b. it reduces the am
   c. preservatives are added ☐ d. all of the above

3. A by-product of cheese production is called…
   a. curd ☐ b. whey
   c. cheese hoop ☐ d. rennet

4. Explain how t… affects bread quality.

   .....

   .....

   .....

   .....

   .....

5. State one function of the following ingredients in cheese production.

probiotic bacteria	
rennet	

6. Explain how two different heat treatment methods affect the quality a… value of milk.

   Method 1: .....

   How it works: .....

   .....

   .....

   … 2: .....

   How it works: .....

   .....

Food production requires the use of various processes to make the desired food p
applied have a smaller or larger impact on its quality. Production processes can b
the nutritional value and sensory characteristics of food. In this section you will l
methods work and how they affect the nutritional value of food.

Methods of food preservation – high temperatures

Food production uses various simple and more complex processes in order to ob
to be nutritious, appealing to the consumer, durable and convenient to use. Pres
helps to conserve the food and secure it from the various factors which could affe

Pasteurisation

Pasteurisation is a process in which food is heated up to around 72 °C for 15 seco
pathogenic bacteria in the food without affecting its quality or nutritional value.
used in the preservation of milk (see previous section), but also other foods such

Ultra-heat treatment (UHT)

Ultra-heat treatment is a special technique in which food is heated up to a very high temperature (over 135 °C) for a very short time (a few seconds). This helps to kill all bacteria and spores without affecting the nutritional value of food in a significant way.

Apply
Th
cans

Sterilisation

During sterilisation, food is subjected to a very high temperature for a long time. Usually, the process is carried out at around 110–130 °C for about 30 minutes. The process helps to kill all bacteria and spores in the food, significantly enhancing its shelf life. Unfortunately, the process may also affect the sensory characteristics and nutritional value of food. For example, milk protein and break down vitamins. As the temperature is high, a reaction called th between protein and sugar in milk, causing it to obtain a brown colour and speci

Canning

Canning is a fairly cheap and effective way of preserving a large amount of food f product of the Industrial Revolution – they were first used for preserving foods a century.

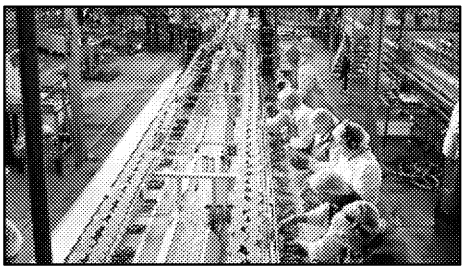
Today, canning is used to preserve all types of food – meats, vegetables, fruit, mi only applied to foods which are already processed (cooked, cut, minced or prepa

Once the food has been cooked, it is poured into cans which are then closed wit sterilised using steam or a superheated water shower, which lowers the pressure seal (as a result, the cans are airtight).

The process of canning can greatly affect the nutritional value and sensory charact

- some fruits and vegetables may become too soft, or even mushy
- acidic foods, such as chopped tomatoes and citrus fruit, may react with t a protective plastic layer has to be added to the inside of the can
- some vitamins may become damaged
- as many fruits are covered with syrup, their sugar content and calorific va
- as many vegetables are covered with brine, their salt content greatly inc

Canning greatly increases the shelf life of food as the seal prevents exposure to o water kills all remaining microorganisms in the food. Canned foods are stamped but there are cases when the canned food is still edible long after that time.



Workers putting food into cans before they are filled with brine and sealed

Some fruit and vegetable mousses under sterilisation in plastic pouches

Methods of food preservation – cold temperatures

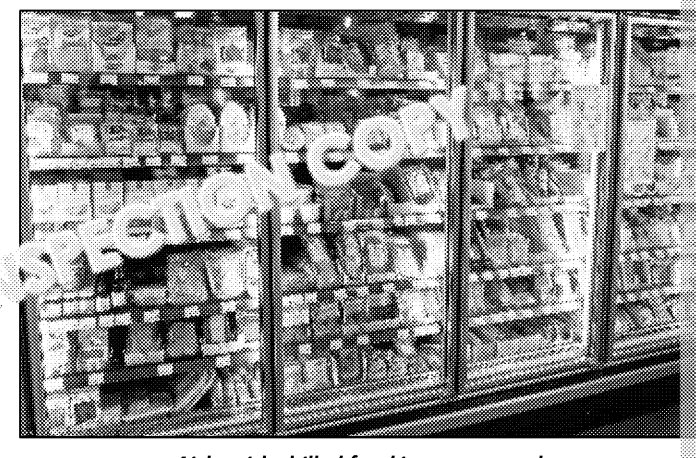
Cold temperatures are also helpful in the preservation of food. This is because at are less active, so the microorganisms cannot multiply. Also, as water in food free microorganisms (remember that they cannot multiply without water!). In this se most common methods which use low temperatures.

Chilling

Chilling means that the food is cooled to between 0 °C and 5 °C. In the food indu process is carried out as quickly as possible, as this shortens the risk of bacterial g

In *blast chilling*, the food is cooled to below 3 °C in a maximum of 90 minutes. B the hot, cooked food – you cannot use a fridge for that as it would increase the internal temperature of the fridge and overburden its cooling system, putting other foods in it at risk. Once the foods are chilled, you can store them safely in a fridge for no more than five days.

The *cook-freeze* system allows the cooked food to cool down from over 70 °C to -18 °C in less than 240 minutes (four hours). There are usually two options available – soft chill, which is suitable for delicate foods, such as fruit and vegetables, as it doesn't develop ice crystals and so does not affect the texture of the food, and hard chill, where small ice crystals are formed. The latter is suita meat, fish pie or lasagne. Once the food is frozen, you can store it in a freezer. R packaging to avoid freezer burn, and mark it with the date of freezing.



Aisle with chilled food in a supermarket

Freezing

Freezing means chilling the food to below 0 °C. Freezing enables formation of ic
the smaller the crystals, and the smoother the texture of the food. Freezing disa
microorganisms in two ways: by reducing the speed of chemical reactions, and b
Various methods of industrial freezing include:

- air-blast freezing – in this method, air at a temperature of -30 °C is blo
usually requires a lot of time and allows the growth of large ice crystals
the food; a form of air-blast freezing is *fluidised bed*, in which food trav
cold air at -40 °C is blown from the bottom so that the food is suspend
of freezing and helps to maintain the quality of food; this method can b
food only
- contact freezing – food is placed between two c metal plates and fr
- immersion freezing – food is immersed in w mperature brine or oth
- cryogenic freezing – food passe gi long channel where it is coo
carbon dioxide

All of these m od be combined.

Once the fo ozen, it needs to be stored in a freezer. Domestic freezers are
industrial freezers can be set down to -40 °C (in freezers cooled with liquid nitrog
low as -184 °C; however, these are only used for freezing the food,
and not storing it, as the very low temperature would cause the food
to shatter).

***The p
nitrogen
the time***

Research

Find out why brine is suitable for immersion freezing.

Accelerated freeze-drying

Accelerated freeze-drying (lyophilisation) helps to extend the shelf life of food by removing almost all water from it, while maintaining its taste. In this technique, food is first frozen (e.g. in liquid nitrogen) and then the pressure is lowered to a point at which water sublimes (changes directly from solid to gas) – this helps to remove extra moisture from the food and keep it dry. The effect is a powder or granules – such as instant coffee. Freeze-drying is also used to dry herbs and fruit. Drying and freeze-drying may lower the amount of water-soluble vitamins in the final product, as they may be evaporated together with water.

Sublima
which s
gases, w

The use of acids, salt and sugar

The use of acids

Acids are used in food for many reasons:

- they lower the pH of the food, making it unsuitable for the growth of microorganisms
- they prevent oxidation and enzymatic browning by deactivating enzymes
- they improve the texture and flavour of foods

Acids used in food production include various types of vinegar (the most popular one is spirit vinegar, as it is cheap to produce), lemon juice, and ascorbic acid (found in many fruits and vegetables). As you may know, acids can react with m have to packaged accordingly (e.g. into plastic-lined c n r glass jars).

Acids are used in the production of various food products, such as dill pickles, sh eggs.

What is int , is that pickling can be done with the use of brine (solution of Pickled vege es will have different nutritional values compared to fresh ones, used. Vegetables pickled in brine often undergo bacterial fermentation, which m bacteria – an example of such a product is sauerkraut.

Research

Research different types of fish which are preserved in acid. Mark on a map wh

The use of salt

Salt has been used for food preservation since ancient times. Today it is used to mushrooms, cure meat and fish, and produce mature cheese. Salt is used either in which it is immersed. Brine (the solution of water and salt) is hypertonic, whic concentration of salt than the cells of living organisms (such as bacteria). For this organisms is removed by osmosis, causing them to dehydrate and die.

Salting usually is applied to meats and fish. This is a very old technique, which w the food before fridges were invented. Salting changes the structure of the food significantly extends the shelf life. An example of a salted food is beef jerky.

The use of sugar

A high concentration of sugar (above 60% of the final product) also helps to prev sugar curing is used in the production of jams, jellies, candied fruit and other foo of sugar attracts and binds water from the solution, maki unavailable for mic crucial to grow). However, sugar-cured products c be oil by certain species One of the most popular foods preserved with he e of sugar is fruit jam. In ja

- it adds sweetness and im e h taste of the jam
- it attracts and bi elping to thicken the jam
- it ac a p tive, as it makes the water unavailable for micoorgan

Preservation through drying and smoking

Smoking is a process applied mainly to cheese, fish and meats. It is carried out in specially designed smoking chambers. Smoke preserves the food and changes its flavour, so it is important to use the right kind of wood – e.g. oak, beech, alder or maple – with addition of other kinds of wood (such as juniper), herbs and vegetables (such as garlic) to alter the flavour and obtain the desired product. Smoking can be conducted in cool temperatures (around 30 °C) or in warm conditions (up to 90 °C), and usually takes from a couple of hours to as much as a month.

Ham and sau

Drying is a process during which water is removed fr[illegible] food, either by using natural means (such as expo[illegible] f[illegible] to sunlight) or technology (such as using industri[illegible]). Drying can be applied to both sol[illegible] such as fruits, vegetables [illegible] and herbs, are gently heated to allow wat[illegible] causes them to lose [illegible] think about grapes and raisins. Liquids, such as mi[illegible] temperatu[illegible] then sprayed to enable fast evaporation of water. Conseque[illegible] fine powder[illegible]
Drying significantly changes the texture of food (usually making it tougher) and a[illegible] water-soluble vitamins may be lost together with water.

Controlled atmosphere and modified atmosphere p[illegible]

Dry foods, and fresh fruit and vegetables can be stored in a **controlled atmosphe[illegible]** room the chemical composition of the air, its temperature and humidity are regulated in order to prevent spoilage and extend the shelf life of food. The air used usually has a lower oxygen content or higher carbon dioxide content, which makes it unsuitable for most living organisms (including pests). For fruit, ultra-low oxygen (ULO) levels and low temperatures help to delay the ripening an[illegible]

Resear[illegible]
Look up dif[illegible] packaging u[illegible]

Modified atmosphere refers to the packaging of food. In a modified atmosphere, the oxygen level is reduced and replaced with nitrogen or carbon dioxide in order to prevent the growth of aerobic microorganisms. Also, carbon monoxide can be used to preserve the red colour of fresh meat. Foods are usually wrapped in clear plastic film, so that you can see the product and observe any changes.

Apply
Fi[illegible] was p[illegible] techn[illegible] obser[illegible]

Vacuum packing

In vacuum packing, the food is placed in a co[illegible] bag, from which the air is immediately sealed. Vacuum packi[illegible] to pack fresh foods, as it protects it microorganisms. Also, som[illegible] (e.g. cereals) can be vacuum-packed in or[illegible]

[illegible]ings to think about (2.3)

Discuss the advantages and disadvantages of various preservation [illegible]

Check your understandin
Food processing and preserving

1. Which of the following is TRUE about canning?
   a. The process uses metal cans only ☐
   b. It doesn't affect the texture of food ☐
   c. It can only be used to pack processed foods ☐
   d. It is used to pack raw foods only ☐

2. Which of the following statements is [illegible] about sterilisation?
   a. It can trigger the Maillard [illegible] ☐
   b. It is conducted
   c. It kills all bacteri[illegible] ☐
   d. It is conducted

3. Th[illegible] which of the following gases is reduced in MAP?
   a. [illegible]arbon dioxide ☐
   b. Oxygen
   c. [illegible]arbon monoxide ☐
   d. Nitrogen

4. Name the two processes that are prevented by the use of CAP in fru

.....

.....

5. Give one reason why blast chilling has to take less than 90 minutes.

.....

.....

6. Explain why brine is a suitable liquid for use in immersion freezing.

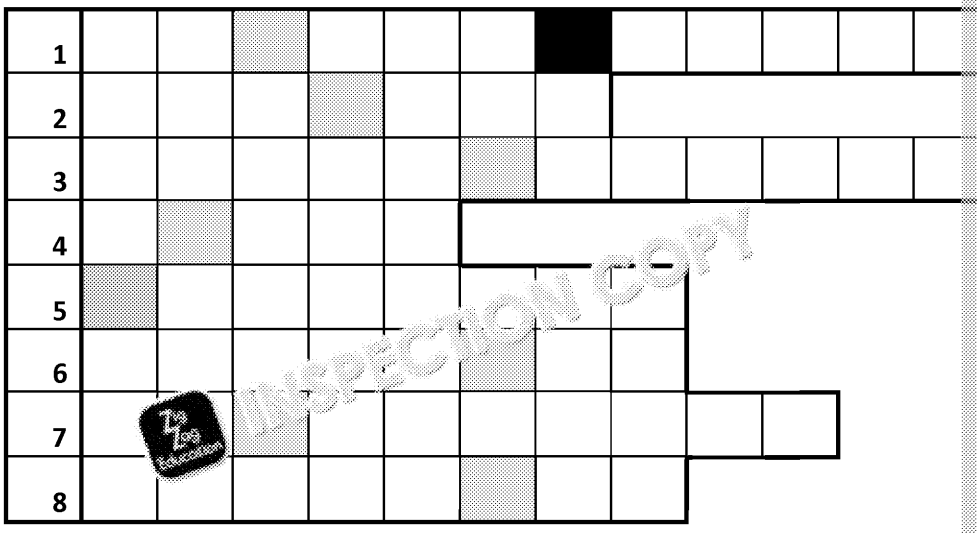
.....

.....

.....

.....

Fill in the answers to the questions below and then use the letters from the shad
relevant to food processing and production (the black squares are spaces betwe



1. Preservation method in which all air is removed. (6, 7)
2. Dairy product made with the use of probiotic bacteria. (7)
3. Process of heating raw milk to 72 °C (14)
4. Solution of water and salt, used as a preservation method. (5)
5. Liquid gas used in cryogenic freezing. (8)
6. Coarse flour used to produce pasta. (8)
7. Heat transfer method used in contact freezing. (10)
8. Type of protein in meat which dissolves during cooking. (8)

The shaded squares reveal this word:

__ __ __ __ __ __ __ __

Chapter 3: Food securi

Overview

In this chapter we explore various factors which affect food security in the world. You will learn about the impact of food on local and global markets and communities – here you will learn about climate change and global warming and the challenges of providing a sustainable and secure supply of nutritional food.

Learning outcomes

After studying this chapter, you should be able to do the

- describe how various factors affect availability of fo
- explain why fair trade is important for global develo
- evaluate the negative and positive impact of genet and health
- identify the main environmental issues associated
- explain what a carbon footprint is and how to mini
- explain how cli ng worldwide impacts on
- exp in wh is meant by sustainability of resource

Key Te

Affordability	Ability to purchase a sufficient amount of quality foo
Availability	Access to a sufficient supply of safe, nutritious food
Carbon footprint	How much energy has to be used, and, therefore, ho the production, processing and transportation of foo
Fairtrade	Ethical category that enables fair wages and prices fo developing countries; designed to prevent human ex
Fish farms	Tanks or enclosed sea areas in which fish or seafood purposes
Food miles	How far the food has to travel from the producer to
Food poverty	Inability to provide oneself with enough food, in ter
Food security	A term created by the United Nations, meaning that, given place in the world, each person should have ac safe and nutritious food
Food waste	Food that is rotten, spoilt or wasted in another way,
Genetically modified (GM)	When the DNA of a given organism is manipulated b to alter its features
Greenhouse gases	Gases which have the ability to trap the warmth in t average temperature on Earth: in lude water vapour nitrous oxide, ozone and ga es
Sustainability	Ability to maint h tural environment and prod

Moral and ethical issues involved in foo

Food security is a global concern. Climate change, environmental exploitation and species extinction lead to a situation where there might not be enough food to feed the growing population of the world.

Food availability

According to the Food and Agriculture Organization of the United Nations (FAO), **food availability** means that at any given time and place, any person should have access to sufficient amounts of safe and nutritious food.[1] The growth of the human population means that more and more food has to be produced to feed people.

What makes food availab

- Sufficient pro – means that enough food is made; intensive farmi (su M ave made it possible, but unfortunately almost all that foo
- Acc etailers – means that shops or farmers are close enough for p food from them
- **Affordability** – means that a person has enough money to buy the food s

What threatens food availability?

- Climate change and the effects of global warming
- Droughts, which make growing plants impossible
- Floods, which damage the crops
- Pollution caused by production and transportation of goods
- Insufficient land for growing food – there are more and more people to fe
- Lack of resources, such as water or fossil fuels
- Overexploitation of soil, which decreases its usefulness for growing plant
- Poverty and lack of money

In developed countries, such as the UK, there are also other factors, such as the distance to the nearest shop, the price of the food, and lack of transportation to bring the food back home.

What does 'nutritious food' mean?

Food should not only fill you up and stop you feeling hungry – it is also a source o micronutrients, which are crucial for the proper growth, development and functi should, therefore, be rich in nutrients such as proteins, fats, carbohydrates, vitam abundance of cheap, low-quality food in developed countries has led to the situa worldwide are overweight or obese,[2] and at the same time 30% of them are und

Food poverty (food accessibil

Food poverty means that a person or a family doesn't have enough money to bu (healthy and nutritious) food. In many areas, especially in developing countries, t diseases and deaths. Unicef states that half of the deaths among children under undernutrition.[4] Food poverty is not restricted to poor countries only. Even rich United Kingdom struggle with the problem. According to Oxfam, 2 million British another 500,000 rely on food parcels from charities to feed their families.[5]

[1] *http://www.fao.org/fileadmin/user_upload/suistainability/Presentations/Availability.pdf*
[2] *http://hungerreport.org/2016/infographics-2/*
[3] *http://drhyman.com/blog/2012/02/29/how-malnutrition-causes-obesity/*
[4] *http://data.unicef.org/topic/nutrition/malnutrition/*
[5] *http://policy-practice.oxfam.org.uk/our-work/inequality/food-poverty#contentprimary_0_ctl00_*

What can be done to make food available?

- Many international organisations, such as the Red Cross, deliver free food t in war zones
- Increase salaries – although this is not easy to do, since it depends on man
- Decrease prices and make food more affordable for people, especially tho done by supporting local farmers
- Food vouchers – which are a way of helping people financially without givi the money from being misused, because it can be spent on food only, and example
- Create food banks – places where food can be given for free to those in ne
- Avoid food waste – and give what you don't eat to those who might need it
- Use modern technologies, such as GM crop, to introduce more efficient agriculture
- Improve storage conditions to enhance the shelf life, e.g. by the use of modified atmosphere packaging or vacuum packs

Rese

Read the
zzed.uk
list the re
of food p

How climate change affects food availability

Earth's climate changes in cycles – just like seasons. Temperatures on Earth have varied for the last 650,000 years, causing the ice to form or melt, depending on the stage of a given cycle. Because of that, Earth has already experienced six glacial periods!

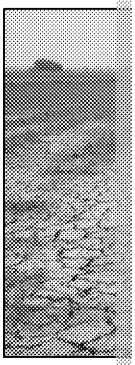
For centuries, climate change was caused by variations in Earth's orbit and in solar activity, which then determined the amount of warmth the planet received from the Sun. The Sun's rays pass through the atmosphere and are then reflected by Earth's surface. In normal conditions, the heat would spread into space without further consequences. Unfortunately, greenhouse gases (such as carbon dioxide) create a coat around Earth's atmosphere which traps the warmth. Therefore, Earth's surface and the air around it are warming up.

The main reasons for rising carbon dioxide levels are:

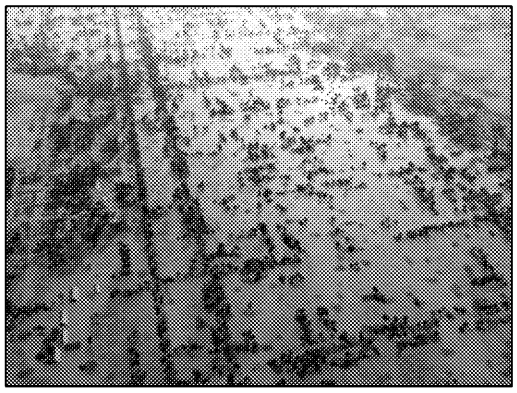
- burning coal, oil and wood to obtain energy, and also for food production and transportation between countries
- deforestation to obtain fuel and land for agriculture

Global warming is dangerous. It can lead to:

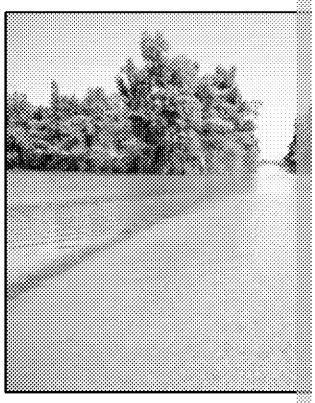
- melting of glaciers and a rise in sea levels
- a rise in global temperatures
- warming of the oceans
- extreme events such as hurricanes, intense rainfall, heatwaves, droughts and floods
- acidification of the oceans



Droughts ar
change and h



A flooded farm

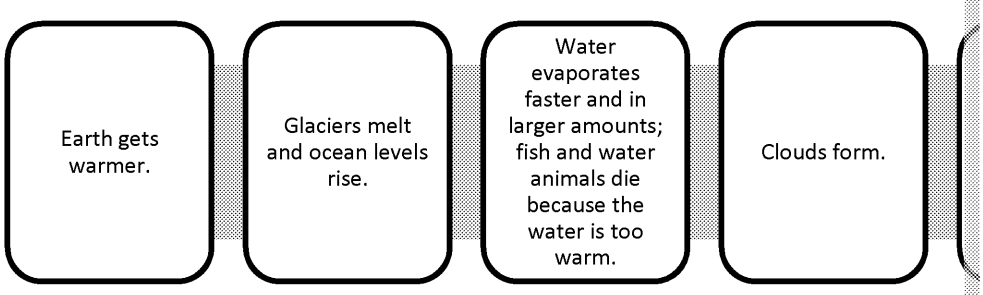


A farm which is so badly flo… farm an…

The effects of global warming that have b… …ed over the past 50 years ar…

- They cause the mass extinction of many animal and plant species, as ma… the new conditio… (e.g. high temperatures or lack of water).
- They lead to the disappearance of land and whole countries under water, … of la… which can be used for planting crops or grazing farm animals.
- They can cause food shortages and famine by causing crop failure (due t…
- They change the pattern of the seasons, which can affect plants' life cycl…

How does this work?



How can we ensure food availability when facing climate change?

Climate change is a global problem. It affects individuals, communities and whol… around the world are involved in the fight against carbon dioxide emissions. An … Paris Agreement, which obligates 197 countries to undertake certain actions to h… warming. Actions have to be taken to:

- mitigate (stabilise and reduce) levels of CO_2 released into the atmosphere … energy from fossil fuels to water or solar power, limiting transportation a… foods, limiting the use of packaging, lowering food waste, recycling and r…
- adapt to the changes that have already happened. This involves making … experience, such as a prolonged summer which allows more crops to gro…

Res…

Visit the … **nasa** a… family c… emissio… lower y… toward…

Moral issues in food production: Fairtrade

Although slavery was banned in 1833, modern societies tend to overexploit their resources – including labour – in order to produce more goods and create a bigge profit. In many countries, children are forced to work, and people are not paid fa for their work – which leads to high poverty rates in such countries as China, Indonesia and India.[6]

Fairtrade is, therefore, a way of stopping modern slavery. It has the following benefits:

- fair prices and wages for producers, farmers and farm workers
- decent working conditions (such as working hours, breaks and tools)
- ends child labour and forced labour
- empowers local farmers, their families and communities – having more money allows them to make choices about their lives and send their children to school
- enab[illegible] and sustainability (e.g. schools and health centres c mo[illegible] pay for the medical care)

Fairtrade rules are designed to enhance the social, economic and environmental producers – not large intercontinental corporations.

The most popular Fairtrade products include:[7]

- bananas
- chocolate / cocoa beans
- coffee beans and tea leaves
- cotton
- sugar

Apply

While shopping, try to find five products that come from Fairtrade producers.

Research

Research and prepare a presentat Fairtrade standards are.

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[6] *http://www.worldbank.org/en/topic/poverty/overview*
[7] *http://www.fairtrade.org.uk/en/buying-fairtrade*

Ethical issues in food production: genetically modif

All food comes from living organisms – plants, fungi or animals – and, therefore, ev
DNA code. DNA contains genes, which determine all the features of a given organ
nutritional value. Modification of DNA – replacing one or more of the genes in the
various plant and animal species that grow larger, are resistant to pests or produce

Why we use GM
• to increase crops and avoid food shortages
• to improve 'shelf life' in foods and lengthen storage time
• to produce biofuel
• to develop resistance to pests in plants
• to decrease the amount of herbicides and pesticides needed
• to increase the amount of eggs, milk and meat produced
• to increase immunity in animals
• to increase the amount of vitamins and other nutrients in food
• to overcome climate challenges
• to prevent malnutrition and fight off hunger
• to improve flavour, colour, appearance or size of fruit and vegetables

The experiments to design and produce GM foods started in the 1980s and, there
(yet) whether they are safe and healthy to consume, because that requires longitudinal studies (performed over a long time, e.g. 50 years). Currently, the European Union law allows for GM crops of cotton, maize, oilseed rape, soya beans and sugar beet. *(Note that EU laws may change after Brexit)*

Did you kn

So-called 'Golden R
prevent widesprea
developing countri
successful at the b
people refused to
yellow rice!

Many people oppose GM foods because:

- there is no scientific proof that long-term use of GM food is healthy and safe
- they believe GM food increases the risk of allergies and cancer
- they may contribute to increased body mass and so to the recent growth around the world
- they may lead to antibiotic resistance (that's because genes responsible f used as markers to determine whether a gene was successfully introduce antibiotic to the plant tissue will kill all of the non-modified cells, leaving antibiotic resistance gene behind)
- GM seeds mix with naturally occurring plants and may cause their extinct decreased)
- genetic modifications often require the use of viruses or bacteria, such as creation and spread of new diseases

On the other hand, genetically modified foods have multiple advantages, and scientists around the world work hard to ensure the newly produced species are not only environmentally friendly, but also safe to consume.

Th
G
1)
2)
3)
4)

5)
6)

Compared with naturally occurring plants and animals, genetically modified ones can:

- contain more macronutrients, such as protein, which help to alleviate hunger in poor countries
- contain more polyunsaturated fatty acids, which may help to lower heart attacks and stroke incidence in rich countries
- contain more micronutrients, necessary to prevent malnutrition

- require fewer resources, such as water, and can be grown almost everyw conditions
- have a longer shelf life, so help to limit **food waste**
- are resistant to pests, so no chemicals have to be used
- produce more meat, milk or eggs, so fewer animals have to be reared and less land has to be devoted to pastures or animal farms
- are resistant to bacteria, so no antibiotics have to be used

Did yo

Almost 60
the world
than any o

GM advocates also claim that for these reasons GM foods are a way of providing generations.

Research

Read about GM crops and food at ...uk/8227-genewatch and find out:

- whether GM cr... ...imals are grown/reared in Great Britain
- wh... ...re ... ...s of GM crops enter Europe
- wh... ...'s easy to find GM-free products in the shops

Genetically modified foods and their impact on health

The development of modern technologies has allowed scientists to manipulate t as viruses, bacteria, plants and animals. There is a strong correlation between diet, nutrition and health, and it is no surprise that genetically modified foods also have an impact on human health.

Did y

Golden R
GM crop
producin

Introducing new genes to DNA or removing faulty ones has many advantages for human health and well-being.

- The food is more nutritious – in fact, crops can produce more vitamins a fatty acids, thanks to which the food we eat (cereals, vegetables, fruit, e nutrients
- Higher nutrient content can help to prevent malnutrition, especially in p
- Higher nutrient content can help to prevent and cure the effects of defic macro- and micronutrients
- Higher content of antioxidants may be beneficial in prevention of many d coronary heart disease
- High-yield crops can help to fight off hunger, as more food can be produc world

Genetically modified organisms have been in use since the 19...0s. During this tim many concerns about using them – due to both the e...v...m...ntal and health-re In fact, there is no sufficient data to prove o... sp... how GM foods affect the h include:

- Higher incidence of ... ...s... – this is usually linked to GM soya beans, wh reacti... th... ...odified crops
- Fea... ...w diseases, which can be caused by creating new bacteria spec... ...at are resistant to all known antibiotics
- A belief that GM foods contribute to the growing rates of obesity in developed countries, such as the USA
- A belief that GM foods increase the risk of cancer in those eating them
- Fear of antibiotic resistance developing in animals and in people eating them

In Great Britain, it is obligatory to state that a food contains GM ingredients if th content in the final product is higher than 0.9%.

Check your understandin
Moral and ethical issues involved in fo

1. Which of the following statements about food poverty is UNTRUE?
   a. It only affects people in poor countries.
   b. It occurs also in rich, developed countries.
   c. It causes malnutrition.
   d. It affects food availability.

2. Which of the following is TRUE about GM fo
   a. It is usually less nutritious than co ve ti l food.
   b. It can increase the risk of lle gies.
   c. It supports biodiv y pecies.
   d. GM anim tile.

3. S hree advantages of buying Fairtrade products.

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4. Explain the effect that climate change has on food availability on Earth

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5. Evaluate the impact of GM food on health.

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Food production and transportation have an enormous impact on the environme
natural resources, many of which are non-renewable. The expanding industrialis
to a situation where there will be no resources left for the future generations to

Food waste

Food waste is, in general terms, all the food that is rotten, spoiled or wasted, and is thrown away. It can be created by food producers, retailers and households. Food waste is one of the major problems of rich developed countries. In 2012, in the United Kingdom alone, the amount of food waste produced by households was about seven megatons and by manufacturers – 3.9 megatons.[8]

Here are five reasons why food waste is wrong:

1. **Wasting food is unethical**. We live in a world of large social inequalities, where over one third of the population is obese, while another billion people suffer from famine.[9, 10]
2. **Wasting food is environmentally unfriendly**. Many resources – water, e produce and transport it. Not only were they used, but, in the meantime
3. **Wasting food is uneconomical**. Many people were involved in the process of production, and the food was paid for. The Waste and Resources Action Programme estimates that each family could save £700 a year simply by avoiding food waste.[11]
4. **Wasting food requires organisation**. After all, someone has to pick up the rubbish from your home and either recycle it or store at a rubbish dump. That, again, contributes to the carbon footprint and increases the social cost of food waste.
5. **Wasting food creates pollution**. The food had to be produced (carbon dioxide), transported (greenhouse gases), packed (pla again). All the by-products of food production and consumption find the contribute to the overall pollution of the planet.

Did yo

The top five
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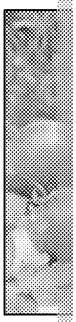
A number of policies were designed to help prevent food waste:

- **Recycling** – of both food and food packaging. The leftover food can be u number of ways, e.g. as animal feed.
- **First in, first out** – rotation of stock helps prevent food waste by controll 'best before' dates.
- **Storing the food in proper conditions** – helps prevent food spoilage by e microorganisms, vermin or environmental factors.
- **Redistribution** – giving away anything that cannot be sold. Some of the part in charity programmes which help distribute the food to those who

[8] *http://www.wrap.org.uk/sites/files/wrap/UK%20Estimates%20October%2015%20%28FINAL%29*
[9] *http://www.who.int/mediacentre/factsheets/fs311/en/*
[10] *https://www.thelifeyoucansave.org/Causes/Hunger-and-Nutrition?gclid=CPPwk4nIvNACFUNmG*
[11] *https://www.lovefoodhatewaste.com/*

Food waste in food production

There are several reasons why food may be wasted before it even gets to a shop or consumer.



- **Crop failure** – poor weather conditions, drought, flood, vermin, pests – all these factors can cause a lot of food to go to waste before it is even harvested.
- **Overproduction** – sometimes good weather conditions support growth of fruit and vegetables so efficiently that too much is produced and, as a result, farmers can't sell the overabundance; in these cases food is often left in the field to rot.
- **Throwing away** – producers may choose to throw away 'ugly', misshapen fruit or vegetables; this is because, in many cases, the produce standards, as otherwise it can't be sold in shops.
- **Faulty methods** – faulty methods of production, e.g. in factories, may lead

Limiting food waste at the source might not be easy, as it may require legal changes measures which are hard to limit the wastage.

- Farmers may choose to use pesticides or herbicides, or to grow foods in polytunnels failure caused by pests, vermin or weather conditions.
- Farmers can choose GM crops which are resistant to weather conditions.
- Farmers can try to sell the food more cheaply for freezing or canning.
- Factories can adjust their processing methods to minimise wastage.
- Factories can sell the food waste to produce natural fertilisers or animal feed.
- At all stages of production – when transporting, cleaning, sorting, cooking, producers can maintain proper conditions to prevent spoilage caused by micro-organisms.
- Factories can use packaging to protect food from external factors – modified packaging methods, such as modified atmosphere packaging or vacuum packaging can help to extend the shelf life of food while not affecting nutritional value.
- Producers can use preservatives – although this might be socially unacceptable, it is a proven method of extending the shelf life of food products.

Food waste in retailers

Smaller and larger shops struggle with large amounts of food which are not sold.

- not paying attention to date marks
- not storing the food in the correct conditions
- improper management and over-ordering

Shop managers may need to implement a couple of strategies to reduce food waste such as:

- Daily check of date marks, especially of fresh produce – a food past its date mark cannot be sold.
- If a food is past its 'best before' date, it is usually still edible, so can be donated to food banks or even given for free to the shop workers and customers.
- Correct storage conditions, both in the storeroom and in the sales hall – this includes especially to temperature and sunlight, as many foods will be packaged at this stage so will be protected from other external factors.
- Lower the price for foods which are close to their 'use by' date as they will date.

What can you do to stop wasting food?

Food waste in homes is usually caused by buying too much, cooking too much, not paying attention to date marks or improper storage conditions. Food may also be wasted due to lack of skills or knowledge, for example, when a person buys a new product and doesn't know what to cook with it or when a person can't cook and burns the meal.

Reducing food waste at home can include:

- Planning your meals and writing a shopping list – buy only the foods you need, in the amount you need. That applies especially to fresh foods, which cannot be stored for a long time.
- Using leftovers – you can use cooked vegetables to prepare a salad (or a cream soup), leftover mashed potato can be used to prepare fish cakes, and stale bread is great for a pudding (or simply for breadcrumbs).
- Freezing foods that you cannot eat right away – that applies especially to meat and fish, and cooked meals. Vegetables have to be blanched or parboiled before freezing.
- Serving only as much as you need. If there is too little, you can always ask for an extra helping.

If your food unfortunately gets spoiled or goes rotten, don't worry – store it in a s compost (or give it to someone who owns a garden).

Research

Visit the website **zzed.uk/8227-food-waste** and try to list five ways in which contribute towards lowering food waste.

Did you know?

A major contribution towards food-related wastage comes from packaging. British people buy 22 million metric tonnes of food every year – and all that food comes in packaging. It is important to dispose of the packaging properly, so it can be recycled or destroyed in a controllable, environmentally friendly way. This is because materials such as glass or plastic will not decompose at all or the process will take a very long time. For this reason, the government and many international organisations strive to limit the number of plastic bags used (introducing the 5p payment per bag has already halved the number!).

Recycling

Recycling is a way of getting rid of waste in an eco-friendly way. To facilitate this, colour-coded bins were introduced in the United Kingdom to help people identify what litter goes where. Note that different countries (and even different city councils) can have different policies – some use more colours, some only sort was into 'dry' and 'wet', etc.

Research

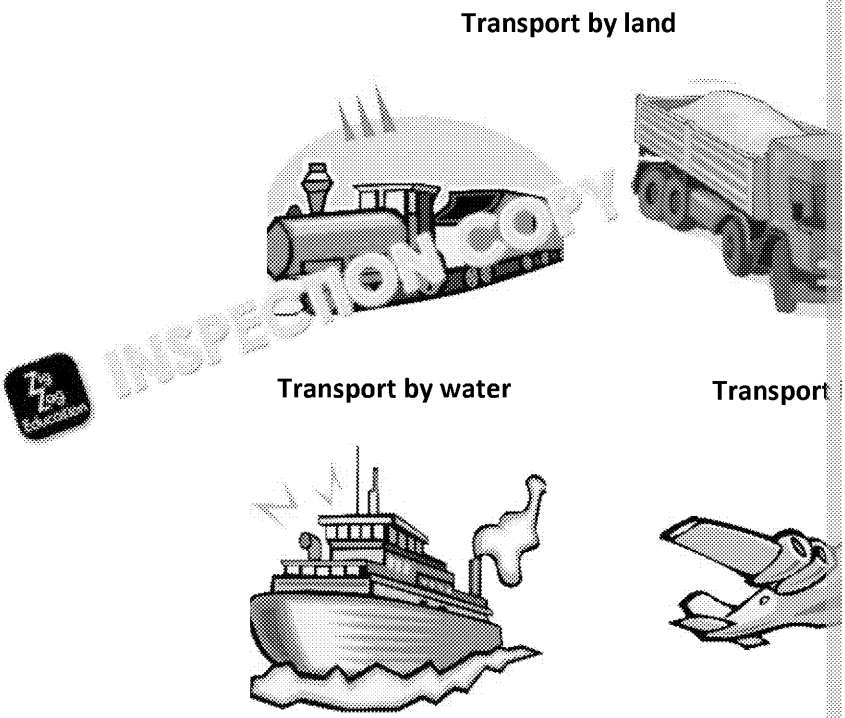
Visit the website **zzed.uk/ 8227-recycle-now** and create a poster in which yo and how you can recycle in your area.

Typical colour of the bin	What go[illegible]nt i[illegible]	W[illegible]
Blue	Paper, aluminium tins, metal cans, glass bottles and jars, plastic bottles, plastic food trays and yogurt pots	The materials packages, rec
Brown	Food waste, vegetable peel, egg shells, teabags, garden waste (cut grass, flowers, etc.)	This is decom for example
Green or grey	Plastic bags, polystyrene, light bulbs, mirrors, sanitary products, nappies	These are no have to be d (e.g. burnt) o

[12] *https://www.thurrock.gov.uk/household-waste-and-recycling/what-goes-in-your-bins*

Carbon footprint and the transportation of materia

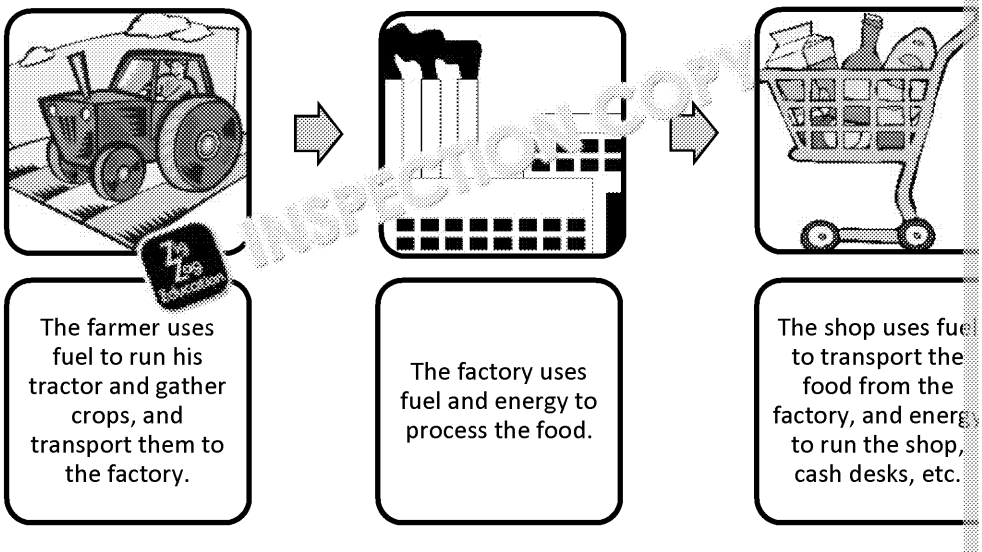
Food can be transported even from very distant countries by trains, lorries, ships means of transport need a lot of energy – from either carbon, petrol or wood. C producing dust, exhaust gases and carbon dioxide. They contribute to general ai pollution of the air and ground (especially near main roads and motorways).



Foods and other goods are transported by different means. Which do you think pro

An important effect of rising global transportation (and consumption of fuels) is g change. This is because large amounts of greenhouse gases are produced during of foods. Greenhouse gases include water vapour, carbon dioxide, methane and produced in large amounts by households (e.g. when heating the house and usin people (e.g. buses and cars). All the greenhouse gases produced as a result of so **carbon footprint**.

Buying locally reduces the need for transportation of produce, and, therefore, is a carbon footprint. It also reduces **food miles** – the distance which food has to tra



Food miles and carbon footprint are built up all the way from the fiel

Reducing the amount of greenhouse gases produced during production and tran
for saving the Earth. It can be achieved by:

- using alternative sources of energy such as wind or solar panels to run fa
- using more effective ways of transportation and improving exhaust filter
- choosing local foods to reduce the need for transportation at all
- planting more trees and stopping deforestation

Research

Visit the website **zzed.uk/ 8227-WWF-footprint** and discuss how YOU ca
footprint.

Things to think about (3.1)

Discuss how food waste, transportation and packaging contribute

Sustainability of resources

Sustainability of food concerns scientists, governments and ecologists all around t
climate change and growing population, may affect food availability in the future,
technologies can come to the rescue, keeping the most pessimistic visions at bay

As the world population grows, more and more food has to be produced to meet
Currently (March 2017) there are 7.5 billion people living on Earth, and the Unite
will grow to 11 billion by 2100.

The more people there are, the more food is needed – but the area and resource
Food production and transportation require a lot of resource such as water and
generate a lot of waste and pollution. Intensive farming and fishing can lead to e
species and to soil exhaustion. For these reasons, the idea of **sustainable food** is
important. The point of sustainable food is to use the available resources only to
overexploit them and allow them to be replenished.

The main principles of food sustainability are:

- reducing waste of food and packaging
- eating more vegetables and fruit, and less meat and dairy to limit the amount of g
- buying locally and seasonally to limit the carbon footprint
- choosing fair trade certified products to promote fair wages and prices
- selecting fish from sustainable resources only
- avoid or limit the consumption of sugar, salt and food additives
- growing food yourself if possible

The idea of sustainability is currently supported by the European Union*, which c
Resource Efficient Europe'. The aim of the policy is to reduce waste, improve effi
optimise consumption in order to protect the environment.

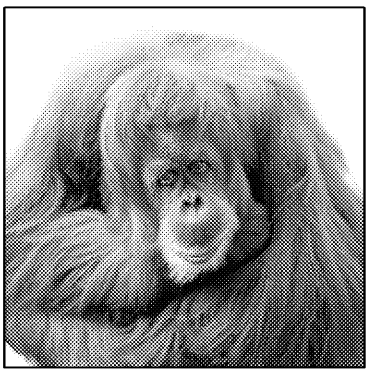
Research

Discover more about sustainability of food at **zzed.uk/8227-EU-environme**

(Note that EU laws may change after Brexit)

An example of how the policy is implemented is **fish farms** (you can learn more a

Why is sustainability of resources important?



Food production has contributed to loss of biodiversity and habitats and endangered wildlife such as orangutans and Sumatran ti

Did you know

Sustai y the ability to keep harvesting or us oduct without causing long-term damag harm to the environment, the animal or to the economy or livelihood of developing countries.

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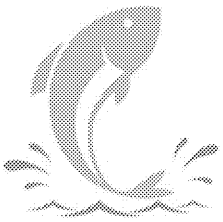
Sustainability issues have surrounded the following food products:

FISH	PALM OIL	
		
Some fish stocks have become endangered through overfishing or habitat loss. Sustainable fish is fish that is caught or farmed in a way that causes minimal damage to marine environments or other wildlife. The Marine Conservation Society and Hugh Fearnley-Whittingst campaigned for Marine Conservati es (also known as Marine Prot Areas) to help protect the UK's most fragile marine environments from overfishing or damage.	Palm oil is grown in South East Asia and is found in many products, such as food, shampoo, biofuel and cosmetics. Palm oil plantations have resulted in mass deforestation of tropical forests leading to loss of biodiversity and w e, including the orangu an er 80 % according t angutan Project). Some supermarkets state that they source palm oil from plantations which can demonstrate that they have not endangered tropical rainforests – this is referred to as *sustainable* palm oil	Ma ord pla res eco rai On be wi live sm pro The co pro
Research*:* Take a look at **zzed.uk/8227-defra-marine** to see a map of Marine Protected Areas.	**Research:** Take a look at the Orangutan Project at **zzed.uk/8227-orangutan-palm-oil**	**Re** Wi **zze**

Check your understandin
Environmental issues and food p

1. Which of the following does not contribute to an increase in carbon f
   a. Using oil as fuel
   b. Using carbon as fuel
   c. Using wood as fuel
   d. Building wind- and solar-driven power plants

2. Which of the following statements is TRUE a ood waste?
   a. The most food waste is produced by ho seholds.
   b. The most food waste is ed by retailers.
   c. The most food waste is duced in food factories.
   d. The mos d waste is produced by farmers.

3. what is meant by carbon footprint.

.....

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4. Suggest two ways in which food waste can be reduced during the pro

   1 .....

   2 .....

5. Explain how fish farms help to support sustainability of resources.

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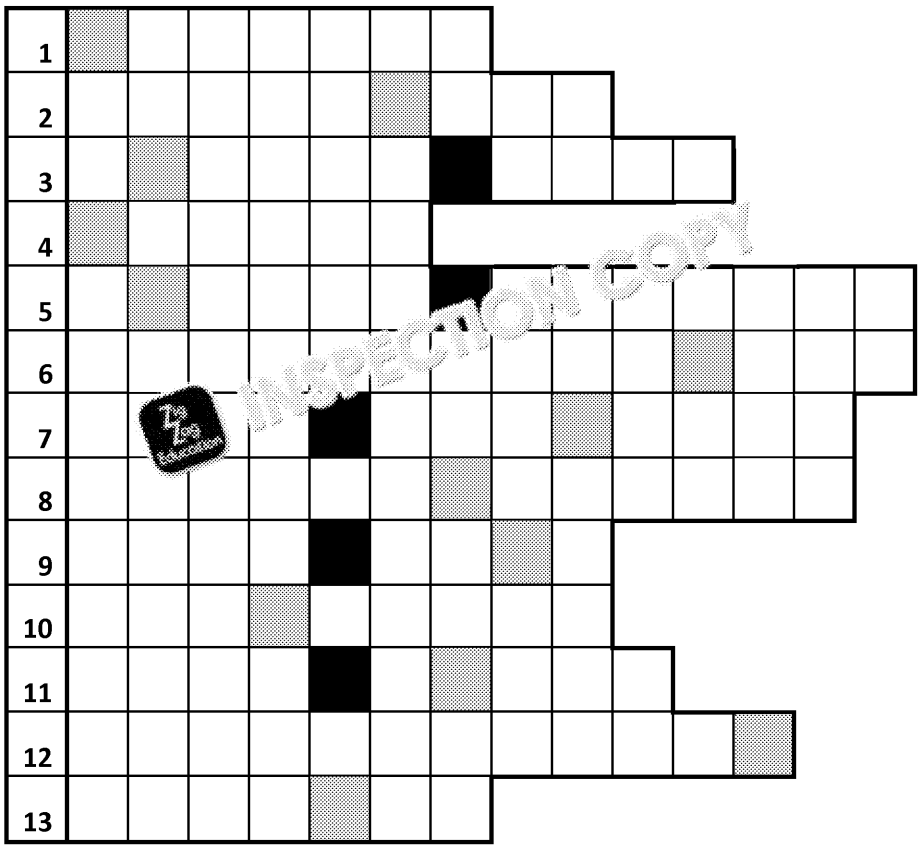
Quiz-ine

Fill in the answers to the questions below to reveal a word relevant to food secu
black squares are spaces between words).



1. Mass of ice which melts as an effect of climate change. (7)
2. The practice of reusing items that would otherwise be discarded as waste. (9
3. GM cereal introduced in South America to prevent vitamin A deficiency. (6, 4
4. The most common Fairtrade fruit in the world. (6)
5. One of the greenhouse gases. (6, 7)
6. Ability to maintain the natural environment and produce goods without des
7. Fishing method in which a net is spread between two boats. (4, 8)
8. Situation where people have the purchasing power t[illegible] a sufficient amou
9. Artificial tank where fish are reared for c[illegible] purposes. (4, 4)
10. Metal from which tins and ca[illegible]de. (9)
11. The distance tra[illegible]od between the farm and the plate. (4, 5)
12. A conc[illegible]hen a person's diet doesn't contain sufficient nutrients. (12)
13. Lengthy period of no rainfall that leads to crop failure. (7)

The shaded squares reveal these words:

Chapter 4: Technological develo support better health and food

Overview

In this chapter you will discover how technology helps obtain food that improves health. You will also learn what additives in foods are used for, their positive impacts and their negative impacts. Lastly, you will learn about probiotics and prebiotics, and how they affect health.

Learning outcomes

After studying this chapter you should be a following:

- ❑ list what additives are used in foods a
- ❑ explain how technology can help mak
- ❑ explain the difference between probio
- ❑ identify benefits associated wi

Key T

Additives	Artificial or natural substances that do not usually occ added to them to enhance their features or shelf life
Antioxidant	A chemical which can prevent oxidation by donating
Atherosclerosis	A condition in which cholesterol plaque builds up an causing them to narrow and stiffen
Cholesterol	A fatty substance necessary to build cell membranes transported in the blood by lipoproteins
Enriching	Addition of vitamins and minerals to foods which ha during processing
Fermentation	A process in which sugar is turned into lactic acid or a conducted by bacteria and yeast
Fortification	A process in which vitamins and minerals are added to increase their nutritional value
Lipoproteins	Molecules built from protein and fat, responsible for from the cells
Phytosterol	A chemical derived from plants which helps to lower prevent atherosclerosis
Prebiotic	Substances and chemicals which supports the growt
Probiotic	Bacteria species that are beneficial for health
Trans fats	Harmful fats generated as an effect of incomplete hy

Processing of foods leads to (sometimes significant) changes in their nutritional v
vitamins and minerals, along with high intake of calories, can lead to diet-related diseases, such as anaemia, atherosclerosis, or beriberi. For that reason, in many countries in the world vitamins and minerals are added to foods to increase their nutritional value and reduce the risk of such diseases.

Di
Beribe
caused

Modern technologies also allow further changes in the structure and nutritional value of food. Some of these changes are used to improve the palatab
others are applied to improve the food's impact on h

Fortification of foods

Fortification of foods is the process in which certain vitamins and/or minerals ar d in order to:

- incr s nutritional value
- restore its nutritional value which has been lost during processing
- make it more suitable for certain consumer groups (e.g. children)
- prevent diseases caused by lack of these vitamins and minerals

Did you know?

In some countries it is mandatory to add iodine to salt to prevent thyroid gland diseases.

*These c
ribofla*

According to the Food and Agriculture Organization of the United Nations (FAO), 'fortification' is applied to foods whether or not they contain a given micronutrient, while foods that have lost their nutritional value during processing are 'enriched'.

There are two important rules about food fortification:

1. Fortification cannot be applied to unprocessed foods.
2. If micronutrients are added, it is obligatory to list the amount on the labe

Foods can be fortified obligatorily or voluntarily.

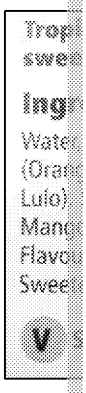
Mandatory fortifi	Volun
Wheat flour and bread iron, niacin, calcium carbonate	Bre Calcium, iron, vitami
t spreads (margarine) Vitamins A and D	
Semi-skimmed and skimmed milk Vitamin A	Whole milk and othe V

[1] *https://www.food.gov.uk/sites/default/files/multimedia/pdfs/breadflourguide.pdf*
[2] *https://www.food.gov.uk/sites/default/files/multimedia/pdfs/yellowfatguidance0610.pdf*

Advantages of fortification

Nutrient deficiency can cause many different health conditions. Mandatory fort
increase the intake of certain vitamins and minerals among the population and t
diseases as beriberi (caused by lack of vitamin B1), anaemia (caused by lack of ir
calcium and vitamin D).

Voluntary fortification of foods is designed to make foods more suitable for certa
the addition of calcium makes cereals better for children, who need it to grow he
example is the addition of vitamin C to foods; this increases the intake of this vit
shelf life – because vitamin C works as a preservative/antioxidant.

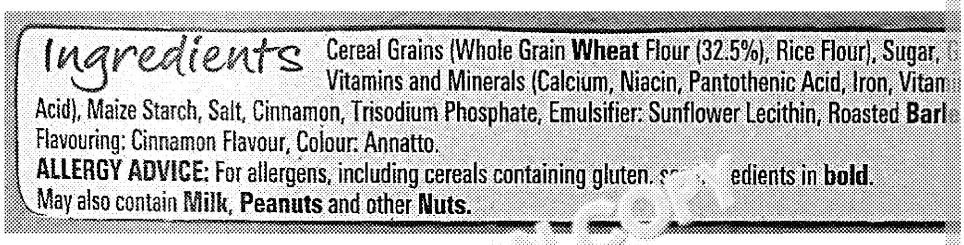


Bread is a staple food fortified by law

Disadvantages of fortification

Although generally beneficial, fortification can have its downsides. For example,
might not be suitable for people suffering from kidney stones, and products forti
beneficial for those suffering from thyroid gland diseases.

As manufacturers often add vitamins and minerals to breakfast cereals, cereal ba
products, they might make them seem healthier and more appealing. In fact, ma
with sugar (and often salt), and their consumption should be limited. The benefit
usually outweighed by the disadvantages, as they might contribute to the increa
and tooth decay.



*These cer
em healthy, but in fact they are full of*

Some substances, su
n, can also affect the taste and
appearanc
food. Iron also interacts with vitamin A and
iodine, and
reason the addition of these nutrients has
to be limited. Some nutrients also interact with each other,
making it difficult to calculate how much of each of them
should be added. For example, calcium limits iron absorption,
while vitamin C increases it.

Apply

Find fi
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them? W
voluntary

In many cases, food fortification may also be a costly process,
and as a result the final foods may be too expensive to be bought by those who
who cannot afford a healthy, balanced diet based on fresh produce).

Check your understanding: Fortifica

1. Which of the following statements about food fortification is UNTRU
   a. It increases nutritional value of food
   b. It restores the nutritional value in processed foods
   c. It is used to prevent certain diseases
   d. It is unhealthy to eat fortified products

2. List two foods which are fortified by law and state one nutrient which

Fortified fo	Nu

3. Explain why foods are voluntarily fortified. Give two examples to sup

   Reason: .....

   Example: .....

   Reason: .....

   Example: .....

4. Explain why some kinds of milk are fortified by law.

   .....

   .....

   .....

   .....

Additives in foods

There are various additives added to food, and currently their use is strictly regul
European Union law. The use of them has to be clearly stated on the food label,
with their function and E number.

Food additives are grouped by their function in the food.

The safety of additives is currently assessed by the European Food Safety Authori
additive can be used in food and in what amount. However, the usage of food ad

One of the most controversial food additives is aspartam s
a very sweet, low-calorie substitute for sugar. Sin e i s
discovery in the 1980s, it has been belie d au e brain
tumours and cancer. However t e n t cent study shows no
link between aspartam t e such diseases, and,
therefore, it i nsi are to consume. However, since it is
broken dow enylalanine in the body, it cannot be eaten
by people suffering from PKU (phenylketonuria).

Did y

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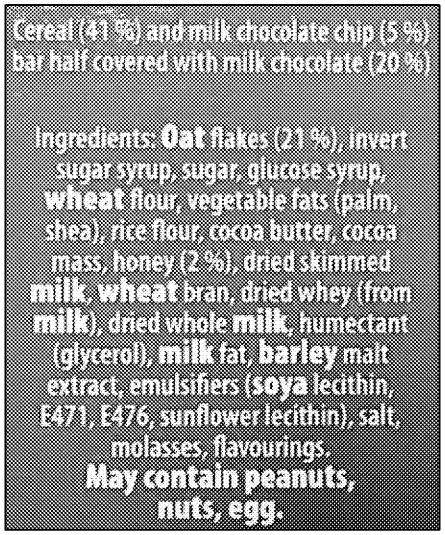
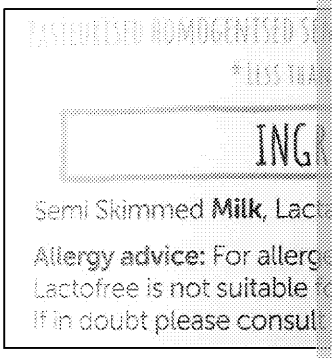
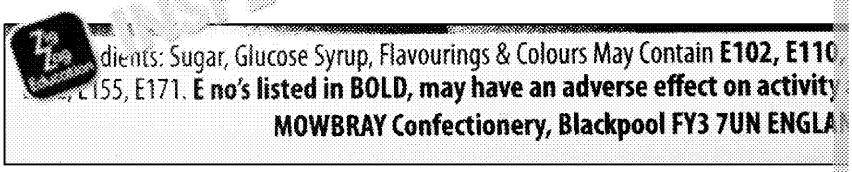
Use of additives can be harmful to people suffering from food allergies, such as sulphite allergy. Sulphites are commonly used in dried fruits and many other products, so it is important to read the label carefully when buying foods.



Cereal and milk chocolate chip bars are mad w n many different food addi s



Lactose-free milk is made wi to impro



This product contains additives which might cause health issu

Advantages and disadvantages of food additives

Group	Function/Advantage	Disadvantage
Colourings	• Enhance the colour • Change the colour • Make food more appealing • Make food more appetising • Improve appearance of food • Some of them are natural	• Can be used to hide poor quality of ingredients • Can increase consumption, leading to obesity • Tartrazine is linked to lethal asthma attacks and other allergic reactions, such as skin rashes, thyr[illegible] tumours and A[illegible]D • Some of them are artificial
Emulsifiers and stabilisers	• [illegible]t mixtures from separating • Keep emulsions and other mixtures stable • Prevent crystallisation of mixtures	• Can be used to hide poor quality of ingredients • Can damage the lining of the intestines, and cause bloating and flatulence • Some emulsifiers are linked to causing *leaky gut syndrome*
Gelling agents and thickeners	• Help to obtain the desired texture/viscosity of food	• Can be used to hide poor quality of ingredients • May cause diarrhoea and allergic reactions
Flavourings	• Enhance the flavour • Change the flavour • Add new flavour to a food • Make food more appealing and appetising	• MSG can cause allergic symptoms such as itching or sweating • May increase consumption, leading to obesity
Sweeteners	• Substitute for sugar • Have a lower calorific value than sugar	• May increase consumption, leading to obesity • Aspartame is a source of phenylalanine, so can't be eaten by people suffering from phenylketonuria
Preservatives	• Enhance shelf life • Prevent bacteri[illegible]ro[illegible] • Prevent[illegible]wth[illegible]moulds a[illegible]ds • [illegible]vent food spoilage • Lower food waste	• Sulphites can cause allergi[illegible] reactions, i[illegible]di[illegible]g anaphylactic [illegible]ock • Nitrates used in cold cuts can cause stomach cancer • Benzoates can cause asthma, skin rashes and other allergic reactions • Sorbates can cause dermatitis (skin inflammation)
Antioxidants	• Prevent food spoilage • Prevent oxidation of food and help to maintain its quality • Stop oils and fats in food from becoming rancid	Some people may not like the fact that they are often synthetic (not natural)

Where can we find additives?

Additives cannot be added to foods which are labelled as 'natural', and artificial additives cannot be added to foods labelled as 'organic'. Nevertheless, manufacturers can choose what substances they want to add to their products.

So where are they used most often?

- Colourants usually make their way into beverages, fruit yoghurts, lollipops, ice lollies and condiments.
- Sweeteners, such as glucose syrup, are added to cereals and cereal bars, sweets and ice creams, and even sauces and condiments.
- Monosodium glutamate is added to savou[illegible] such as instant soups stock cubes.
- Sodium nitrite is added t[illegible]ats and meat preserves.
- Aspartame and [illegible] substitutes are often found in low-sugar, 'ligh[illegible] che[illegible]ur[illegible].

Did yo

Some food [illegible] adverse hea[illegible] hyperactivity[illegible] out for:
E110 – Sun[illegible]
E102 – Tar[illegible]
E122 – Car[illegible]
E124 – Pon[illegible]
E129 – Allu[illegible]

Stock cubes are made with the use of glucose syrup, monosod[illegible] glutamate, flavourings and colourants.
They also contain potato starch, which acts as a thickener.

Research

Research different types of food additive to show the natural and artificial ones.

Apply

W[illegible] find [illegible] diffe[illegible] why [illegible]

Check your understanding: Additiv

1. Which statement about food additives is TRUE?
   a. They increase nutritional value of food. ☐
   b. They prevent certain diseases. ☐
   c. They can cause health issues. ☐
   d. Their use is mandatory. ☐

2. Common problems linked to food additives include…
   a. allergies ☐
   b. nervous system disorders ☐
   c. asthma ☐
   d. all of the above ☐

3. S…on… …n of each of the additives below in food production.

Additive	Function
Monosodium glutamate	
Tartrazine	
Aspartame	
Sulphur dioxide	
Lecithin	

4. Give three positive outcomes of using sweeteners in food products.

   1 .....

   2 .....

   3 .....

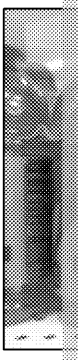
When talking about new trends in food production, it is worth mentioning functional foods. Functional foods are products which:

- provide extra health benefits (beyond their normal nutritional value)
- are similar in appearance to conventional food (so, for example, pills and capsules do not count)
- can be consumed as part of a healthy, balanced diet.

Functional foods are usually labelled with a health claim on the package, so that it is easier to identify them. Functional foods include those which are designed to improve cardiovascular health and support immunity and digestion.

Did y

The term
first used



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Probiotics

Probiotics are 'good' bacteria living in the human body. They live mainly in the digestive system, and their levels are highest in the large intestine. In the body, they play multiple functions:

- improve immunity by fighting off the 'bad' bacteria in the intestine
- improve digestion by breaking down some dietary fibre
- produce short fatty acids, which can be used by our bodies as an extra source of energy
- produce vitamins, such as vitamin K, B12, B1 and B2
- increase absorption of iron, calcium and magnesium
- prevent diarrhoea
- maintain the proper pH of the skin and vagina
- help to maintain a healthy body weight

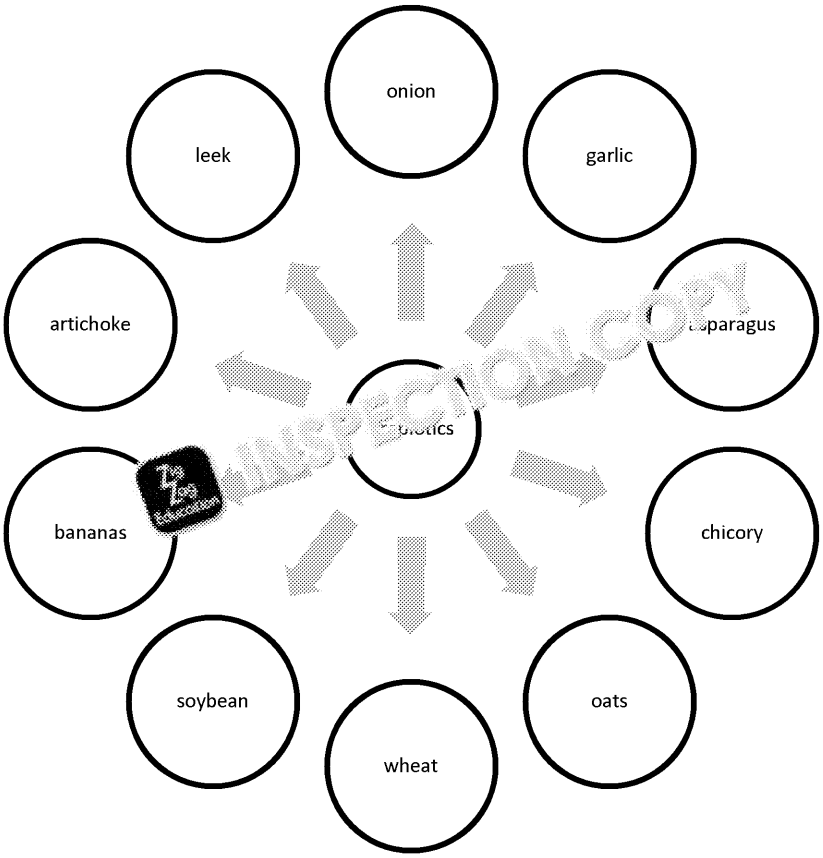
Probiotic bacteria usually belong to one of two species: *Lactobacillus* (e.g. *L. casei*, *L. acidophilus*) and *Bifidobacterium* (e.g. *B. lactis*). They are also used in the production of food products such as yoghurt, cheese, fermented milk beverages (e.g. Yakult®, Actimel™), sauerkraut and gherkins. The positive health effect of consuming probiotics depends on their ability to survive the journey from your mouth to the large intestine, as only the live bacteria can thrive and multiply in the gut.

Things to think about (AO1)

Discuss why some doctors may prescribe you probiotic supplements if you have taken antibiotics.

Prebiotics

Prebiotics are indigestible substances which support the growth of probiotic bac
of dietary fibre, inulin and fructo-oligosaccharides. Prebiotics are naturally found



Prebiotics
of the int
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Studies sh
helpful in
and allevi
syndrome

*This yo
and pr*

Apply

Read the labels of five different yoghurts and list the bacteria species used in their production.

Research

Try to find out why inulin may b
(apart from improving their nut

Further Reading:

Phytosterols

Cholesterol is a fatty substance necessary to build cell membranes, bile acid and some hormones. It is transported in the blood by lipoproteins.

Low-density lipoproteins (LDL) transport fat from the liver to the cells; they increase the levels of blood cholesterol and are, therefore, called 'bad'.

High-density lipoproteins (HDL) transport fat from the blood to the liver, where it is stored or removed from the body; they reduce the amount of cholesterol and fat in the blood and are, therefore, also 'good'.

High levels of LDL cholesterol are linked to increased risk of cardiovascular disease, heart attack, hypertension and stroke.

To prevent this, especially among the elderly, cholesterol-lowering spreads are made from a mix of vegetable oils (such as rapeseed oil, sunflower oil and olive oil), to which phytosterols are added. Also, special care is taken to make sure that no **trans fats** are released.

Studies have shown that an intake of 1.5–2.4 g of these substances lowers the level of LDL cholesterol, thereby decreases the risk of death from heart attack.

The producers of such spreads have also introduced other products containing phytosterols. These include milk drinks and yogurt.

Such products are especially beneficial for people at risk of overweight, obesity, high blood pressure and blood cholesterol levels. These conditions often occur together.

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Check your understanding: New and e

1. Which of the following is TRUE?
   a. All cholesterol is harmful. ☐
   b. Plant sterols decrease LDL level in blood. ☐
   c. Plant sterols decrease HDL level in blood. ☐
   d. Cholesterol level is not important for health. ☐

2. Probiotics occur in largest amount in…
   a. the large intestine ☐
   b. the small intestine ☐
   c. the stomach ☐
   d. the mouth ☐

3. Name three f… p… …cts made with the use of probiotics.

   1 .....

   2 .....

   3 .....

4. Describe the difference between probiotics and prebiotics.

   .....

   .....

   .....

5. State three benefits of consuming probiotic yoghurts.

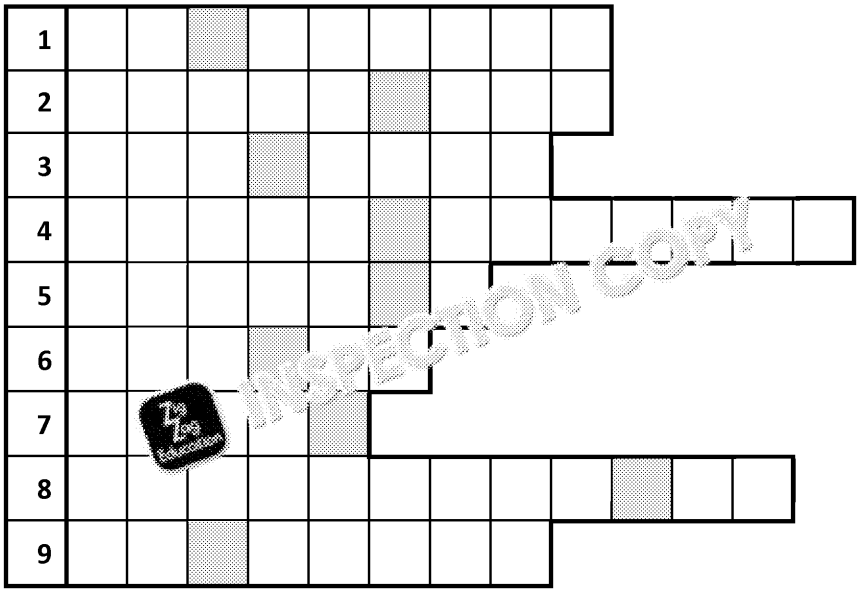
   i) .....

   ii) .....

   iii) .....

Quiz-ine

Fill in the answers to the questions below to reveal a word relevant to technolog
industry in the shaded squares.



1. Sweetener which can be broken down into phenylalanine. (9)
2. The other name for a vegetable fat spread. (9)
3. Natural colourant derived from tomatoes. (8)
4. Useful species of bacteria which produces lactic acid. (13)
5. Iron is added to flour to prevent this health condition associated with iron d
6. A serious health condition which may occur if the blood vessels in your brai
   plaque. (6)
7. Flour made from this cereal is fortified by law. (5)
8. The main function of sulphites in food. (12)
9. Emulsifier naturally present in egg yolk. (8)

The shaded squares reveal this word:

_ _ _ _ _ _ _ _ _ _ _ _ _

Chapter 5: Development of culina

Overview

In this chapter we will look at food products from British tradition and from other cuisines. We will explore different styles of cooking from different cultures and will look at the equipment and methods used to cook British and international dishes.

We will also look at the different presentation and serving styles of traditional and modern recipes

Learning outcomes

After studying this chapter you should be able to do

- ❑ understand and describe the distinctive featu of cooking
- ❑ describe the equipment and cooking methods non-traditional cooking
- ❑ understand and describe how British and inte
- ❑ identify eating patterns and how they influen
- ❑ identify differen entation and serving sty
- ❑ be abl er create and adapt recipes fr
- ❑ ers d how culture affects cuisine

Key Terms

Al fresco	Eating outside (e.g. picnics/barbecues)
Bento	A Japanese method of food preparation (in boxes)
Brunch	Late morning meal eaten in place of breakfast and l
Cuisine	A cooking style associated with a particular country
Culture	A way of living based on tradition
Eating patterns	A way of eating based on the culture of a country or
Ethnicity	Relating to groups of people who belong to a specifi
Etiquette	Conforming to correct customs or behaviour
Export	To send goods to another country for sale
Garnish	A decoration or embellishment of food which can be
Global	Worldwide
Immigration	Individuals or groups of people from one country m another country
Import	To bring goods from abroad for sale
Presentation styles	A way of showing off food in a variety of different w
Ritual	A ceremony performed in a specific order
Scandinavian	Relating to Norway, Sweden, Denmark, Finland and
Siesta	A rest break taken in Spain the hottest part o
Smorgasbord	Scandinavian buffet-style food meaning *buttere*
Sushi	A tradi la nese food preparation method
Tagine	ware dish for cooking North African spicy ste
Tapas	Traditional Spanish snacks or small meals
Tradition	Something that is long established within a country
Wok	Shallow frying pan associated with Chinese cooking,

British cuisine

The way we eat can be influenced by how we have been brought up and the tradit which we live. The type of food that is specific to a particular region or country is r **cuisine**. Cuisine is a country's style based on ingredients, preparation, cooking me presentation/serving techniques. There are many things that affect a country's cu eating and cooking may decrease as more modern methods are embraced or whe affect **eating patterns**.

Typical British cuisine includes fish and chips, steak and kidney pie, shepherd's p apple pie, bangers and mash and regional variations such as t ad-in-the-hole, Yorkshire puddings, bubble and squeak, Cumberland d ancashire hotpot. Traditional desserts include bread and butte ud ing, potted dick and jam roly pudding. Wales offers foods such as b h and Welsh rarebit and is also influenced by Italian and Mi as cuisines due to immigration during the eighteenth and nin enturies. The East End of London is known for its je eels. Scotl er known for porridge and has its own unique food product in haggis. A tr al breakfast in Northern Ireland is the Ulster Fry and other foo typically associated with this part of the UK are soda bread and Irish stew. Corn renowned for its Cornish pasties and stargazy fish pie and Derbyshire known for Bakewell tarts.

Spotted dick pudding

The distinctive features of traditional British cuisine one time characterised by availability and cost, with proportion of dishes being stodgy (high fat and star With **global** trade and **import** of exotic foods, in add a mix of cultures and **ethnicity**, British cuisine has e to include and embrace foods that were not availab 50 years ago. Some traditional dishes are created through the need to reuse leftover food, such as bubble and squeak, which uses leftover vegetables.

Modern food recipes are influenced by different cultures and the availability of exotic and foreign foods. Eating outside (**al fresco**) has become more popular during the summer in the UK and barbecues have increased in popularity. The U boasts many restaurants that offer cuisines from different countries and cultures which introduce us to new or unfamiliar foods or ways of cooking.

Research

1. Look up what is included in a traditiona ble and squeak.
2. Look up the traditional method and e pment for cooking a t Yorkshire pudding and h diers from making individual Yo

ngs to think about (5.1)

Discuss one reason why, in bubble and squeak, meat was replaced

Apply

List three foods that are more readily available now than they w

Find recipes for four of the regional foods mentioned in this section

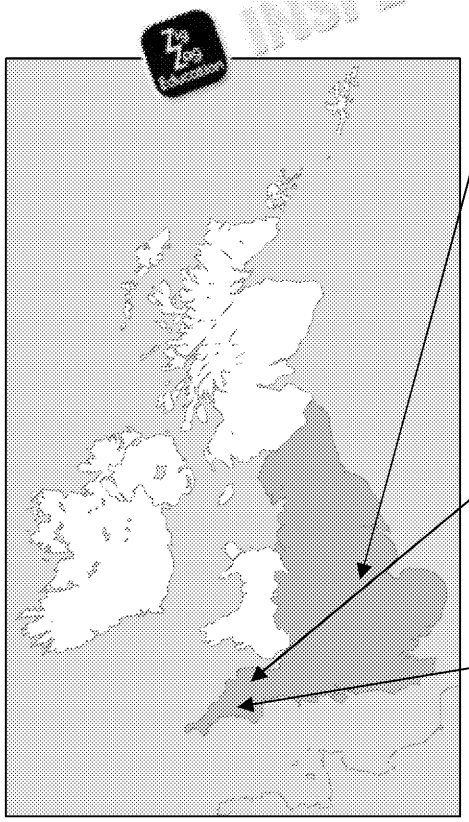
Regional variations

Cuisine in Great Britain varies more or less depending on the region. As the clim
the produce and traditional foods. According to EU law, traditional foods can be

- PDO – Protected Designation of Origin – this status is given to foods prod
in a specific region with the use of traditional, recognised methods
- PGI – Protected Geographical Indication – given to foods which are prod
specific region
- TSG – Traditional Speciality Guaranteed – given to foods which are made
methods, but aren't linked to any specific region or area

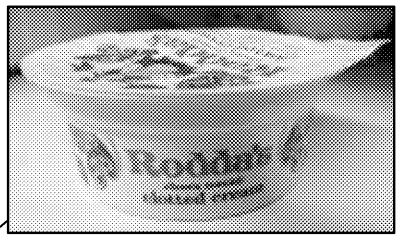
**You don't need to know these names, BUT you need to rec nise traditional fo
Great Britain.**

England



Did you know?

Melton Mowbray pork pies are characteristic of central England.



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Did you know?

Cornish pasties have the PGI status. This means that they need to be prepared in Cornwall, but the final baking can take place anywhere.

England can be divided into nine regions, each of which can offer a variety of foo
variety of meats, cheeses, vegetables and fruit. The most popular foods include:

- Cumberland pork sausages
- Cheddar, Stilton and Wens ese
- English muffins
- Eton s
- Eng akfast
- Lanc hotpot
- Cornish pasty
- Jellied eels
- Yorkshire pudding
- Devonshire cream tea
- Bakewell tart

Researc

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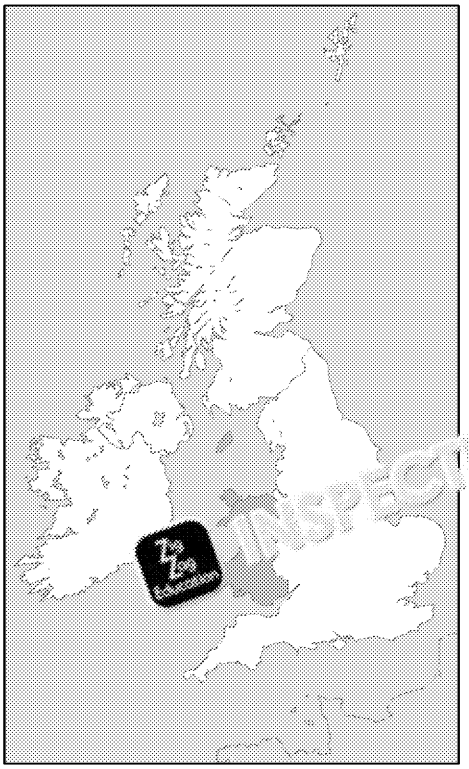
Ludlow Food

Food is an important part of English culture and is celebrated during various festi
Festival, the Whitstable Oyster Festival and the Taste of Cumbria Food Festival.

Wales



Traditional Welsh cuisine is hearty and filling – that's because it evolved to fill the bellies of hard-working Welsh farmers, fishermen, miners and steel workers. When in Wales, make sure you taste these tradit

- cawl – a thick, hearty soup mad
- Welsh rarebit – a savoury chees poured ov toasted bread
- n sausages – fully veg ese, leek and mustard
- leek and potato soup – the cou
- Welsh cakes – soft, buttery bak cinnamon
- bara brith – dense loaf full of dr

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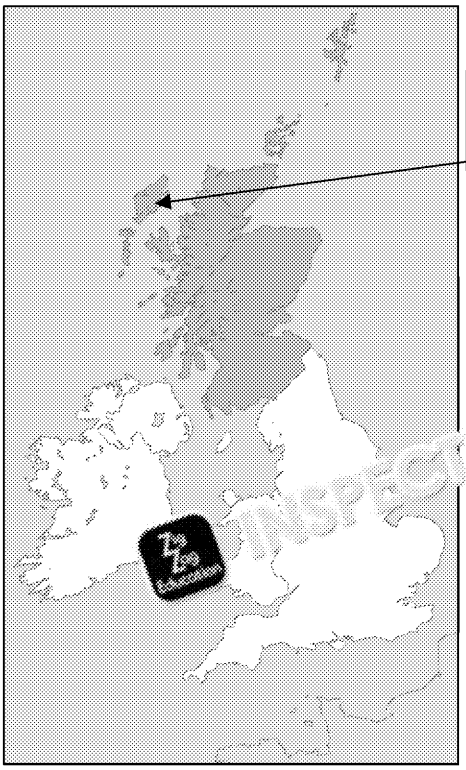
Wels
natio

Welsh food is known for its quality, and exports to other countries are growing. You can enjoy a variety of Welsh foods a for example, the Anglesey Oyster Festiv which takes place in October.

Apply

Find a recipe for a traditional Welsh dish and calculate its nutritional value. Then try to adapt it to suit today's society better.

Scotland



Did you know?

Stornoway black pudding can only be produced in the Western Isles of Scotland.

The first thing that comes to mind wh
Haggis. Ha s t e national dish of S
s p of minced with onion, oatm
ion are then encased in the animal
Other foods associated with Scotland

- porridge
- Scotch broth (made with barley, pulses and sometimes cabbage)
- kippers (pickled and cold-smok
- kedgeree (flaked fish with rice,
- black pudding (blood sausage)
- Dunlop cheese
- shortbread and oatcakes
- scones
- Dundee cake.

Scotland is also known internationally f

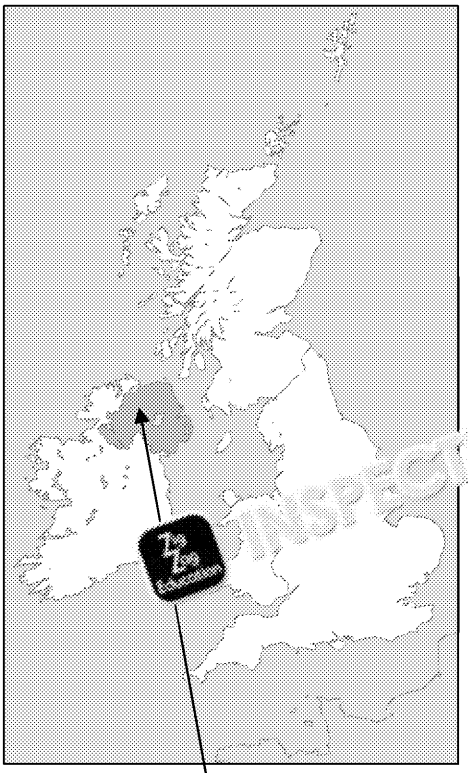
Did you know?

Scotland is the birthplace of the renowned chef Gordon Ramsay.

Research

Tom Kitchin is another popular Scottish chef. His cooking is greatly inspired b
zzed.uk/8227-the-kitchin-menu and find the Scottish inspirations in the m
create a menu for your region?

Northern Ireland

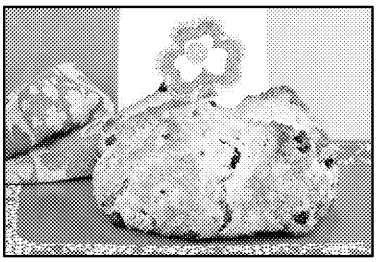


Ulster fry is an Irish take on a full 'English' ***breakfast***

Northern Irish cuisine is a mixture of Br
the most popular foods you will find:

- soda bread
- Ardglass potted herring (slightly
  breadcrumbs)
- boxty (potato cake made from a
  potatoes)
- champ (potato mash with milk a
- dulse (a snack made of seaweed)
- pasties (p s made of sausage
- U fr ull breakfast with sod
  st and Guinness pie
  Irish stew (made with mutton, p

Ireland is also home to Irish whiskey (
of a blend of grains, not just barley). T
culinary traditions during numerous f
Bushmills Salmon & Whiskey Festival
Festival.



Check your understanding: Britis

1. Which of the following foods is a typical example of traditional UK cu
   a. Bangers and mash ☐ c. Sushi
   b. Chow mein ☐ d. Kebabs

2. Which of the following foods has been adapted to replace meat with f to become a UK favourite at Christmas?
   a. Christmas pudding ☐ c. Yule log
   b. Christmas cake ☐ d. Mince pies

3. Which of the following foods is charac[illegible] of Scotland?
   a. Ardglass potted herring ☐ c. Glamorgan sausage
   b. Stornoway black pud[illegible] ☐ d. Lancashire hotpot

4. I[illegible] **dients** characteristic of Welsh cuisine.

   1 .....

   2 .....

   3 .....

5. Fish and chips is one of the most iconic British dishes. Below are ingre fish and chips.

Ingredients
650 g haddock fillet
225 g plain flour
300 ml lager
8 large potatoes
2 l beef dripping

Method

1. Peel the potatoes and cut into thick ch brown. Remove from the pan and spri
2. Sift the flour into a bowl and add lager is formed.
3. Dust the fish fillets with flour and dip i
4. Deep-fry until golden brown. Serve wi

Identify two ways in which the recipe could be changed to better suit society. Justify your choices.

i) Change 1 .....

Justification .....

.....

ii) Change 2 .....

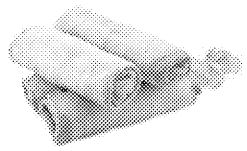
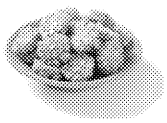
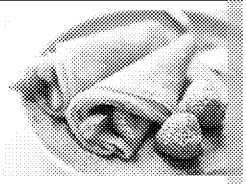
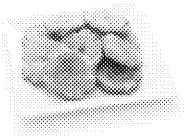
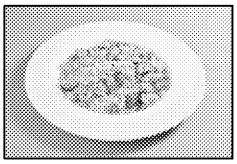
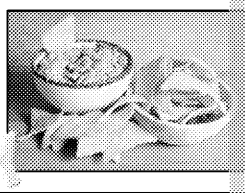
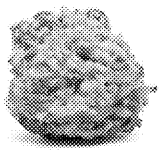
Justificati[illegible] .....

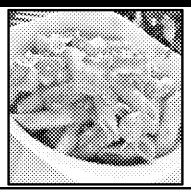
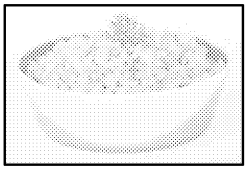
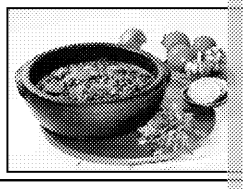
.....

Almost every country has its own, distinguishable cuisine. These cuisines develo conditions, available produce, soil quality, availability of land to grow and rear fo cuisine has developed also due to the dominant religion, e.g. in India the cuisine Hinduism, and in Morocco – by Islam. Modern cuisines are usually a medley of v bring their own foods and traditions with them, and influence the locals.

Foods from various cultures

In Britain, due to global trade expansion, we sample a range of international cuis from other countries to describe cooking methods, pa from France. The from France: mayonnaise, crêpes, soufflé, holl omelette, quiche, c croissant, fondue, gateaux to name b ome food terms refer to the coo product itself, such as *en crou* (a pastry crust) and *gratin* (lightly browned cr common foods consu Br ain with an international origin include typically spaghetti b se pizza. The cuisine of some countries may be linked to t example, **Sc vian** countries may typically have recipes that are predominat some countries is influenced by other **cultures** due to travelling, **importing**, **imm** by foreign people. For example, cuisine is varied within the African continent du variations between countries but also to the historic influence of French and Por South American cuisine is also influenced by Spanish, French and Portuguese cui to any cuisine from around the world, each with its own distinctive style, **presen** following *typical* examples:

Chinese	Japanese	French
		
Spring rolls, sweet and sour stir-fry, noodles, chow mein	Miso, tofu, rice, wasabi, sushi	Niçoise salad, dauphin potatoes, escargots, v au-vents, crêpes
Caribbean	**Spanish**	**Mexican**
		
Pepperpot, seafood, plantain, rice dishes, papaya and coconut	Patatas br ella, gazpacho chorizo	Enchiladas, tortillas, c con carne, tacos, guacamole, nachos
Afri	**Indian**	**Asian (e.g. Thai)**
		
Plantain, cassava, groundnut stew, couscous	Curries, biryani, tikka, dal, bhaji, dosa	Thai curry, stir-fry, ric dishes, coconut and vegetable soup

Italian	Eastern European	South American
		
Lasagne, spaghetti bolognese, pizza, antipasto	Goulash, stew, bulgur wheat, dumplings	Quinoa, feijoada (blac bean stew)

Research

Look up one traditio and one traditional di

Apply

List three fo that are traditi

List three foods are traditionally

You may notice that some cuisines are very similar to each other and use the sam example, the cuisine of Southern France, Italy, Greece and Morocco can be seen as similar as they all use a lot of fresh tomatoes, aubergines, courgettes, thyme, oregano, lemon, etc. That's because they are all located in the Mediterranean region and enjoy the same mild climate. For this reason, cuisines of these countries can be collectively named as Mediterranean. Another example is East Asia, which includes China, Japan and Korea – all of these cuisines are based on rice and use other similar ingredients.

Res

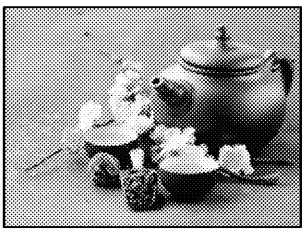
Look u charac and Ita similar

Things to think about (5.2)

Discuss why and how the cuisine of a country can change over time

Recipes: Traditional and modern variations

In most countries there are modern variations of traditional recipes which retain
or ingredients but which better suit a modern lifestyle. In Japan, the traditional
observed in some provinces but busy lifestyles or different outlooks mean that th
ceremonies is now in decline in the more modern cities, such as Tokyo. As tradit
decline, so do the associated recipes and food preparation techniques for that co



Most modern recipe variations are created to make t
more affordable, quicker to prepare and cook and us
ingredients that are more readily available.

Some modern variations h
such as mince pi
made wi

In some case
non-sustain
may be mad

Research

Look up a traditional British recipe that could still be prepared and cooked today with available ingredients.

Apply

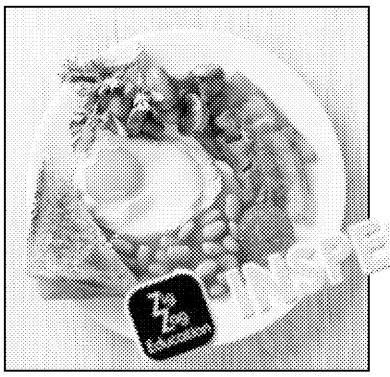
List one trad
has a modern v

Things to think about (5.3)

Discuss why a traditional recipe may need to be adapted to meet

Eating Patterns

Eating patterns can influence what type of food we eat. For example, typical tra
may include eating a roast dinner on Sundays consisting of beef or other meat w
and a full English breakfast which may consist of bacon, sausages, eggs, beans, m
bread. Other typical British traditions may include afternoon tea, dinner, supper



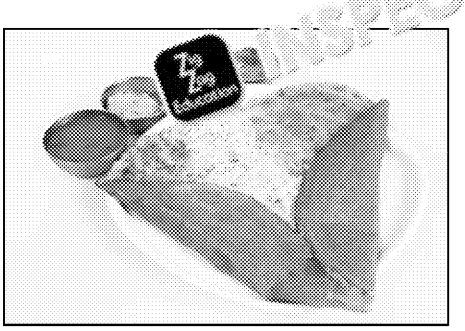
Although a full English breakfast is still consumed regularly in the UK, some people prefer
healthy brea
pe
ch

Modern ways of living and working have affected the way some people eat, for r
and ethical concerns. Typical UK eating patterns are influenced by different ethn
introducing new foods and ways of cooking, more information about healthy livi
and different ways of working. In Spain a traditional part of the working day is th
hottest part of the day between 2pm and 4pm, where workers may visit a restau
take a later siesta) or take a rest. With air conditioning and the need to keep up

businesses do not keep with the tradition but prefer to work throughout the day
proposals to end the working day at 6pm instead of 7pm may mean that there is
tradition may die out eventually. A typical and traditional way of eating in Spain
dishes or snacks from which people can share.

Eating patterns are often influenced by religion and culture. In traditional Japan
observed and the preparation and cooking were incorporated into a special ritua
living and working mean that there may not be enough time to devote to traditi
However, some customs do still exist and small lacquered boxes containing porti
boxes (called **bento** boxes) which can be bought as takeaways or prepared for lu

A traditional Indian breakfast differs greatly from a typical UK breakfast and may
and dosas (thin pancakes made with lentils with a variety of fillings). An American bre
pancakes with syrup and sometimes fruit. Modern lifestyles, due to time constraints an
breakfast may consist of toast and cereal.



Example of a traditional Indian breakfast

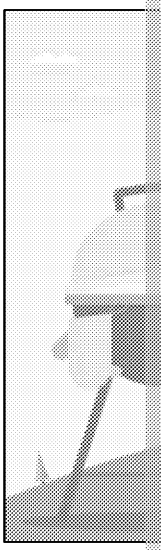
Example of Spanish tapas

Apply

List one reason why eating a full English breakfast isn't possible for some people.

Research

Look up the difference between *brunch* and *lunch*.



Barbec
popular i

Things to think about (5.4)

Discuss why eating patterns may differ from country to country.

Presentation styles

Presentation styles can affect how we view food and can help to make it more appealing or appear more appetising. In some cases, the presentation of food may be unappetising and discourage consumption. Food in restaurants is presented to embellish and show off the food and make it look more creative and colourful, sometimes with **garnishes** of flower petals. Some garnishes may be for decorative purposes only while traditional garnishes such as salad vegetables can be consumed (the rule is, you shouldn't put anything inedible on the plate).

In Japan, presentation is important when providing food. **Sushi** is a type of food preparation consisting of vinegared rice with seafood or meat and/or vegetables and sometimes fruit. Sushi is usually presented in the form of small balls or rolls. The way that sushi is prepared and presented is considered an important aspect of this food. Sushi is often served with condiments such as soy sauce, wasabi or pickled ginger. Although most Japanese food is eaten with chopsticks it is acceptable to eat sushi with (washed) hands and some Japanese restaurants provide wash cloths to ensure hands are clean before and after eating.

A traditional way of eating in Scandinavian countries is the **Smorgasbord** (buttered table) which consists of a variety of cold foods, such as open sandwiches, served as a buffet which can eaten as and when required.

Equipment and cooking methods

Equipment and cooking methods vary depending on the dishes being created and the traditional cooking methods of the country of origin; some recipes call for specific cooking equipment.

Preparation

Equipment, tools and utensils that may be used for food preparation include: colanders, slicers, mixers, blenders, graters, strainers, mixing bowls, mincers, garlic or lemon presses, juicers, mashers and peelers, measuring cups, scales for measuring, cutting boards, measuring cups, can openers, knives, ladles and spoons, whisks, scissors, cheese slicers, mortars and pestles for grinding herbs and spices, and tenderisers for tenderising meat.

Tagines are used in traditional North African (e.g. Moroccan) cooking

Research

Look up the type of cooking equipment needed for creating Japanese sushi.

Cooking

Equipment and tools which are used for cooking include:

- barbecue for outdoor cooking
- tagine – an earthenware dish with a conical lid used for slow-cooking North African spicy stews (also called tagines)
- baking oven and grill
- earthenware pizza oven
- skillet – frying, sautéing and browning
- griddle – a heavy, flat iron baking plate
- frying pan
- air fryer – fries food without the need for oil or fat
- wok – a large pan used for stir fries, steaming, poaching
- sauté pans –lightly fry
- soup pots and sauce pans
- casserole dish – for stews
- ramekin dish – a small dish for a helping of food
- baking trays – for tray bakes, potatoes
- stockpots – for boiling

Check your understanding: Internati

1. Which of the following statements is TRUE about tapas?
   a. They are associated with Middle Eastern cuisine. ☐
   b. They are associated with Spanish cuisine. ☐
   c. They are associated with French cuisine. ☐
   d. They are associated with Scandinavian cuisine. ☐

2. Which of the following dishes is commonly used in Northern Africa?
   a. wok ☐ c. paellera
   b. cazeula ☐ tagine

3. Which of the following stater [illegible] TRUE about a smorgasbord?
   a. It is associated w[illegible] ☐ c. It is associated with
   b. It is asso[illegible] Africa ☐ d. It is associated with

4. [illegible] staple food around the world and is used to produce many o[illegible] different cheeses and state which cuisine they come from.

Cheese	Coun

5. Describe three different factors which influence the development of a

   i) Factor 1 .....

   How it affects cuisine .....

   .....

   .....

   Ii) Factor 2 .....

   How it affects cuisine .....

   .....

   .....

   [illegible]act[illegible] .....

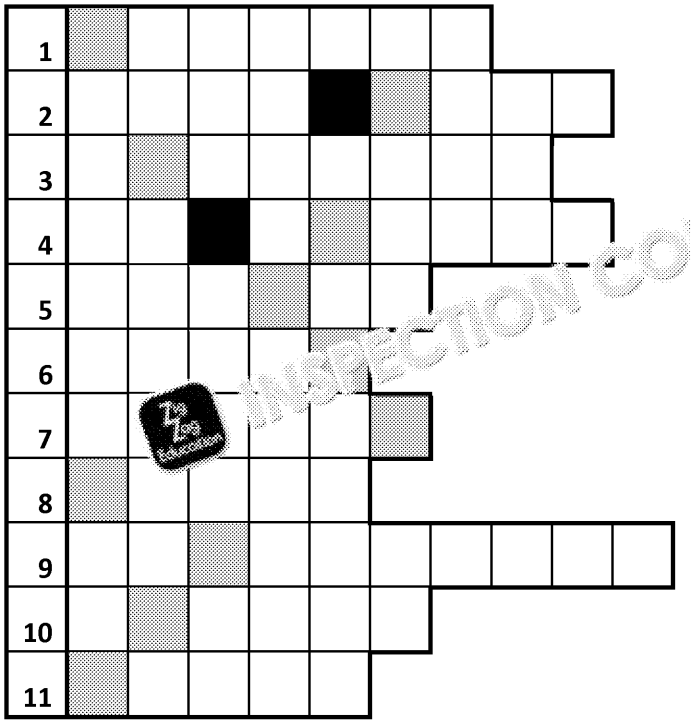
   How it affects cuisine .....

   .....

   .....

Quiz-ine

Fill in the answers to the questions below to reveal a word relevant to cuisine in t
squares are spaces between words).



1. Blue mould cheese made in England. (7)
2. Traditional dessert made of whipped cream, crushed meringue and strawbe
3. Where clotted cream and pasties originally come from. (8)
4. This French term means 'in a pastry crust'. (2, 6)
5. Large sausage made up of sheep's offal. (6)
6. Chow mein is a dish that originated in which country? (5)
7. This is made from chickpeas, olive oil and garlic and is associated with Midd
8. Potato pancakes characteristic for Northern Ireland. (5)
9. These utensils are traditionally used in Asia to eat meals in place of a knife a
10. Salad niçoise originates from which country? (6)
11. Stuffed pancakes served as part of an Indian [illegible] (5)

The shaded squares reveal th[illegible] ord

_ _ _ _ _ _ _ _ _ _ _

Chapter 6: Factors influencing f

Overview

In this chapter we will look at the factors that influence food choice such as physical activity, occasion, costs, preference, availability, lifestyle, seasons and times available to prepare and cook food. This chapter also explores how food choice may be connected to religious, ethical and moral beliefs or to food intolerances. In this chapter we will look at the importance of food labelling and how to interpret nutritional information. We will also explore various meth... marketing and how the... food choices.

Learning outcomes

After studying this chapter you should be able to d...

- ❑ understand and describe the factors that may...
- ❑ understand and describe how religious, ethica... affect food choice
- ❑ understand and describe how food intolerance...
- ❑ identify allergenic ingredients
- ❑ list mandatory infor...ation which should be in... non-mand...or...ation
- ❑ in...rp...t ...tional labelling
- ❑ ...derstand how food marketing can influence...
- ❑ list mandatory information which must be incl... non-mandatory information
- ❑ interpret nutritional labelling
- ❑ understand how food marketing can influence...

Key Terms

Allergen	Usually non-harmful substance which can trigger a reaction in ... immune system, causing an allergic reaction
Animal welfare	Protecting an animal's mental and physical needs
Balanced diet	A diet that meets the energy and nutrient needs of an individu...
Best before	Date mark which applies to food quality
BMI	Body mass index indicates a healthy or unhealthy weight range... weight (kg) by their height (in squared metres)
BMR	Basal metabolic rate refers to the rate at which calories are bu... off during rest.
Calories	Units for measuring the energy producing value in food, when ...
Consumer	Someone who uses or purchases a product or service
Ethical beliefs	Behavioural rules relating to right or wrong in a moral sense
Export	Transporting and selling goods to another country
Fairtrade	Trading between developed and developing countries providin...
Fasting	A period of time without eating or eating only small amounts o... health reasons
Food allergies	An allergic reaction to food involving the immune system
Food intolerance	An adverse reaction to certain foods involving the digestive sy...
Health claim	Statement which directly links consumption of a given food pr...
Lifestyle	The way in which an individual lives, eats ...nd works
Moral beliefs	Beliefs that determine what is ri... ...d what is wrong
Non-mandatory information	Information which ma... ...ppe... ...on ...ood labelling but is not req... suggestions)
Nutrition claim	Stat... ...which ...ndicates the content in a food product of a g... ...to ...ealth
Obesity	...being over the weight recommended for a person's height
Organic	Food which has not been treated with any artificial chemical s...
PAL	Physical activity level to estimate energy expenditure
Pester power	The ability of children to influence their parents into buying th...
Seasonality	The time of year in which food is grown/harvested or available
Sedentary	Being inactive or sitting for long periods of time
Use by	Date mark which applies to food safety
Vegan	Eating only plant food with no animal products in the diet
Vegetarian	Does not eat foods consisting of, produced with or created fro... animal. Does not eat meat, poultry, fish, shellfish, insects, by-p... made with processing aids created from these.

Factors which influence food ch

There are many factors which may influence an individual's food choice. These may be health related, connected to a belief system, be based on **animal welfare** issues or on income and/or lifestyle.

The lifestyle of a consumer will be reflected in their food choices and diet. For example, if a person leads an active life with plenty of strenuous activities they will require foods that sustain energy and endurance.

D
A
wh

Personal, social and economic factors affec

What we eat rarely depends on what we WANT to eat. More often, it is a result o includes lifestyle factors, state of h[illegible] availability and affordability of food, soc and many others. Some of these are presented in the table below.

Factor	Food Choice
PAL (physical activity level)	The **physical activity level** (PAL) of an individual is used to estim 24-hour period and is expressed as a number. PAL influences fo much energy has been expended and how much energy needs t weight gain). **Sedentary lifestyles expend less energy and so require less cal**
Health	Health can be a governing factor in food choice, either through certain foods because of specific health issues, to maintain weig healthy and balanced lifestyle. **A healthy diet is one with a variety of foods in the right propo**
Occasions/ celebrations	Food choices are affected by occasions such as birthdays, religio consumed during these occasions may differ from day-to-day ea sweet/sugary foods, snacks, alcohol or fizzy drinks). **Some religious festivals, such as Ramadan, require a period of food for a period of time for religious, medical or health reaso**
Income/cost	A person's income can influence their food choice and determin income consumer may eat fewer expensive fresh foods and eat compared to a high income consumer. Food costs can be a pro **Processed meat can cause cancer according to the World Heal**
Preferences/ enjoyment	Preferences affect food choice – some consumers prefer spicy f tooth and prefer sugary foods, some consumers may have a pre Some food preferences may be linked to health. Enjoyment of f choice for some people. People who love to talk about food, wa variety of food products are referred to as *foodies*. People who they eat and who like to eat good food are called *gourmets*. **Some people hate sprouts while others love them!**
Availability/ seasonality	Food availability can be influenced by transport, weather, politica imposed on a country's ability to **export**), drought, fire or floods. of consumers. **Seasonality** may also be a governing factor if food of the year, although this is less of an issue in the UK where we in **In 2015 in the UK there was a national shortage of Bourbon cr Bourneville factory in North East England.**
Lifestyle / time of day / available time	Lifestyle can be a big factor in food choice. Some people with v to eat meals at set meal times or have time to prepare or cook f **A 2015 study by the University of Cardiff showed a link betwe and educational performance in the classroom.**

Factor	Food Choice
Culture	The place we grow up in also can determine our food choices. T we are exposed to foods and tastes specific to our particular co Later in life this can cause issues when trying foods from other c not used to them and might reject them as too strange or unus **People from Western Europe are unlikely to indulge in maggot Asian countries.**

Physical activity level (PAL)

The PAL is calculated to work out energy consumption over a 24-hour period and food energy requirements of active or inactive people. A vidual's **BMR** (bas calories that are burned off during rest.

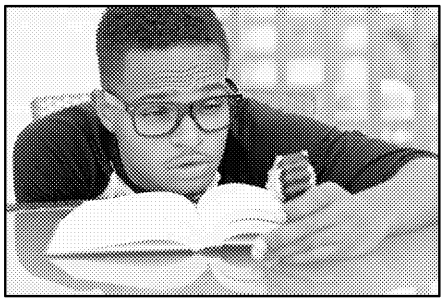
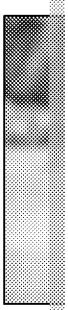
Working out physical acti y l

To know a person's PAL to know how active that person is. This is usua survey, dur ici individual answers a range of questions about their lifes Although it ot be easy, you can usually assess a person's PAL using the ta

Activity	PAL
Sedentary / light activity	1.3–1.5
Moderate activity	1.5–1.7
Vigorous activity	1.8–2.2

Di

Sede for l gene

SEDENTARY	MODERATELY ACTIVE	
		
Jules avoids sports or active exercise at school and when he comes home he sits in his bedroom and texts his friends, uses his computer f cia media and plays co g mes. Jules d n ve much and prefers to long periods rather than being physically active. This means Jules has a **SEDENTARY** lifestyle with a PAL of 1.3.	Ben walks two mil to college and the es back home ve day. At the weekend he chills with his mates and is moderately active, although some time is spent sitting watching TV or using his phone to send pictures or snapchatting his mates. Ben is **MODERATELY** active with a PAL of 1.6.	Tall ar s u ru Tall alt h me go.

Basal metabolic rate (calories used while at rest)
The Harris–Benedict equation is used to work out BMR. **You don't need to mem**

Harris–Benedict equation female: 655 + (4.35 × weight in pounds) + (4.7 × heigh
Harris–Benedict equation male: 66 + (6.23 × weight in pounds) + (12.7 × height i

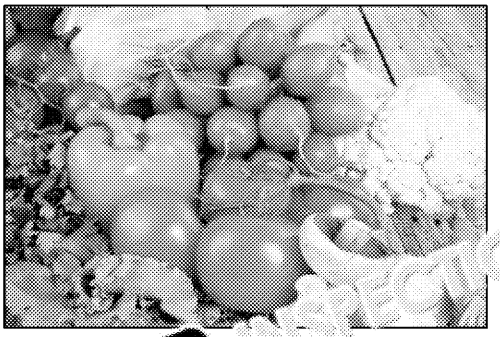
BMR male = (10 × weight in kg) + (6.25 × height in cm) – (5 × age in years) + 5
BMR female = (10 × weight in kg) + (6.25 × height in cm) – (5 × age in years) – 16

By multiplying a person's BMR by PAL, you can obtain their TEE, or Total Energy Expenditure. It is the amount of energy a person needs every day to lead their lifestyle and maintain their weight.

Scenario – Sian
Sian is a 50-year-old wo[illegible] height of 5' 4" (1.6 m) and a weight of 8 ston
Sian works [illegible] ffi[illegible] her job is mostly sedentary but she is reasonably activ
walks briskl[illegible] hour every evening. Sian's PAL is around 1.6.

Working out Sian's TEE (using her BMR and PAL)
The PAL for a light to moderately active person is around 1.3 to 1.7 (we can work out Sian's BMR using the Harris–Benedict equation above by calculating (10 × 54) + (6.25 × 160) – (5 × 50) – 161) = 1,129). If we use the equation to work out Sian's TEE (BMR × PAL) this results in 1,806 kcal as her TEE. **This equation uses Sian's weight in *kilograms.***

Working out Sian's daily food energy requirements
A healthy diet should provide around 50% of energy from carbohydrates, up to 35% of energy from fat and 15% of energy from protein. This means that Sian should consume around 903 kcal from carbohydrates (that is equivalent to 240 g), 630 kcal from fat (around 70 g) and 270 kcal from protein (67 g).



Healthy eating
People may choose foods that benefi
healthy **balanced diet** or because the
that prevents them eating certain foo
eating more o[illegible]rtain food. For exa
cut ou[illegible] sa[illegible] d[illegible] to high blood pressure
[illegible] sugar levels or diabetes, wheat
spicy foods due to a poor digestion. T
healthy eating programmes
are promoted and delivered
within scho[illegible]ere is a wealth of information available about healthy eating – magazines, newspapers, social media, books, TV programmes – and these can influence food choices. Some types of media will present articles about a hyped-up superfood which promises fantastic health or slimming results and, although the claims may contain some truth, it is better to maintain a balanced approach to diet and food.

Childhood obesity

Childhood **obesity** is a big problem in the UK and the government, as part of their childhood obesity strategy (prompted by Jamie Oliver's campaign), has imposed a tax' on soft drinks in order to curb unhealthy sugar intake in children. The Soft D Industry Levy is referred to as the 'sugar tax' in the media. This levy, or tax, mea soft drinks companies will pay a charge for drinks with added sugar or total suga of 5 grams or more per 100 millilitres. The revenue in England from these charge spent on programmes that encourage children to eat a balanced diet and be mo physically active.

Apply

Sugar tax was introduced to lower sugar intake among the young. Think about how to lower the amount of sugar or sub sugar in a recipe for a dess choice.

Research

Find out about Jamie O troduce a sugar tax in to combat childhood o **zzed.uk/8227-jamie-**

Food and education

In January 2015, the Department o standards to ensure that all schools requirements of a healthy, balance supply drinks with added sugar, cris meals or in vending machines.

Research

Look up the healthy schools food **school-food**

Healthy weight

A healthy weight can be achieved by following a balanced diet (alongside physica people's food choices reflect their desire to keep within a healthy weight range.

An individual's **BMI** (body mass index) indicates whether the weight range for th dividing the weight (in kg) by the height (in metres) and then dividing by the heig weight helps to prevent health conditions typically associated with being overwe disease, stroke and type 2 diabetes. The table below shows what a BMI score in

BMI Score	Result
Below 18.5	Underweight
Between 18.5 and 24.9	Normal
Between 25 and 29.9	Overweight
30 and above	Obese

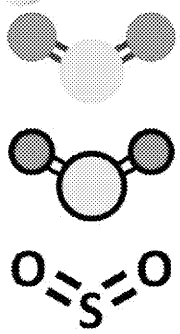
Remember BMI below 18.5 indicates being underweight, which can b overweight

Health conditions

Some health conditions may affect food choice. Some people add certain foods t
health condition or avoid certain foods altogether which may trigger a reaction o

Condition	Foods that may be avoi
Diabetes	Sugar and sugary foods
High blood pressure	Salt, saturated fats, trans fats
Heart conditions	Fat, stimulants such as coffee and alcohol
Asthma and allergies	Dairy products, wheat, preservatives*, artificial colou ***allergic to dairy or wheat but not to nuts, and vice v***
Digestive issues	Dairy, tea/coffee, spicy foods, pickled foods, alcohol
Eczema	Dairy products, alcohol, to

*Some people are allergic to the preserva 22 (sulphur e) and avoid foods containing this preservative.



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Health and age

Food choices may be related to age. Infants and toddlers have smaller stomachs and so need to eat smaller portions of food. A child's sense of taste and preference can affect food choice and make them fussy eaters with an aversion to certain foods. In the later developmental stages of a child's life they may require foods that help to maintain healthy growth and more calories to meet an active lifestyle and faster metabolism. In contrast an older individual may choose to eat smaller meals and, in the case of women over 40, eat more foods containing calcium to help maintain healthy bones. Some people may avoid crunchy, tough or hard to eat f
dentures.

Some child
aversion to
such as bro
cabbage. T
follow thro

Celebrations and occasions

There are many types of celebrations and occasions which may affect food choices such as:

- Birthdays (may eat more sugary foods, cake, jellies, etc. and consume more calories)
- Religious festivals – may eat more sweets, spices, meat and sugary foods such as puddings or alternatively may fast (limit) food for a certain occasion.
- Anniversaries (may eat richer foods and consume unfamiliar food)
- Events and fairs (may eat food from burger vans or food stalls, that is usu… may consume sugary drinks)
- Hallowe'en (may eat more sweets and sugary foo…)
- Weddings (may eat rich food, particularly rich fr… cake)
- Holidays (may eat unfamiliar foo… such as snails in France, spicy sausages in Aus… Germany)
- Din… (may eat a combination of foo… which are unfamiliar to the digestion)

Apply

Chocolate fudge cake … cakes served at big occas… try to modify it to lower … in it.

Income and cost of food

Food cost can be a factor in determining which foods a person buys or eats. An individual's income can affect their food choices as some foods are expensive and outside their budget. Healthy foods such as fresh vegetables and fruit may be too expensive for some individuals and families and they may adapt their diets to include cheaper foods such as tinned and processed foods.

Some ingredients are more expensive than others, such as organic fruit and vegetables. Some foods shown below can be priced far too high for the wages o…

- asparagus
- lemongrass
- almonds
- lobster
- virgin olive oil
- saffron
- avocados
- truffles
- coconut oil

Did you k…

Some people p… products to en… get a fair price …

A balanced diet can be maintained on a low income by incorporating cheaper he… recipes which list expensive ingredients can be adapted to suit a lower income b…

Preferences and enjoyment

Preferences and enjoyment of food, whether for taste, texture, colour or appear… Some children develop an aversion to certain foods as th… ow up and this cont… Some people have a 'sweet tooth' which means t… prefer sweet-tasting fo… savoury foods. Some people choose not … meat, fish, eggs or dairy products … diet. In this instance, food prefer… may be prompted by ethical or moral rea… welfare. It is possible t… planned and balanced diet regardless of preferen… with a healt… eri…

Availability and seasonality

Some foods are readily available throughout the year while others are governed by availability or seasonality. For example, pumpkins abound in the shops in the autumn ready for Hallowe'en celebrations; cranberries and turkey become more available nearer to Christmas as do certain foods such as stollen (fruit bread from Germany traditionally eaten at Christmas). Although most fruit and vegetables are readily available all year round in the UK, some people prefer to eat foods that are 'in season'. Foods that are in season have more nutrients (as they are freshe buy. Locally sourced food that is in season can help the environment by cutting other countries.

Foods 'in season' may include spri g , asparagus, blackcurrants, l ms, erries, damsons, blackberries, rasp , awberries, marrows, sweet d me types of fish and meat.

Lifestyle (including time of day and available time)

A person's lifestyle can affect their food choices. For example, a busy person may not have time to prepare or cook food or even sit down to eat a meal. Some people may prefer to eat small snacks while on the go throughout the day while some people may prefer to eat a meal at a table. Lifestyle can affect how healthy or balanced a person's diet is if they do not have enough time to shop or cook. Some people may find that they eat differently at the weekends as they have more time to prepare and cook food. The time of day can also affect food choices; some people like to eat a large protein-rich breakfast while some people prefer a Some people forego breakfast entirely, although research indicates that this can levels throughout the day. The way that an individual has been brought up and t associated with their childhood can also govern the time of day that meals are co that they need to eat when they are experiencing stress and may reach for tasty eating a healthy meal (a fatty, salty savoury or sugary snack eaten in times of str food'). A person's activity level will also determine how much or little they shoul person has a higher energy requirement than a sedentary person and so can con gaining weight.

Some research has shown that the healthiest way to eat throughout the day is to have a substantial breakfast, a lighter lunch and then a very light dinner. This is not possible for some people with busy lifestyles who may not have time to prepare or cook a large breakfast.

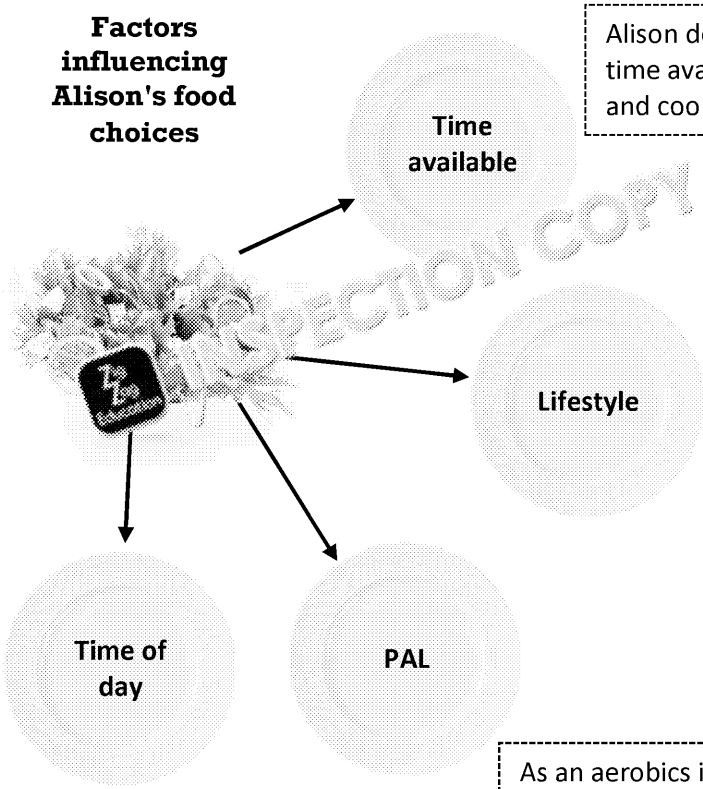
Did

There i breakfa prince a

Case studies

Scenario 1 – Alison's choices on a plate

Alison is a busy person with a physically demanding job as an aerobics instructor changeable during the week. Her hobbies include mountain climbing and long-d choices are influenced by her lifestyle, physical activity level (PAL) and healthy ea



Alison doesn't have much time available to prepare and cook food.

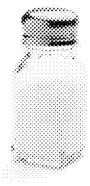
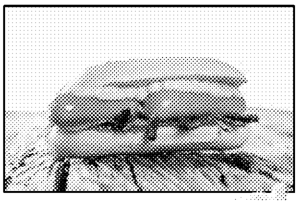
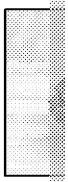
Alison is a vega and requires a diet that comprises protein from n animal source that meets he energy and protein needs.

As an aerobics instructor Alison uses a lot of energy and requires foods high in carbohydrates to replenish energy, and proteins t repair damaged muscles from exercise.

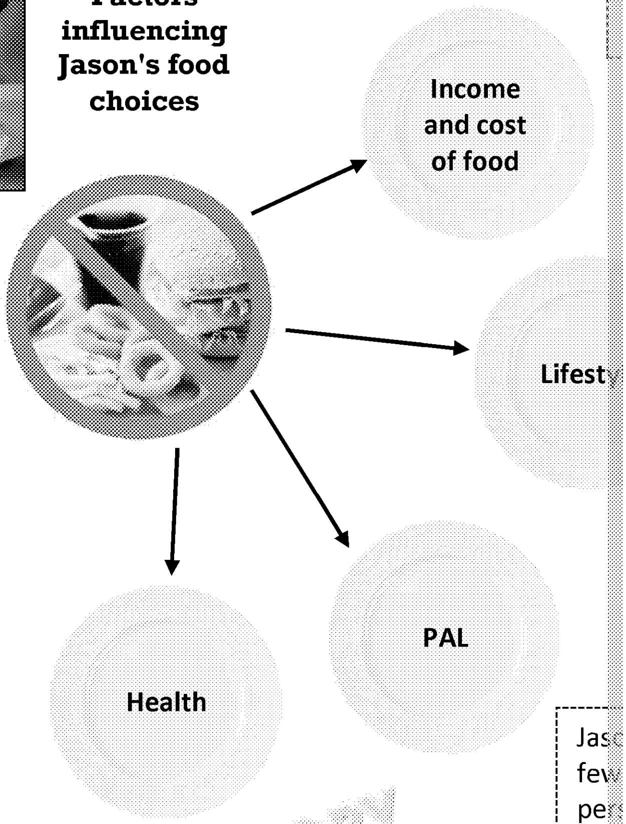
Due to her working hours, Alison cannot follow normal meal times.

Scenario 2 – Jason's choices on a plate

Jason leads a sedentary life without much physical activity. He is on a low incom
influenced by enjoyment and preference, his income and food cost.

Salt	Fatty foods	Sug
 Salt can be a cause of or exacerbate high blood pressure.	 Fatty foods are implicated in digestive disorders, obesity and heart problems.	 Sugary fo obesit

Factors influencing Jason's food choices



Jas
fev
per
fev
act
hea

Jason is overweight due to the high fat content in his diet and has been diagnosed with high blood pressure (due to salt) and diabetes (due to sugar in his diet and inactivity).

Rev

Food c
factor
health

Research

Look up the World Health Organization's report on red and processed me
zzed.uk/8227-red-meat

Skills example

Ali has been asked to prepare a recipe for a family of four, one of whom is a vega
animal products in their diet. The other three family members are meat-eaters b
has a sulphite allergy (preservative E220 sulphur dioxide). The low- to mid-incom
likes to eat fresh vegetables daily.

After consideration of the dietary needs and restrictions Ali has decided to use th
Recipe from The Vegan Society (zzed.uk/8227-aubergine-penne)

Aubergine and chickpea penne

- Large pinch of saffron threads
- 450 ml / 16 fl oz vegan stock
- 2 tbsp olive oil
- 1 large onion, roughly chopped
- 1 tsp cumin seeds, crushed
- 350 g / 12 oz aubergine, diced
- 1 large red pepper, deseeded and chopped
- 400 g / 14 oz canned chopped tomatoes with garlic
- 1 tsp ground cinnamon
- 30 g / 1 oz fresh coriander, roughly chopped
- 400 g / 14 oz canned chickpeas, drained and rinsed
- 280 g / 10 oz vegan dried penne
- Salt and pepper
- Harissa or chilli sauce, to serve

Reasons for Ali's choice:

I have chosen this recipe for a family of four, one of which is a vegan, one who has a sulphite allergy. For this reason, the recipe contains no animal products used vegan penne pasta as some pasta contains egg. I have used vegan stock s no meat products (e.g. chicken stock). I have used fresh raw ingredients where with the preservative sulphur dioxide and have had to be particularly careful a these are sometimes preserved using E220, sulphur dioxide, and for the same with a home-made chilli paste using chilli flakes, cumin, coriander, caraway se contains a balanced amount of protein and calories, the three meat-eaters ha their meal if desired.

The low- to mid-income family is health conscious ... likes to eat fresh vegeta lifestyle into consideration and their preferences for fair trade and organic pro budget into consideration ... meal costs approximately 80p–£1 per perso

All of the factors below have been taken into consideration when choosing this

How the recipe could be modified in terms of co[illegible]ailability:

- Saffron may be difficult and/or [illegible] obtain and so turmeric can be su
- Aubergines can be re[illegible]d b[illegible] quash, although this may be influenced
- Fresh herbs co[illegible] re[illegible]placed by dried herbs.
- Oli[illegible]an [illegible] replaced by sunflower oil.

Did you know?

Certain foods, e.g. pumpkins or cranberries, are more sc
after and more readily available at specific times of the ye
such as Hallowe'en and Christmas respectively. In these
tradition and consumer demand is an influence on food c

Things to think about (6.1)

Discuss how low-income families could maintain a healthy diet, takin
alternatives and availability.

Check your understanding: Personal economic factors affecting food

1. Which of the following statements is correct about PAL?
   a. It refers to the physical activity level of an individual.
   b. It refers to the psychological activity of the brain.
   c. It refers to performance analysis.
   d. It refers to the paleo diet.

2. Which of the following statements is TRUE about a sedentary lifestyle?
   a. expends less energy, so fewer calories are required
   b. expends more energy, so more calories are required

3. Which of the following statements is TRUE about income and costs?
   a. Food prices are not normally a prohibitive factor in food choice in
   b. A low income consumer may eat more fresh foods and less proce
   c. A low income consumer may eat fewer fresh foods and more pro
   d. An individual's income has no influence over food choice.

4. Which of the following statements is FALSE about how lifestyle may a
   a. Eating irregularly can interfere with concentration levels.
   b. Eating a healthy breakfast improves performance in the day.
   c. Busy lives can interfere with set meal times.
   d. Busy lives have no effect on meal times.

5. Identify one health issue caused by excess consumption of each of the

   1. Saturated fat.....

   2. Kitchen salt .....

   3. Sugar .....

6. Explain how an occasion/celebration may affect one's food choices.

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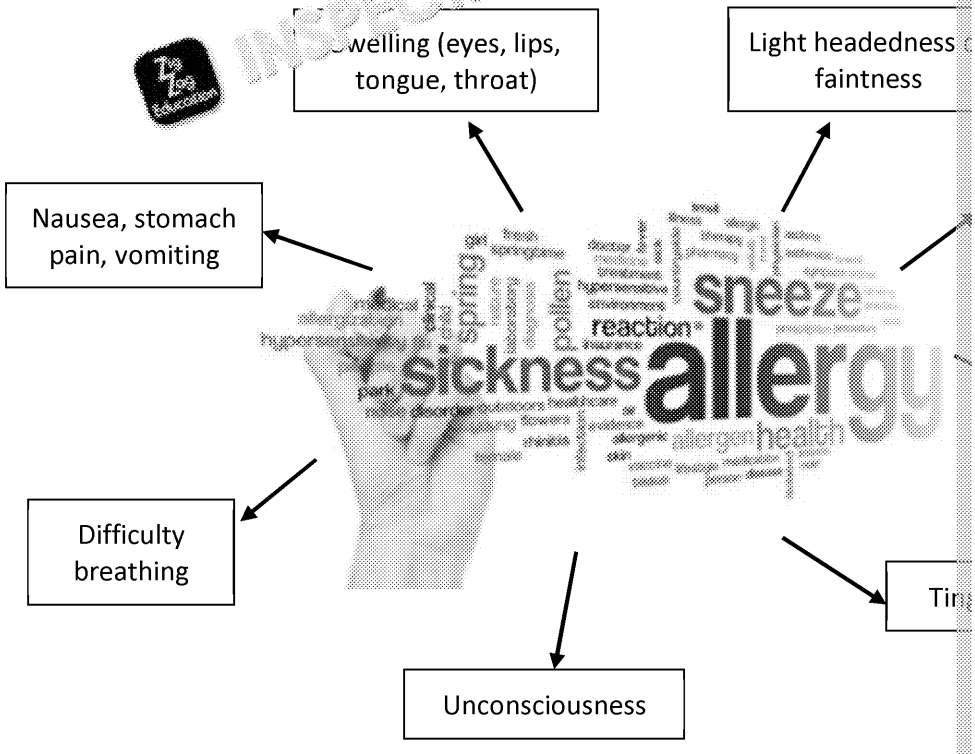
Medical reasons (food intolerances ar

Earlier we briefly discussed various health reasons which affect people's food ch
allergies also fall in that category. Food intolerance is an adverse reaction to cert
system. A food allergy is an allergic reaction to food, involving the immune syste

Allergies

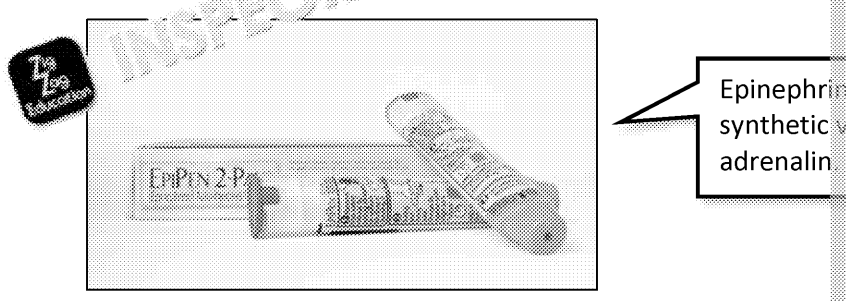
An allergy occurs when the body produces antibodies to fight a perceived invade
that is considered safe and innocuous to most people, such as celery, but which
an individual with a compromised immune system. An allergic reaction can be m
death. Allergic responses may only take a few minutes to ma ifest or take sever

Signs of an allergic reaction include the fo g:



Anaphylactic shock

Anaphylactic shock is a severe response to a food allergen or non-food related fa
symptoms are swelling of the lips and throat, itchy skin / h and difficulty brea
unconsciousness or asthma attack. People who a of anaphylactic shock
provided with adrenaline in the form of a hi they inject.



Allergens

It is a legal requirement for food handlers/caterers or manufacturers to inform c
which may be allergenic. The **14 allergens** which must be displayed in ingredien

1. Soya beans
2. Milk/dairy
3. Cereals containing gluten, such as wheat, rye, barley, oats*
4. Crustaceans (e.g. prawns, crab, lobster)
5. Molluscs (e.g. oysters, snails, octopus)
6. Eggs
7. Fish
8. Mustard
9. Celery
10. Sesame
11. Lupin
12. Peanuts
13. Tree nuts (e.g. al ews)
14. Sulph

*Oats are na ly gluten-free, but are processed in the same factories as other cereals and very often become contaminated with gluten!

Did you k

Peanuts are not re
legumes – edible s
the soil. For that r
be called groundnu

Storing and handling allergenic ingredients

It is important that allergenic ingredients do not come into contact with non-alle
non-allergenic ingredients MUST be stored and handled separately to allergenic
help to identify allergenic ingredients in the storage area. Storage containers mu
ingredients can be CLEARLY IDENTIFIED.

All food handlers should be aware of their responsibilities when handling, prepar
ingredients and the danger that is posed to consumers with allergies when allerg
be serious and even small amounts of some allergens (such as peanuts) can be F

Preventing cross-contamination

To prevent cross-contamination between allergenic and non-allergenic ingredien

- Clean utensils thoroughly after using allergenic ingredients and before p
with allergies.
- Food handlers should also ensure that spillages are wiped up promptly a
thoroughly after touching allergenic food and then handling non-allergen
- Store allergenic and non-allergenic foods separately.
- Clearly label allergenic ingredients.
- Clean work surfaces or use separate work surface d dedicated equipm
- Changing into protective clothing can hel or nt cross-contaminatio
allergenic foods.

A Examine the labels of five different products, and give tw
ways in which allergenic information is given on them.

Food intolerances

Food intolerance is different to an allergy and does not result in life-threatening s
shock. Food intolerances can necessitate a change in food choices and adaptatio
Typical symptoms of food intolerance can include bloating, stomach ache, diarrh
Foods that can be the cause of food intolerances include:

Gluten (from wheat, rye, barley and oats*)

Wheat (bread, baked goods, cereals and many other foods)

Ye
sto
pr

La
da

*Oats are na ly ee, but are processed in the same factories as other
contaminat gluten!

Intolerance to milk can be caused by a missing enzyme (lactase) required to brea
the body which results in bloating, stomach ache and/or diarrhoea. An allergic r
result in an allergic reaction with similar symptoms to lactose intolerance, makin
between allergy and intolerance.

Revision tip

Due to food intolerances and food allergies, it is important that ingredients are clearly listed on food items or menus.

If you modify a recipe for different religions, cultures or dietary groups, justify your reasons for the food choices you make.

In addition to dairy products, such as cheese and yogurt, many other foods contain milk as an ingredient. For example, cake, biscuits, crackers, chocolate, etc.

Exclusion or elimination diets

In order to find the cause of an allergy or food intolerance a person must underg
excluding suspect foods from their diet and keeping a check on their symptoms.
re-introduce an excluded food known to cause intolerance into their diet withou
their body has built up a tolerance to it.

List one food that may be avoided due to food **intolerance** and one food or ingredient that may be avoided due to food **allergy**.

Things to think about (6.2)

Discuss how an individual with a food allergy could be at risk whe

Check your understanding: Medical intolerances and allergie

1. Which of the following foods is an allergen which must be displayed i
   a. Lettuce ☐ c. Cucumber
   b. Celery ☐ d. Radish

2. Which of the following foods is most likely to contain gluten?
   a. Tomato sauce ☐ c. Cheese sauce
   b. Cottage cheese ☐ Rice pudding

3. Anaphylactic shock is a life-th[illegible] reaction characteristic of:
   a. Allergies ☐ b. Food intolerances

4. [illegible] edient of custard (recipe given below) which is a sou[illegible] nce and one ingredient which is a source of food allergy.
   – 4 large egg yolks
   – 2 tbsp caster sugar
   – ½ tsp salt
   – 500 ml whole milk
   – 1 vanilla pod

Food-intolerance-related agent	
Food-allergy-related agent	

5. During production of cheese, milk undergoes many changes. Explain w
   safe for a lactose-intolerant person, but not for a person allergic to m

.....

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.....

The information included on a food label and the way a product is displayed in a s
people's food choices. Food labelling is subject to EU law, and all countries belon
to apply these rules. This is to ensure that all European citizens have the possibil
when buying food. Various marketing techniques are used to make products app

Food labelling

Food labelling can affect an individual's food choice, whether through providing i
value, fat, sugar and/or salt content or by listing potential allergens or ingredient
some people. Some information is mandatory, such as ingredients, and
some information, such as serving suggestions are no mandatory.

When buying food, people should check / inspect the label to ensure the
safety and quality of the food. For example:

- people suffering from diabetes should pay attention to sugar
content of the food, especially free sugar / added sugar
- people who wish to lose weight should pay attention to the amount of fa
choose foods rich in dietary fibre
- sportsmen should pay attention to the protein content of a food

One of the most important elements of a food label is the date mark. There are t
food packaging:

- **use by** date, which refers to food safety and is used on fresh and perisha
have a very short shelf life and need to be stored in certain conditions, e
- **best before** date, which refers to food quality and is used on non-perisha
these can be dry foods or foods which have been preserved to enhance t

Date marks help consumers to make food choices in the shop as they help them
food. They can also help you decide whether you'll be able to consume them bef
food waste) and whether you can store them in the correct conditions (e.g. whet
your fridge).

You will learn more about nutritional labelling requirements later on in this cours

Things to think about (6.3)

Discuss what elements of a food label may be important for variou

Food marketing

Food marketing or advertising can influence an individual's food choices by using
and deals, such as meal deals, buy one get one free (BOGOF) and special offers.

Supermarket promotions can encourage consumers to buy more products, e.g. t
of one, discounted products, buy one get second half price, etc. Purchasing mor
needed can lead to food waste.

Meal Deals	BOGOF	
		
Meal deals are promotions that encourage a consumer to buy a product (such as a sandwich) and get a deal with it (such as a free drink).	BOGOF is a promotion that encourages consumers to buy an item and get another item free. Some offers are for buy one, get one half price. Food offers can lead to food waste if the surplus food products are not consumed.	Discou money exampl with a 2 the co might e buy mo

Point of sale marketing

Point of sale marketing refers to the attempt to increase sales at the counter or t
place. Point of sale marketing tries to grab the attention of consumers waiting i
and encourages them to make an unplanned purchase. A queuing consumer has
promotional displays while they wait and may feel bored, thirsty or hungry and f
the advertising for snacks, drinks, sweets or magazines, particularly if there is a d
of individual who is more likely to be tempted by point of sale marketing is refer
Some supermarkets may try to tempt customers back by giving a 'money off' cou

Point of sale (POS) is where a purchase is made, such as a shop till or supermarket check

Reward cards are a comm supermarkets and shops to encourage turn to their store by providing points for every purch de which can be redeemed against future purchases.

Did you know?

Eye level is 'buy level' and this influences where items are positioned on shelves near to point of sale.

Some consumers are tempted by brand names while others are tempted by value items (usually supermarket own brands).

Media influences

The media (magazines, newspapers, recipe books, TV programmes, diet DVDs/books, the Internet) all play a part in influencing the food choices of consumers, through health articles, diet advice, food scares, hype over 'superfoods', food provenance programmes (i.e. where does your food come from?), advice on nutrition (such as vitamins and minerals), vegetarian/vegan societies' help and advice, recipes in magazines, online and on TV. Some newspaper, online or magazine articles use results from recent food research to create (sometimes sensational or deliberately provocative) headlines to hook po
TV is designed to appeal to the average consumer and tempt them into buying th
of imagery and jingles (short songs or tunes) that stick in the mind.

An example of such action is *product placement*. I pla placement, a popula
or series is asked to use a particular prod th ne label can be clearly seen
positive connotations in the cons and increases trust of the brand. S
often sought for, which i es and profit for the producer.

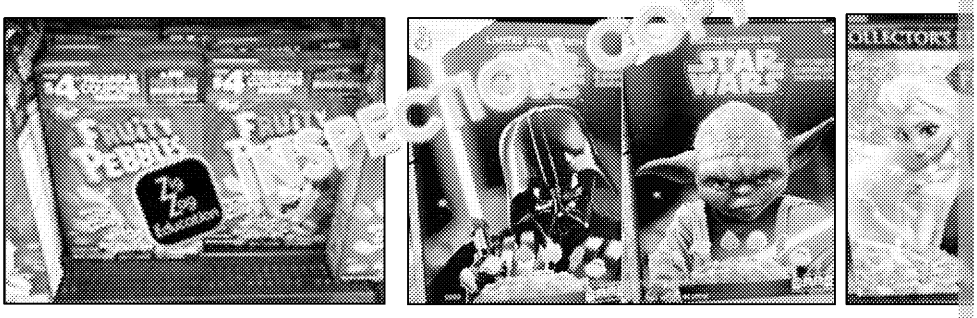
In this TV programme, a
of coffee from a popul
you can see a hotel's lo
used the *product place*
the attention of the p

Another technique known as *endorsement* involves hiring celebrities, actors and
actively promote various products in TV adverts. This also helps to create positiv
the message in your brain says 'if it is good enough for this superstar, it is good e

Food producers can also attract consumers by using specific vocabulary. Keywor
'traditional', 'like at home' and 'real' are examples. Marketing techniques also in
vegetarian or vegan-friendly, so that while shopping consumers don't need to ch
which products are suitable for them.

It is also quite popular to use pictures of cartoon characters on foods which are targeted at children. And although it's not the children who make the final choice at the till, they can use **pester power** to influence their parents.

A



These boxes of breakfast cereals are clearly aimed at children and teen

Things to think about (6.4)

Discuss how advertising can influence a consumer's food choices.

Check your understanding: Consume

1. POS stands for:
   a. Percentage of sales ☐
   b. Point of services ☐
   c. Point of sale ☐
   d. Put on sale ☐

2. Which of the following does NOT refer to food marketing?
   a. selling a product at full price ☐
   b. selling a product half price ☐
   c. selling a product as part of a meal deal ☐
   d. selling a product with a BOGOF deal

3. Explain why placing products at eye level in a shop may be an effective technique.

4. Impulse buying refers to unplanned decisions made right before the p marketing technique which is aimed at impulse buyers.

5. Describe two marketing techniques which help to increase sales of pr children.

   Technique 1 .....

   Description .....

   Technique 2 .....

   Description .....

Religious and cultural belie

There are many religions existing in the world and some of them may affect food
significant way. The table below shows how some religions may be a factor in fo

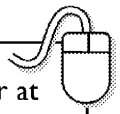
Religion/Belief	Food Choice
Buddhism An Asian religion/philosophy founded by Siddhartha Gautama in the fifth century	Buddhist cuisine is traditionally based on the East monks. Although most Buddhists are vegetarian principles of non-violence), some branches do no their diet but may restrict meat-eating during tim vegetarian diet is when mon accept leftover fo They believe that it is natural to eat meat if provid gesture of charity, only if the animal has **not** bee An aspect of some Buddhist sects' cuisine is life and also avoidance of certain plant food foods, such as garlic or onions.
Hinduism A South Asian belief system based on Vedic religion with the worship of many gods	In Hindu culture the cow is considered sacred and observe a strict vegetarian diet, beef is generally diet. Some Hindus also follow a strict avoidance diet) including onions, garlic, leek, mushrooms, a in a way that minimises disruption or harm to nat Traditionally the Hindu concept is one of non-vio including animals. Some Hindus do eat meat but quickly and humanely without it suffering. A typi rice, dal (dried pulses such as lentils or yellow pea vegetables, fruit, beans, grains, nuts, seeds, chap milk.
Islam A Muslim religion founded by Muhammad (as a mark of respect, Muslims add 'Peace be upon him' whenever they mention the holy Prophet) which follows the teachings of the Qur'an. Islam means 'submission to the will of god (or Allah)'.	By Islamic Law, Muslims must not drink alcohol o must only consume halal meat (in Arabic halal me slaughtered in the name of Allah. This ritual slau or jugular of an animal while it is alive and allowi the carcass while reciting a prayer from the Qur'a permissible for the animal to be stunned before s text which provides religious and dietary advice f festivals, such as Ramadan (ninth month of the ye dawn until sunset for a month), require a period
Judaism A religion of Jewish people based on the teachings of the Torah	Judaism follows the teachings of the Torah and on the stunning of animals before slaughter and anim slaughtered. The slaughter must be conducted by Slaughter of animals must be conducted so that u instantaneous and then death almost instantane fr ss before consumption is allowed und consumption of pork is forbidden. Fruit and veget to remove soil and microbes and inspected to ens cannot be eaten with dairy products (cooking uten Shellfish is also forbidden. A Jewish diet is referre
Rastafarianism A black Jamaican religion that venerates Haile Selassie as a god	Rastafarians follow a diet called *ital* (the word ita word 'vital' and refers to natural and organic foo which does not permit pork or shellfish. Some fo not eat any meat and generally do not use salt in Rastafarians do not drink alcohol, coffee or milk. (but not if over 12 inches in length) and vegetable Rastafarian diet and processed and/or preserved additives are avoided.

Religion/Belief	Food Choice
Sikhism A religion founded by Guru Nanak based on one god and which originated in Punjab (northern India) in the fifteenth century.	A traditional Sikh diet is usually lacto-vegetarian w eat animal products except for dairy products. Ho meat-free diet and Sikh principles state that an in themselves whether or not to eat meat. If a Sikh they should only consume animals that have bee suffering or religious ritual. This is why Sikhs do n Punjabi as *kuttha*) which has been slaughtered slo Islamic Law. As Sikhs believe that their body is a avoid any food, drink or substance which could ca This may include avoidance of alcohol, tobacco a or drug. Some Sikhs also f[illegible] a period of fastin

Did you know?

- A vegetarian diet [illegible] or fish but may include dairy and e[illegible]. A [illegible]getarian does not eat eggs or meat but does [illegible]e dairy products. A pesco-vegetarian (pesca[illegible]an) excludes meat but eats fish.
- A vegan does not eat meat, fish, eggs or dairy or any other animal product for religious, ethical, moral or health reasons. A fruitarian only eats the fruit of a plant (including nuts and seeds) so as not to kill the whole plant.
- An atheist is a person who does not believe in a god or gods.

Research



Look up the RSPCA's stance on stunning animals before slaughter at **zzed.uk/8227-religious-slaughter**

Things to think about (6.5)

Discuss how a recipe created for a follower of Islam must differ f

Apply

How would you modify the recipe for a traditional English breakfast to meet the needs of:

- a M[illegible]
- J[illegible]
- a Hindu?

Check your understanding: Religious an

1. Which of the following statements is TRUE about a Muslim diet?
   a. Only halal foods can be eaten.
   b. Pork is the staple food for Muslims.
   c. Muslims often celebrate with wine and champagne.
   d. Only kosher foods can be eaten.

2. Which of the following statements is TRUE about Hinduism?
   a. Neither beef nor milk can be consumed.
   b. All Hindus follow strict dietary rules calle[d] attvic diet.
   c. The cow is a holy animal and, the[re]fore beef cannot be eaten.
   d. Shellfish is among the for[bi]dden foods.

3. Which of the [fo]llowing statements is FALSE about Sikh diet?
   a. [A]ll Sikhs are strict vegetarians.
   b. [Si]khs do not eat halal or kosher meat.
   c. [Si]khs avoid alcohol and tobacco.
   d. Sikhs can choose whether or not to eat meat.

4. Fill in the table to indicate how the following ingredients of a cottage p[ie] replaced or modified to meet the dietary needs of a Jew.

Beef mince	
Milk	

5. Rastafarians follow specific dietary rules called *ital*. Identify one health [b]diet. Justify your choice.

   Health benefit:.....

   Justification:.....

6. Muslims have a set of particular food laws. Give three rules you woul[d] when preparing a dish for a Muslim.

   1 .....

   2 .....

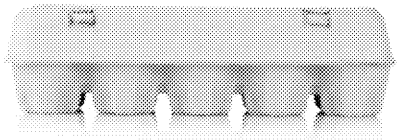
   3 .....

Some people's food choices are linked to their ethical or moral beliefs. This can b
animal welfare, support for fair trade for developing countries, championing of l
local economy and help local growers, a desire to promote **organic** farming or to
Some food choices are due to environmental concerns about population growth
meat-based diet requires more energy, water and land than a plant-based diet w
used to raise livestock – source: *The Vegetarian Society*).

Animal welfare

Animal welfare is about protecting an animal's mental and physical needs. Concerns over animal welfare can influence an individual's food choices and may even necessitate a complete change of diet, as in the case of vegetarians or vegans, or mean that a consumer buys from a company with high animal welfare standards.

Concerns for animal welfare can influence people's food choices for ethical and moral reasons.



Some people will only buy free-range eggs
that are allowed outside at least part of the
have been allowed to roam freely and not l
sold in the UK must be stamped to indicate
0 = organic **1 = free-range** **2 = barn**

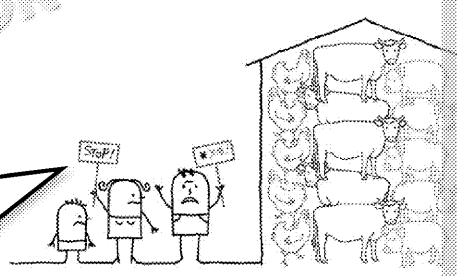
Research

Look up the UK government's advice on the welfare of free-range hens at **zzed.uk/8227-free-range-hens**

Look up the UK government's trade regulations for the marking of eggs at **zzed.uk/8227-egg-marking**

Some people are concerned about the way that animals are kept, particularly wi
production of meat or eggs where animals are kept in confined spaces without e
individual may choose to buy only products that are organic or that display a foo
Red Tractor symbol from the Assured Food Standards Board or the RSPCA Assure
meets animal welfare standards. If food carries the RSPCA Assured logo (previou
means that the farms have undergone inspection to ensure animal welfare stan

Some people object to the way in which some farm animals are kept.



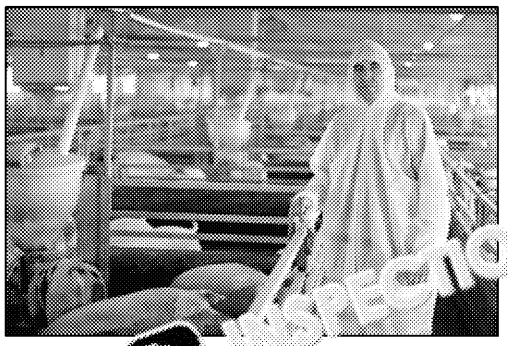
Research

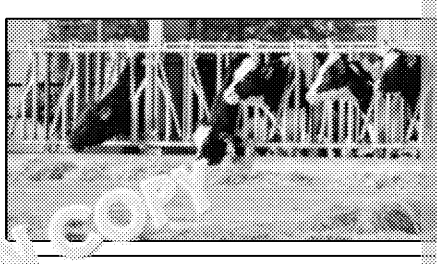
Look up RSPCA Assured information on their website **zzed.uk/8227-rspca**

Look up the Red Tractor scheme at **zzed.uk/8227-red-tractor**

Did you know?

It is illegal to produce foie gras (French for *fatty liver*) in the UK due to animal w
considered a cruel food by some people due to the methods used (force-feedi
grains and fat causing their livers to swell in size). It can, however, still be bou
UK. In response to public protest, some UK restaurants have removed foie g

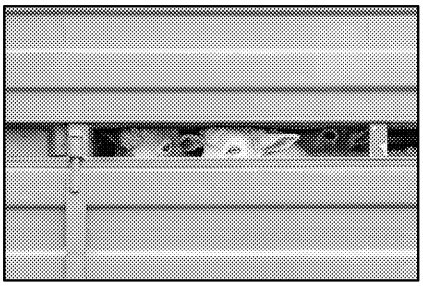




Intensive farming (also known as f
form of farming with higher livesto
profit. Some people think that fa

In addition to factory farming methods, some people may also be concerned abo
to concerns over an animal's welfare while in transit. The UK government have c
safeguard live animals in transit. In some cases, Animal Transport Certificates m

For this reason some people's food choices are prompted by a desire to buy only



Research

Look up advice for farmers, slaughterhouses, hauliers and pet breeders on liv
zzed.uk/8227-transport-regulation

Did you know?

Some people's food choices are influenced by environm tal concerns such a
food product (food miles) has travelled and th ec hat transport has on t

Local produce

Local foo
often only
work h

Locally produced foods are becoming more and more popular. The term 'local' usually refers to foods made within 100 miles of the place of consumption or purchase. People may choose to buy local foods for various reasons:

- from concern about animal welfare during transport – as discussed previously, animal welfare standards may not be followed in transit, and people may choose to buy locally produced foods to reduce the distance the animals have to travel from the farm to the abattoir
- from concern about greenhouse gas emissions and pollution created by the means of transport – transportation uses large amounts of fossil fuels; when burnt, these create greenhouse gases (e.g. carbon dioxide) and pollution (e.g. heavy metals) which pollute the air, water and soil, especially along main roads and motorways; buying locally means that less transportation is needed and less pollution is created
- because local foods are often cheaper than imported foods – this is because there is no need to cover the cost of transportation, driving, logistics, international taxes and tolls, etc.
- because local foods are often fresher and tastier than imported foods – very often fruits are picked while still unripe so that they can be s distance; local fruits can be left to ripen naturally so that they are higher i transported or stored, so they are fresher
- to support local communities and farmers – by buying locally you create e workers, retailers and shop workers, delivery workers, etc. They then ca earned on other goods and services, such as schools, and, therefore, help to develop and empower the local community.

Organic food

Farming methods can usually be described as either conventional, intensive or organic. Intensive production aims to lower the costs and maximise production. The point of organic farming is to produce good-quality, healthy, chemical-free produce. The two methods of farming are shown in the table below.

Organic farming	Intensive and
• The use of pesticides is restricted • Only natural fertilisers can be used • No artificial colours or preservatives can be added to the final product • The high standards for animal welfare are followed • Antibiotics are only used as and when necessary • Free from genetic modifications, GM feed, etc.	• Pesticides are used ro • Artificial fertilisers are • Various additives may improve it • Animal welfare standa • Antibiotics are used ro diseases • Can use GM organism

There is no scientific data to prove that organic foods are safer or healthier than conventionally produced foods (apart from lower levels of pesticides, studies show no difference in nutrient content). Organic farming is also more costly, requires more land and emits more greenhouse gases to produce the same amount of food as conventional farming. Nevertheless, many people choose organic from concern about their health or the environment.

Vegans and vegetarians

Some people's food choices may be prompted by compassion or concern for ani
ethically and morally wrong to take the life of an animal for human consumption
eat meat, fish or shellfish, but may eat eggs, milk and dairy products. Depending
vegetarians can be divided into three subgroups, as shown in the table below.

	Lacto-vegetarian	Ovo-vegetarian
Eats	Milk and dairy	Eggs
Doesn't eat	Meat Fish Eggs	Milk and dairy Meat Fish

Vegans are people who do [illegible] animals or animal-derived products includ
dairy produce) [illegible] product containing animal ingredients. A vegan ma
which are [illegible] by companies that test on animals and do not wear clot
contain leat[illegible] any other animal product. A vegan does not drink milk becaus
to exploit or use an animal in any way. Dairy cows must continue giving birth in
although female calves may eventually replace old dairy cows, the unwanted ma
(lactating means producing milk after birth) are removed from their mothers, so
of being born, and slaughtered for meat. Vegans also avoid eggs because they d
animals in any way and because they disagree with the methods used. Although
healthy) remain in a hatchery to become egg layers, male chicks are of no use an
(egg laying hens are a different breed of poultry to chickens and not suitable for

Some people are prompte
reasons or environmenta
2010 stated that agricultu
dairy products, accounts f
freshwater consumption,
and 19 % of the world's g

Did you know?

Former US president (1993–2001) Bill Clinton went (mostly) vegan for healt
Former US vice president Al Gore is vegan due to enviro mental concerns a

Apply

Research a re[illegible]uisine
Lorraine [illegible]od, it to meet
the need
- a lacto-vegetarian
- an ovo-vegetarian
- a vegan

Did you know?

According to the Veget
typical meat eater's die
2.5 times the amount o
to a vegetarian diet and
vegan diet: **zzed.uk/82**

Check your understandin
Ethical and moral beliefs linked to

1. A vegan would be likely to refuse to eat…
   a. Honey ☐ c. Molasses ☐
   b. Maple syrup ☐ d. Golden syrup ☐

2. Vegetarians who eat milk and dairy can also be called…
   a. Pescatarians ☐ c. Lacto-vegetarians ☐
   b. Ovo-vegetarians ☐ d. Fru[illegible]ians ☐

3. Which of the following statemen[illegible] TRUE about organic foods?
   a. They are designed t[illegible] a higher yield.
   b. They may h[illegible] food allergies.
   c. The[illegible] ther and more nutritious than conventional foods.
   [illegible]ey have lower levels of pesticides.

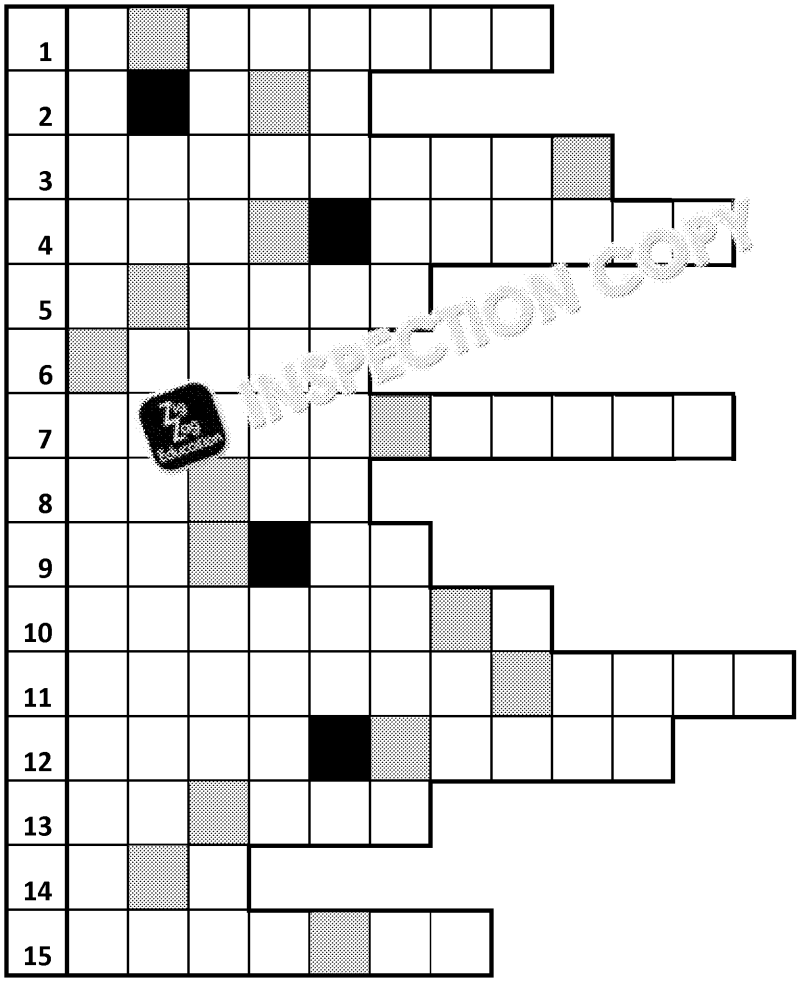
4. Complete the table to explain what food products are unlikely to be c
   consider the following factors important.

Local community	
Animal welfare	
Lack of pesticides	

5. Assess how environmental and animal welfare concerns influence an i
   choices.

Quiz-ine

Fill in the answers to the questions below to reveal a word relevant to food choic
black squares are spaces between words).



1. A substance which causes an allergic response. (8)
2. Dietary rules characteristic of Rastafarianism are referred to as this. (4)
3. This refers to an individual's energy requirements while at rest: basal ____ r
4. Date mark which applies to food quality. (4, 6)
5. Food which is permitted for a Jew is referred to as this. (6)
6. Person who doesn't eat any produce of animal origin. (5)
7. A non-life threatening reaction to certain foods (such a milk), causing symp
   stomach ache. (11)
8. Acronym for a marketing technique in which second product is obtained fo
9. Date mark which refers to food [illegible] (3, 2)
10. Traditional Hindu flath[illegible]
11. Severe, life-thr[illegible] reaction can also be called _____ shock. (12)
12. Eggs fr[illegible] which have been allowed outside in the fresh air for at least
13. Where [illegible] comes from. (6)
14. Acronym that refers to an individual's activity level. (3)
15. Grown or reared without any added chemicals. (7)

The shaded squares reveal this word:

_ _ _ _ _ _ - _ _ _ _ _ _ _ _ _ _ _

Chapter 1: Food provenance (food sourc

Where food is grown, reared and caught

Things to think about (1.1)
PROs: allows producers to grow foods over large areas; allows the foods to grow in n
sunlight and with microorganisms and insects that improve growth (such as beetles)
CONs: vermin; floods and droughts; unpredictability; need to use pesticides; contamin

Check your understanding
Q1: D, **Q2:** C, **Q3:** A (1 mark for each, max. 3 marks)
Q4: 1 mark for each correct row. Two correct examples needed for each. Other exa
marks).

leaves	cabbage, watercress, kale, spinach
	carrot, parsnip, parsley, beetroot, radish, celeriac
	tomato, cucumber, aubergine, courgette, pumpkin, melon

Q5: Any two from: (1 mark each, max. 2 marks)
- helps to prevent and avoid overfishing of natural fisheries
- helps to preserve natural habitats
- helps to preserve naturally occurring species and support biodiversity
- prevents extinction of wild fish species
- helps to provide sufficient amount of food (fish) for the growing populatio
- also provides caviar and other products
- used to produce animal feed
- or any other suitable answer

Q6:

The answer is clear and well structured. It includes a reference to at least four poi content, with a relevant description/explanation. The answer includes a reference and disadvantages of growing plants in polytunnels. To gain 8 marks, examples m
The answer shows good knowledge and understanding of the topic. The answ to at least one argument for and one argument against growing plants in polyt description/explanation. An example may be given to support the points made.
The answer shows some knowledge but little understanding of the topic. The a reference to only one argument (either for or against). No examples are given.
No answer given or answer incorrect.

Arguments for growing plants in polytunnels:
- suitable for growing tropical plants, which need warmth to grown
- protect from external factors, such as strong wind or massive rainfall
- protect from vermin
- protection from frost
- enables long harvest season
- shortens the growth cycle, so plants can be harvested a few times a year
- allows to grow species which would not otherwise grow in a given area

Arguments against growing plants in polytunnels:
- re… water supply
- po… ilation increases risk of fungal growth
- polytunnel can become damaged and may require to be repaired, which is
- it's best located in a sheltered site as strong wind could blow it off
- provides limited space, so only limited crops can be produced

The answer could also refer to examples of foods grown in polytunnels:
- soft fruit (berries such as strawberries, blueberries)
- vegetables such as cucumbers, radish, lettuce, bell pepper, cauliflower, pea tomatoes, aubergine, spinach
- herbs such as basil, chives, parsley greens, coriander

Other relevant answers can be credited.

Check your understanding

Q1: D, **Q2:** B, **Q3:** B (1 mark for each, max. 3 marks)

Q4: One mark for each correct row (max. 5 marks)

Organic farming	Int
fewer or no pesticides are used	pesticides are used r
no artificial colours or preservatives are added to food	various artificial add
maintains highest animal welfare standards	animal welfare stand
antibiotics are only used as and when necessary	antibiotics are used r
no GM organisms, seeds or feed are used	GM organisms, seeds

Q5: Any two from: (1 mark each, max. 2 marks)

- supports biodiversity
- supports responsible use of natu[illegible]ces, such as water
- prevents extinction of an[illegible]ant species
- provides sufficie[illegible]of food without damaging the natural environm
- limit[illegible]ution
- or[illegible]suitable answer

Q6:

The answer shows thorough knowledge and understanding of various farming response clearly analyses multiple ways in which farming methods affect the q food. The answer is well structured. Examples may be given to support points
The answer shows good knowledge and understanding of various farming met response analyses one or two ways in which farming methods affect the safety food. Examples may be given to support points made.
The answer shows little knowledge and understanding of various farming met response points out one way in which farming methods affect the safety and q the explanation may be lacking. No examples are given to support the answer.
No answer given or answer incorrect.

Indicative content:

- quality of the soil (amount of nutrients, acidity) affects the quality of veget which are grown in it
- quality of the soil also has an impact on the quality of meat from animals w plants
- intensive farming methods may introduce pesticides and other chemicals t allergies and poisoning
- intensive farming methods may introduce antibiotics to the food, which be increases the risk of antibiotic resistance
- chemicals from food (e.g. hormones from poultry) may affect humans' hor
- eggs from hens which are fed industrial feed can have altered nutritional v with omega-3 fatty acids, carotenes and other substances
- the quality of organically produced eggs and meat [illegible]ot be controlled in f affected by a number of external factors
- organically grown and reared foo[illegible]er pesticides, and, therefore, a
- or any other suitable ans[illegible]

Quiz-in[illegible]

1. Salmon
2. Free-range
3. Organic
4. Strawberry
5. Venison
6. Polytunnel
7. Foie gras
8. Livestock
9. Herbicide
10. Antibiotic
11. Poultry

The shaded squares reveal this word: **seasonality**

Chapter 2: Food processing and pr

Food processing

Things to think about (2.1)
No. During homogenisation, fat molecules become smaller, which allows them to disp
prevents the milk from separating into liquid and fat, so, without advanced technolog
cream out of homogenised milk. Plus, it would be costly and pointless to homogenise

Things to think about (2.2) (possible arguments)

- Primary and secondary processing decrease the nutritional value of foods.
shredding, freezing, cooking, draining and reheating decrease the amount o
- Also, oxygen is harmful because it leads to oxidation.

To prevent micronutrient loss:

- fresh foods should be sold whole, not cut
- foods should be stored in dry, dark conditions to protect them from moistu
- foods should be stored at the correct temperature to prevent bacteria grow
- cooked foods should not be drained if possible
- appropriate cooking techniques should be chosen, e.g. steaming instead of
- the time and temperature of cooking should be adjusted and shortened whe
- raw fruit and vegetables should be eaten more often

Check your understanding
Q1: C, **Q2:** D, **Q3:** B (1 mark for each, max. 3 marks)
Q4: 1 mark for each relevant point from: (max. 4 marks)

- Flour which is high in gluten will produce better quality bread. This is beca
structure which traps carbon dioxide produced by the yeast and, therefore,
texture of the bread. Examples of this include rye flour and strong wheat fl
- Low-gluten flour is less able to hold a large amount of gas inside, and so th
as it won't be able to prove properly. An example of this is plain wheat flou
- Gluten-free flour will produce a tough, dense bread as it will be able to hold
and the bread will lack volume and texture. Examples of this include rice fl
- Self-raising flour, although it contains gluten and extra raising agent, may n
chemical raising agent in it might affect the final taste.

Q5: 1 mark for any correct function for each of the ingredients (1 mark each, max. 2

probiotic bacteria	• process lactose in milk • produce lactic acid • lower pH of milk • increase acidity • begin the process of protein denaturation and coag
rennet	• coagulates the protein in milk • responsible for the final texture of mature cheeses

Q6: Any two from: (1 mark for the heat treatment method, 1 mark for explaining ho
nutritional value of milk; max. 4 marks)

- Pasteurisation – uses fairly low temperature, and only a short time is requi
nutritional value of milk, and the changes are reversible
- Ultra-high temperature treatment – uses a very high temperature for a very
slight changes in nutritional value (e.g. loss of thiamine), but they are usuall
- Sterilisation – uses very high temperature and requires a long time; becau
milk is significantly altered (many vitamins are damaged), and its quality i
increased chemical reactions (Maillard reaction) which produce brown pigm
which change the appearance, taste and aroma of the milk; also protein can
the high temperature
- All heat-treatment methods increase milk's shelf life, although some are m
UHT) than others (pasteurisation).

Food preservation methods

Things to think about (2.3)

Examples could include:

- **Pickling – advantages**: increases the amount of probiotic bacteria in food; increa
  growth of microorganisms for a long time by lowering the pH of the food
- **Pickling – disadvantages**: greatly increases the amount of sodium in the food; t
  unsuitable for certain groups of people (e.g. those with stomach issues)
- **Vacuum packing – advantages**: stops aerobic bacteria from multiplying; can be
  affecting their taste or nutritional value
- **Vacuum packing – disadvantages**: doesn't stop anaerobic bacteria from spoilin
  colour and appearance of the food
- **Sterilisation – advantages**: greatly increases the shelf li f food; kills all of the
  safe even for people with compromised immu t
- **Sterilisation – disadvantages**: may lo he r itional value of food, especiall
  may affect the appearance, te ar a and taste of the food

Check your understa

Q1: C, **Q2:** B (1 mark for each, max. 3 marks)

Q4: 1 mark for each correct: (max. 2 marks)

- oxidation (accept other names such as oxidisation)
- enzymic browning (accept other names such as enzymatic browning)

Q5: 1 mark for any correct answer, with or without explanation: (max. 1 mark)

- Blast chilling shortens the time that food spends at the danger zone tempe
- Blast chilling shortens the time during which bacteria and other microorga
  conditions.
- It helps to ensure food safety.
- It helps to prevent food spoilage.
- or any other suitable answer

Q6: 2 marks for one well-explained point: (max. 2 marks)

- Brine is a solution of water and salt (sodium chloride).
- Water freezes at 0 °C. The freezing temperature of brine can be as low as -2
- As a result, brine stays liquid at freezing temperatures for food (-18 °C) an
  medium.

Quiz-ine

1. Vacuum packing
2. Yoghurt
3. Pasteurisation
4. Brine
5. Nitrogen
6. Semolina
7. Conduction
8. Collagen

The shaded squares reveal this word: **churning**

Moral and ethical issues involved in food productio

Check your understanding

Q1: A, **Q2:** B (1 mark for each, max. 2 marks)

Q3: Any three from: (max. 3 marks)

- ensures fair wages and prices for the food producers and farmers
- enables decent working conditions and rights for the workers
- ends child labour and forced labour
- empowers local farmers
- enables local growth and sustainability
- supports education and access to health facilities
- or any other suitable answer.

Q4: Any four from: (1 mark each, max. 4 marks)

- Climate change is an effect of human actions and causes the average temper
- effects of climate change include massive rainfalls, tornadoes, etc.
- Many plants and animals are not fit for the new temperature conditions, an
- environment, e.g. fish.
- Drought makes growing plants impossible, and, therefore, there is no food
- cattle.
- Floods damage crops and, therefore, there is no food for people or feed for
- Climate change also causes sea levels to rise, and therefore large areas of la
- there is less land available to grow food or rear animals.
- or any other suitable answer

Q5:

The answer is clear and well structured. It includes a reference to at least fou indicative content, with a relevant description/explanation. The answer incl to both advantages and disadvantages of GM foods for health. To gain 8 marl be given.
The answer shows good knowledge and understanding of the topic. The ans reference to at least one advantages and disadvantages of GM foods on health description/explanation. An example may be given to support the points ma
The answer shows some knowledge but little understanding of the topic. Th a reference to only one advantage/disadvantage. No examples are given.
No answer given or answer incorrect.

Indicative content:

Advantages of GM foods:

- GM foods are more nutritious and contain more vitamins or omega-3 fatty
- prevent malnutrition and can be used to treat the effects of deficiency.
- GM foods can be higher in protein, and, therefore, prevent malnutrition an
- kwashiorkor.
- GM foods can be higher in antioxidants, and, therefore, be useful in the pre
- diseases, such as coronary heart disease or can
- GM plants and animals provide more food and, therefore, help to prevent h

Disadvantages of GM foods:

- GM foods are rel growing incidence of food allergies.
- GM f ca rce of new antibiotic-resistant bacteria.
- G can be linked to the growing rates of obesity, although further stu
- re ip between the two.
- GM food can contribute to cancer, although further studies are necessary.

Other suitable answers may be accepted.

Environmental issues and food production

Things to think about (example arguments) (3.1)

- Food production: use of water, fossil fuels, fertilisers; transportation to fac
- Transportation: use of fossil fuels; food miles
- Packaging: use of water, fossil fuels, natural resources; transportation to fa
- It all creates food miles and carbon footprint. The more greenhouse gases a carbon footprint. The increased amount of carbon dioxide in the air accum cannot leave the atmosphere. Therefore, the air and Earth's surface heat up faster. Massive rainfall occurs more often. People suffer from either droug occur. People die of famine and lack of water.

Check your understanding

Q1: D, **Q2:** A (1 mark for each, max. 2 marks)

Q3: 2 marks for a well-explained point: (max. 2 marks)

- Amount of carbon dioxide (and other greenhouse gases) emitted during th transporting, consumption and disposal of goods, e.g. food.
- The sum of all carbon dioxide emissions released into the atmosphere in a g
- An indicator used to measure the effect human activities have on the envir
- Any other suitable answers.

Q4: Any two from: (max. 2 marks)

- Use of pesticides and herbicides can help to prevent crop failure, and dama caused by pests and vermin.
- GM crops are more resistant to weather conditions, so could prevent crop f
- Overabundance of food could be sold for a lower price, e.g. for canning or f
- Storing food in proper conditions, e.g. coolers, can help to keep it fresh for l retailers.
- In factories, specially adjusted packaging methods can help to preserve foo extended.
- Factories can adjust their production methods so that no produce is waste leftover pulp and skins can be used for other purposes.
- Or any other suitable answer

Q5: 1 mark for each relevant point from: (max. 4 marks)

- Fish farms are artificial fisheries in which chosen species of fish, crustacean
- Consequently, there is no need to obtain them from natural fisheries.
- Fish farms prevent overfishing of natural fisheries, support biodiversity an habitats.
- Fish farms also prevent by-catch, as only fish of a specific species and size c
- Fish farms use natural resources, such as water, responsibly, and dispose o controllable way.
- Fish farms help to prevent pollution and damage to the natural environme

Other suitable answers may be accepted.

Quiz-ine

1. Glacier
2. Recycling
3. Golden Rice
4. Banana
5. Carbon dioxide
6. Sustainability
7. Pair trading
8. Biodiversity
9. Fish farm
10. Aluminium
11. Food miles
12. Malnutrition
13. Drought

The shaded letters reveal these words: global warming

Chapter 4: Technological developments to health and food fortificatio

Fortification of foods

Check your understanding

Q1: D (1 mark)

Q2: 1 mark for each correct row (at least one correct nutrient should be stated for e

Fortified food	Nut
Wheat flour / bread	Calcium, iron, thiamin
Vegetable fat spreads	Vitamin A, vitamin D
Semi-skimmed and skimmed milk	amin A

Q3: Any two from: (1 mark for each reason, 1 mark for each example, max. 4 marks)

- **Reason**: to make food more suit[illegible] the target group
  - **Example**: breakf[illegible] fortified with calcium and vitamin D ar in childr[illegible]
- **Rea[illegible]** to [illegible]d more appealing
  - **Example**: addition of minerals to food make it look healthier so the similar, non-fortified product
- **Reason:** to enhance the shelf life of food
  - **Example**: vitamin C not only has a positive effect on health, but als preservative
- or any other suitable answer

Q4: 2 marks for a well-explained reason (max. 2 marks)

- Only semi-skimmed and skimmed milk has to be fortified.
- Mandatory fortification of semi-skimmed and skimmed milk with vitamin A
- Vitamin A is fat-soluble. The vitamin A level in semi-skimmed and skimme removed with the excess fat.

Additives in foods

Check your understanding

Q1: C, **Q2:** D (1 mark for each, max. 2 marks)

Q3: 1 mark for each correct function (max. 5 marks)

Additive	
Monosodium glutamate	Flavour enhancer / fla
Tartrazine	Colourant
Aspartame	Sweetener
Sulfur dioxide	Preservative
Lecithin	Emulsifier

Q4: Any three from: (max. 3 marks)

- provide sweet taste
- have lower calorific value than sugar
- can support dental health (e.g. xylitol)
- improve the flavour, e.g. of s[illegible]ry [illegible]s such as tomatoes
- make food more app[illegible]g ar[illegible]ppetising
- or any other s[illegible]a[illegible]wer

Things to think about (4.1)
Antibiotics are very strong drugs which have the ability to kill bacteria. When taking
(disease-causing) bacteria and the good ones living in your gut. Probiotic supplemen
have finished your antibiotics to restore the good gut flora and improve your immun

Check your understanding
Q1: B, **Q2:** A (1 mark for each correct, max. 2 marks)
Q3: Any three from: (1 mark each, max. 3 marks):
- yoghurt
- cheese
- milk beverages, e.g. Actimel ™, Yakult, kefir
- sauerkraut, kimchi
- gherkins (pickled cucumbers)
- miso, tempeh, natto (made of fe soya)
- kombucha
- or any other su

Q4: 1 mark f point from: (max. 2 marks)
- Pr s are live microorganisms (bacteria) which have a positive impac
- Pre s are substances (e.g. dietary fibre) which support the growth of t

Q5: Any three from: (1 mark each, max. 3 marks):
- support digestion
- improve immunity
- produce vitamins
- increase absorption of certain minerals (e.g. iron, calcium)
- prevent diarrhoea
- help to maintain healthy body weight
- accept other suitable answers

Quiz-ine

1.	Aspartame	4.	Lactobacillus	7.	Wheat
2.	Margarine	5.	Anaemia	8.	Preservative
3.	Lycopene	6.	Stroke	9.	Lecithin

The shaded squares reveal this word: **probiotic**

Chapter 5: Development of culinary

British cuisine

Things to think about (5.1)
After World War II there was a period of rationing because of food shortages. This m
and households were only allowed restricted amounts. To combat this restriction, re
and more readily available ingredients.

Check your understanding
Q1: A, **Q2:** D, **Q3:** B (1 mark for each, max. 3 marks)
Q4: Any three from: (max. 3 marks)
- lamb
- beef
- potatoes
- leeks
- cockles
- monkfish
- Ca[illegible]ly
- la[illegible]weed)
- An[illegible]y Pig Snout apples
- or any other suitable example

Do NOT accept examples of dishes, e.g. Welsh cakes, bara brith.

Q5: 1 mark for each modification identified and 1 mark for each relevant explanatio
Examples could include:
- replace plain flour with wholemeal flour – this will increase the amount of
more suitable in terms of the current dietary guidelines
- replace beer (lager) with milk or water – to reduce the calorific value of th
unsuitable for children, so is best replaced with an alcohol-free liquid
- blanch potatoes before deep frying – this will seal their surface and precoo
need to be fried for less time and will absorb less fat (so will be less energy
- bake the fish/chips instead of deep frying it – this will lower the calorific va
more suitable, especially for people who wish to lose weight or simply lead
- replace beef dripping with vegetable oil – this will help to lower the amou

Accept other suitable answers.

International cuisines

Things to think about (5.2)
A country's cuisine can change over time due to travel, export and trade, immigratio
also be influenced by the resources available and weather conditions or natural even
flooding. It can also be influenced by war and by embargoes imposed by other count

Things to think about (5.3)
Traditional recipes may be adapted according to the availabili[illegible]f ingredients, or to
environmental or sustainability concerns.

Things to think about (5.4)
Eating patterns can differ betw[illegible]ou[illegible]es due to lifestyle and culture. These may
(Spain traditionally has a [illegible]m 2pm to 4pm), the weather (heat), availability o
traditional v[illegible]co[illegible]g and eating and religious and moral beliefs.

Check your understanding:

Q1: B, **Q2:** D, **Q3:** C (1 mark for each, max. 3 marks)

Q4: 1 mark for each correct row (only one cheese for each row is required) (max. 3 m
may be accepted.

Cheese	Coun
Stilton, Wensleydale, Suffolk Gold, Cheddar, Dunlop, Caerphilly, Red Leicester, Double Gloucester	
Brie, Camembert, Comte, Tomme, Reblochon, Morbier, Livarot, Saint-Nectaire	
Parmesan, Mozzarella, Ricotta, Gorgonzola, Pecorino, Fontina, Mascarpone, Taleggio	
Emmental, Gruyère, Appenzeller, Raclette	Sw
Gouda, Maasdam, Leyden, Leerdammer	The N

Q5: 1 mark for each factor identifi[illegible] mark for explaining how it affects the cui
- **Factor**: climate
- **How it aff[illegible]ine**: weather conditions, average temperature and rain
o[illegible], b[illegible]also the time of meals, e.g. in Spain dinner is eaten late, as ea
- **Fa[illegible]oil quality**
- **How it affects cuisine:** acidic, neutral or alkaline soil determines what can
area
- **Factor**: religion
- **How it affects cuisine**: Islam, Hinduism, Buddhism, Judaism, Sikhism and R
dietary rules and restrictions; people who follow a religion must obey the r
not allowed to eat certain foods, and must observe fasting periods and cele
specific example, e.g. Muslims, cannot eat pork and, therefore, the cuisine i
main religion usually does not use any pork
- **Factor**: migration
- **How it affects cuisine**: people migrating from other countries bring their c
culinary preferences, and, therefore, they influence/trigger a change in the
India to UK resulted in the invention of chicken tikka masala
- **Factor**: lifestyle
- **How it affects cuisine**: applies to modern cuisines; people tend to choose
determines eating patterns
- **Factor**: market development
- **How it affects cuisine**: helps to import new foods from abroad and makes
development of the cuisine
- or any other suitable answer

Quiz-ine

1. Stilton
2. Eton mess
3. Cornwall
4. En croute
5. Haggis
6. China
7. Hummus
8. Boxty
9. Chopsticks
10. France
11. Dosas

The shaded squares reveal this [illegible]d: **s[illegible]rgasbord**

Chapter 6: Factors influencing foo

Personal, social and economic factors affecting foo

Things to think about (6.1)

Low-income families could maintain a healthy diet by finding alternatives to more ex
sunflower oil instead of coconut oil, and replacing fresh ingredients with tinned or fr
supermarkets sell fresh foods at cheaper prices when they are near their sell-by date
buy foods which would normally be out of their price range. Foods that are easy to g
year are generally easier to find and cheaper to buy.

Check your understanding

Q1: A, **Q2:** A, **Q3:** C, **Q4:** D (1 mark for each, max. 4 marks)

Q5: 1 mark for any correct health issue for each given ingredi : (max. 3 marks)

1. Saturated fat: Overweight, obesity, increas l l o cholesterol level, increa atherosclerosis, coronary heart dise s st o e, heart attack
2. Kitchen salt: Hypertension n a eart attack, stroke
3. Sugar: Overweight, ob d , de tal caries / tooth decay, increased blood sugar

Accept other suitab h w s.

Q6: Any fou (1 a x each, max. 4 marks)

- Du celebration, people eat more food in general.
- Du g a celebration new, unknown foods can be introduced.
- During a celebration people tend to choose foods of higher energy content.
- Celebration-specific foods are often higher in fats than everyday food.
- Celebration-specific foods are often higher in sugars than everyday food.
- A celebration often requires special, festive foods, which are not eaten duri
- People may choose to drink more alcohol.
- Or any other suitable example.

Medical reasons: food intolerances and allergies

Things to think about (6.2)

- Allergens can be hidden within food and be served unknowingly to an aller fatal symptoms, such as hives, sneezing or anaphylactic shock.
- Individuals could be served food which contain allergenic ingredients witho
  - nuts or sesame seeds within sauces (e.g. satay sauce)
  - sulphites used as preservatives within packaged or processed foods or i
  - shellfish or crustaceans within sauces and soups
  - soya beans within a variety of foods
  - cereals such as wheat within soups, sauces, gravy and thickeners
  - eggs and milk within a variety of foods
  - celery within vegetable stock and soups
- Serving food that has been in contact with an allergen to an allergic individu particularly for peanut allergy sufferers (dust from peanuts or other nuts c vital that all allergens are kept away from food that will be served to an all
- People with allergies should ask to see the ingredients of every food item t all caterers to supply these to customers.
- There is a risk, should an allergic reaction occ hat catering staff, includi trained or equipped to handle it.
- Allergic individuals are a ris y do not make their allergy known or c allergic reaction.

Check your st nding:

Q1: B, **Q2:** C (1 mark for each, max. 3 marks)

Q4: 1 mark for each correct (max. 2 marks)

- Food-intolerance-related agent: milk (lactose)
- Food-allergy-related agent: egg, milk

Q5: 2 marks for a well-explained point. 1 mark for a basic explanation. (max. 2 mark

- During production of cheese, lactose in milk is fermented into lactic acid.
- For that reason, mature cheese contains very little or no lactose, so poses no
- During production of cheese, protein in milk coagulates and denatures, but
- In fact, the protein content of cheese is much higher than in milk.
- For that reason, people allergic to milk proteins cannot eat any dairy produ

Things to think about (6.3)
Examples could include:

- people with allergies – should pay attention to the list of ingredients and sp
  food is free from allergens and safe for them to consume(allergens are usua
- lactose-intolerant people – should pay attention to milk content in the food
- people with high blood pressure – should pay attention to salt/sodium leve
- people with coronary heart disease / high blood cholesterol levels – should
  fat / saturated fat or enriched with phytosterols which help to lower blood
  pointed out in a health or nutrition claim)
- people with vitamin deficiency – can check whether the food contains a giv
  present or added during fortification)
- people for whom animal welfare is important – can see whether the food w
  welfare standards, e.g. organic or free-range
- people who cannot cook – may find preparation instructions useful
- date marks – can be useful for people concerned about food waste issues, a
  food with a shorter life if they know they won't be able to eat it before that d

Things to think about (6.4)
Advertising can affect a consumer's food choice through descriptive words, and colou
the product appear more appealing or attractive. Advertising can also make us want
about diet, lifestyle and nutrition, or tempt us or by appealing to our ethical or moral

Check your understanding
Q1: C, **Q2:** A (1 mark for each, max. 2 marks)
Q3: 1 mark for the reason, 1 mark for the correct explanation/description (max. 2 m

- **Reason:** because it places products at the most easily accessible place
- **Description**: (any one of the following):
- In this technique, the most expensive products are usually placed on the sh
  consumer. This means that items aimed at adults will be placed at their ey
  will be placed a bit lower. Items aimed at toddlers are usually marketed at
  ones who make the choice in the shop.
- People tend to buy things more often if they are placed comfortably and ar
- Other items, such as cheaper or less attractive products (e.g. value brands)
  highest shelves and are more difficult to reach.

Q4: (1 mark) Point of sale
Q5: 1 mark for each correct from: (max. 2 marks)

- **Technique**: Using pictures of popular cartoon characters, toys, etc. on food
  - **Description**: Packages of these products are often very colourful and
- **Technique**: Items aimed at children are often placed at their eye level (low
  - **Description**: It makes sure children will be able to see these products
- **Technique**: Items aimed at children are often placed on special stands, wh
  - **Description**: This attracts the youngest consumers
- **Technique**: Items aimed at children are often described as 'natural' or bea
  - **Description**: This suggest that the given pro[illegible]s good for children,
    their growth, so helps their parents m[illegible]a[illegible]ision about purchase
- **Technique**: Point of sale techniq[illegible]so often used to sell products for ch
  sweets or chocolate bars
  - **Description**: [illegible]or[illegible]ducts are small and easy to reach even by sma
    attenti[illegible]hildren queueing at the till
- A[illegible]he suitable answers.

Religious and cultural beliefs

Things to think about (6.5)
Consider that Islamic law forbids eating pork only, while most Sikhs are vegetarians (
in the recipe would have to be replaced with a vegetarian equivalent; Sikhs would als
Sikhs and Muslims should avoid alcohol. Most Sikhs also don't drink tea or coffee, so
substituted with an acceptable product.

Check your understanding
Q1: A, **Q2:** C, **Q3:** A (1 mark for each, max. 3 marks)
Q4: 1 mark for each correct row (max. 3 marks)

Beef mince	It has to be ensured that the animal was killed in the pr Otherwise, the beef has to be replaced with kosher beef
Milk	If beef is used in the recipe [illegible] to be replaced, e.g.

Q5: 1 mark for a health benefit, 1 mark for an explanation/justification from: (max. 2
- **Health benefit**: helps to lower blood pressure / lowers the risk of type 2 di
  - **Justification**: Rastafarian diet is full of fresh vegetables and fruit, [illegible]e; fibre helps to control cholesterol and sugar absorption
  - ay help to reduce the risk of the conditions named above
- **Health benefit**: boosts immunity / prevents anaemia
  - **Justification**: the diet is rich in vegetables and fruit, which provide immunity, helps to build collagen and improves iron absorption
- **Health benefit**: helps to prevent hypertension
  - **Justification**: the diet is low in sodium – Rastafarians do not use sa intake is fairly low
- Or any other suitable example.

Q6: Any three from: (max. 3 marks)
- When selecting recipes, pay attention to the meat content of the dish/meal pork, pork blood or gelatine.
- The dishes cannot be made with the use of pork fat (lard).
- Pay attention to the alcohol content of food as Muslims cannot drink any al
- Pay attention to how the meat was obtained, as only halal meat can be eate
- The food and beverages must be caffeine-free as Muslims should also avoi
- Pay attention to the time of meals; for example, during Ramadan food can
- Accept other suitable answers.

Ethical and moral beliefs

Check your understanding:
Q1: A, **Q2:** C, **Q3:** D (1 mark for each, max. 3 marks)
Q4: 1 mark for each correct row (max. 3 marks). Other responses may be accepted.

Local community	e.g. bananas, oranges, kiwis and other imported foods, as people w are produced locally (this helps to support local farmers and who
Animal welfare	e.g. eggs from barn- or cage-bred hens and [illegible]lk from intensively rather choose foods which were ma[illegible] r spect for animal we eggs) or else become vegetarian/vegan to avoid animal exploitati
Lack of pesticides	e.g. conventionally [illegible]m[illegible] reared foods, as people would rath pesticides [illegible] (e.g. organic)

Q5: Any three from: (1 mark for indicating how the concerns influence food choices
explanation/description):

- choosing foods from sustainable sources (e.g. fish, palm oil) – the consume
produced in a way that limits the negative impact on the environment
- choosing animal-derived foods (e.g. eggs, milk, meat) which are labelled as
Assured, Red Tractor scheme, etc. – many people care about the conditions
kept, and, therefore, will choose to buy such products to support animal w
kept in humane conditions
- choosing foods which were not genetically modified – GM foods have a larg
decreasing species diversity and leading to extinction of less immune speci
non-GM foods can help to support species diversity and natural habitats
- choosing Fairtrade foods – as they are also often produced in a sustainable
- choosing seasonal foods and locally produced foods – as this helps to lowe
helping to limit the impact on the environment by decreasing production
carbon dioxide)
- Other suitable answers may be a

Quiz-ine

1. Allerge
2. Ital
3. Metabolic
4. Best before
5. Kosher
6. Vegan
7. Intolerance
8. BOGOF
9. Use by
10. Chapatti
11. Anaphylactic
12. Free-range
13. Origin
14. PAL
15. Organic

The shaded squares reveal this word: **lacto-vegetarian**