Zig Zag Education

Food and Nutrition GCSE | WJEC | 3560

endorsed for wjec cbac

Course Companion

for WJEC GCSE Food and Nutrition: Where food comes from

zigzageducation.co.uk

POD 8258

Contents

Teacher's Introduction

This resource is designed to meet the Area 5: Where food comes from element of the WJEC GCSE Food and Nutrition qualification.

What it covers

The resource comprises three chapters covering the following:

Chapter 1: Food provenance	**Chapter 2:** British and international cuisines	**Chapter 3:** Food manufacturing
• The origins of food (where and how food is caught, grown or reared) • Sustainability and security of food	• British cuisine • International cuisines	• Food processing (primary and secondary) • Technological developments which support health and food production

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.
Skills	Based on the suggested application of skills section of the WJEC GCSE Food Preparation specification, these test learners' food safety skills through practical application.
Study tip	Useful tips to help the learner concentrate on important aspects of the text that may appear in the final assessment.
Check your understanding	Multiple-choice, short-answer and extended-answer questions appear at the end of each section to test knowledge and develop 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.

*A webpage containing all the links listed in this resource is conveniently provided on ZigZag Education's website at **zzed.uk/8258***

You may find this helpful for accessing the websites rather than typing in each URL.

M Golebiowska, March 2018

Chapter 1: Food provena

Overview

In this chapter you will learn how foods are grown, reared and caught. You will discover various methods of farming, and their advantages and disadvantages. You will also learn to recognise various types of fruit, vegetable, meat and fish. In the second section of this chapter you will learn about food security and sustainability of resources.

Learning outcomes

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

- ❑ know and distinguish between grown, reared and
- ❑ classify fruit, vegetables, meats and fish
- ❑ understand the advantages and disadvantages of
- ❑ understand the impact of food production on the
- ❑ describe various aspects of food security and effe

Key Terms

Affordab	When something, e.g. food is not too expensive for most p
Availabilit	When it is possible to buy or get a sufficient amount of som
Carbon footprint	How much energy has to be used, and, therefore, how muc production, processing and transportation of foods
Factory farming	Type of agriculture focused on intensifying food production animals in small areas of land, to increase production of mi potential costs
Fairtrade	Ethical category that enables fair wages and prices for food developing countries; designed to prevent human exploitat
Fish farms	Tanks or enclosed sea areas in which fish or seafood is reare
Food miles	How far the food has to travel from the producer to the co
Food poverty	Inability to provide oneself with enough food, both in term
Food security	A term created by the United Nations, meaning that, at any in the world, each person should have access to a sufficient food
Food waste	Food that is rotten, spoiled or wasted in another way, and h
Free-range	Farming method in which animals and birds are allowed to the day
Game	The meat of hunted animals and birds
Genetically modified (GM)	When the DNA of a given organism is manipulated by gene
Greenhouse gases	Gases which to trap heat in the atmosphere, increasing the They include water vapour, carbon dioxide, methane, nitro
Intensive farming	Type of agriculture focused on intensifying food production herbicides, GM crops and other methods
Livestock	All animals that are domesticated and reared to provide food, work
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, pesti or GM feed and GM organisms, under strict conditions
Polytunnel	Tunnel frame covered with polyethylene, used to grow plan
Poultry	The meat of farmed birds, e.g. chicken and turkey
Seasonal food	Food characteristic for a given season of the year
Sustainability	Ability to maintain the natural environment and produce go
Venison	The meat of a deer

The origins of food: where food co

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

Food has to be grown, reared, caught or gathered, before it is processed and can
plates. In this section we will discuss the different methods of food production a
them.

Grown foods

Foods may be grown in fields, orchard[illegible] polytunnels.

The most traditional [illegible]rowing foods includes fields and **orchards**. [illegible]re large areas in which roots, bushes and trees are grown to pr[illegible]vegetables, fruits, nuts and seeds. They are kept under the open sky, which means that they are susceptible to all weather changes, low and high temperatures, 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.

Di

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Picking apples in an orchard

Field

Polytunnels were inven[illegible]1940s to enable the growth of tropical [illegible]. They are long, plastic tunnels created to ensure the [illegible] and humidity necessary for proper development of such plants. Thanks to polytunnels, we can enjoy strawberries, cucumbers and lettuce all year long. Polytunnels protect the plants from external hazards such as weather changes or insects, and, therefore, it is easier to predict how much food will be produced.

Straw

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,
Orchard	mostly hard fruit and nuts	apples, ch olives, wa
Polytunnel	mainly soft fruit	strawberr tomatoes
	vegetables	lettuces,
	[illegible]	white mus mushroo

Did you know?

Some vegetables such as lettuce, basil or wasabi may be grown using hydropon
they are not planted in soil, but their roots are put directly in water.

Research

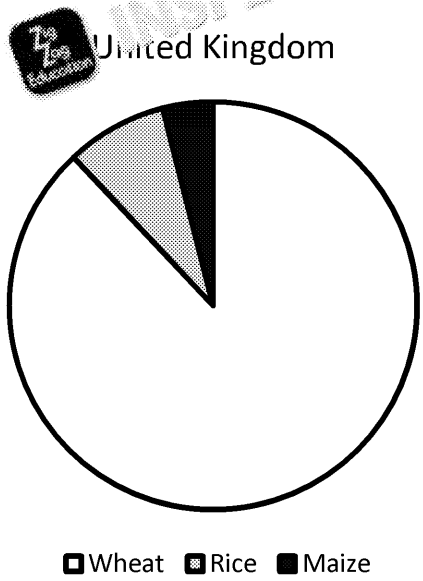
Find out what plants can be grown hydroponically at
http://modularhydro.com/ArticleLibrary/WhatCanYouGrowHydrop

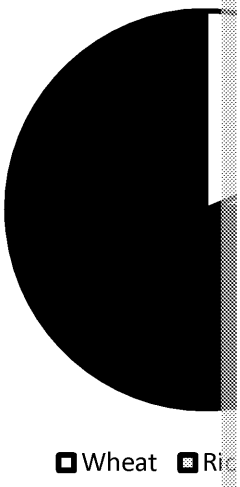
Hydroponic farming

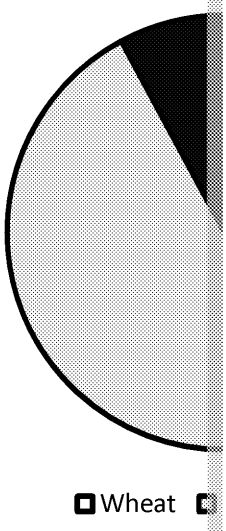
The region in which people live often determines what can be grown and, therefore, determines their diet. This usually is embodied in national dishes; for example, Mexican cuisine uses a lot of sweetcorn because maize grows in Mexico, but traditional British cuisine doesn't have any sweetcorn in it because 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.

The charts below illustrate the main three grains consumed around the world – wheat, rice and maize.

Notice how consumption patterns change with the region and climate of each co certain produce. According to *National Geograph* ... ost popular foods in th total consumption) and wheat (18% of tot... sumption). Next, there are vege (8%).





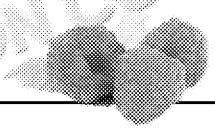


Classification of fruit and vegetables

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 t the development of technology, it is possible to produce fruits which are seedless Generally, a fruit consists of a seed or seeds surrounded by a pericarp (the soft o hard fleshy part) and covered with skin. An exception is the strawberry, which h its seeds on the outside.

Fruits can be classified according to how many flowers they have developed from This means we can differentiate between simple fruit (developed from one ovary flower), multiple fruit (developed from multiple flowers gathered into a mass) an aggregate fruit (developed from multiple ovaries of a single flower).

A bana sir ple fruit.



Raspberries are multiple fruits.

A

Fruits can also be classified according to their type / culinary use.

Tree fruits	grow on trees, have an edible skin and firm texture	ap
Stone fruits	have a hard stone in the middle, usually surrounded by a soft, fleshy pericarp	pl
Berries / soft fruits	soft texture and small pips	st
Dry fruits	their skin becomes dry once they reach maturity	pl
Exotic fruits	characteristic of tropical countries, not grown in the UK	ba fru
Citrus fruits	surrounded by tough, aromatic skin; have a juicy texture	or

Vegetables can be classified according to which part of the plant they come from

Fruits	ingredients which are botanically fruit, but are used as vegetables in cooking	courgette, cucu aubergine
Seeds	those which grow in pods (which are also sometimes eaten)	green peas, be
Flowers	the edible flowers	artichoke, broc
Leaves	formed by the leaves	lettuce, kale, ca
Stems	the edible stem which constitutes the main part of the vegetable	asparagus, cele
Roots	usually long or rounded in shape	carrot, parsnip, beetroot, sugar
Bulbs	grow just below the surface of the ground and are formed of many layers	garlic, onion, le
Tubers	de ound on the root of the plant	potato, yam, Je
Fungi	m oms can grow both above and below the ground	Portobello, but

Things to think about

Discuss the advantages and disadvantages of growing foods in fields

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

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 worki
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.

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 livestock. This applies especially to cows (milk 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.

Apply

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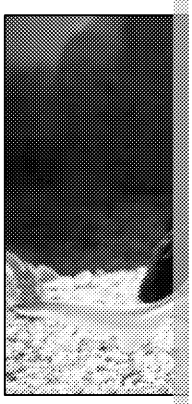
inf

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

What people rear…	
Cattle	Leather, beef, milk
Poultry	Meat
Horses	Meat, entert
Pigs	Pork, l

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.



Sturge

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 **https://www.rspca.org.uk/adviceandwe fa e/ n/fish/farming** and dra
steps in fish production. Do fish fa us ganic or conventional farming me

Poultry, such er , geese and turkeys, is also reared around the world
animals are kept in henhouses. The birds may be kept in tight cages, or
around the house and even be allowed to go outside. The way is which poul
meat and eggs produced. Also, **organic farming** rules may apply here – this is wh
feed, are not given antibiotics if not necessary, etc.

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

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-feedi
fattening

Another example is squeezing many animals in tight boxes placed on top of each other, as is the case in battery farms (cage egg farms). 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 include:

- keeping animals in closed bu…g…thout access to natural sunlight
- cramming in animal… …n't turn around or move (e.g. cows in feedlo…
- using a…tic… …revent diseases and speed up the growth of animals, w… in micr…isms (which, in the near future, may lead to creation of new, l…
- genetically manipulating DNA of animals to produce more muscle tissue, eg… animals would
- overexploiting animals, which shortens their life (an intensely reared cow liv… to around 20 for one living in the wild)
- transport conditions – when animals are finally transported to slaughterhou… trucks and often spend a couple of days without food or water before they …
- slaughtering conditions, in which animals' throats are slit open and the anim…

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 pig)
- poultry (from chicken, duck, turkey, goose, etc.)
- game (both from mammals and birds – see caught foods for more info)
- offal (the edible internal organs of the animal)

Appl…
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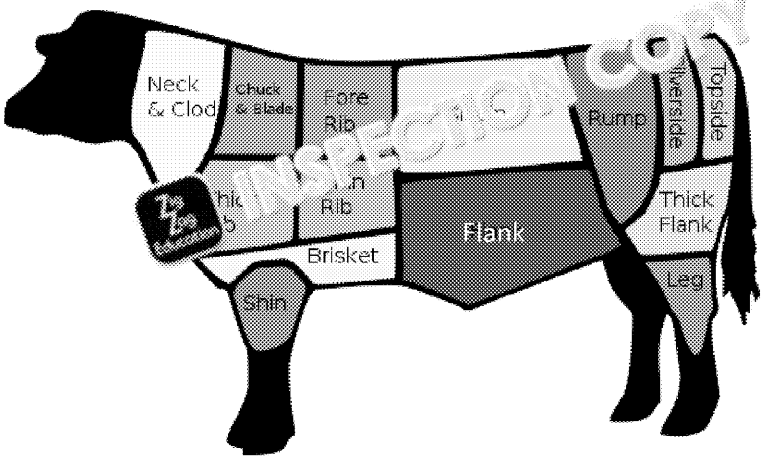
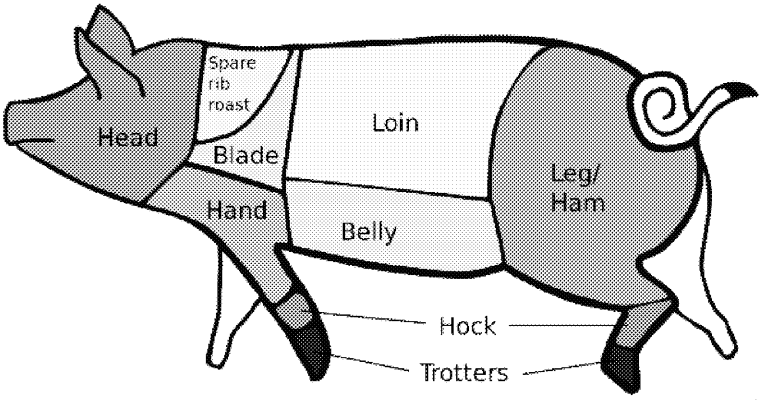
wi…

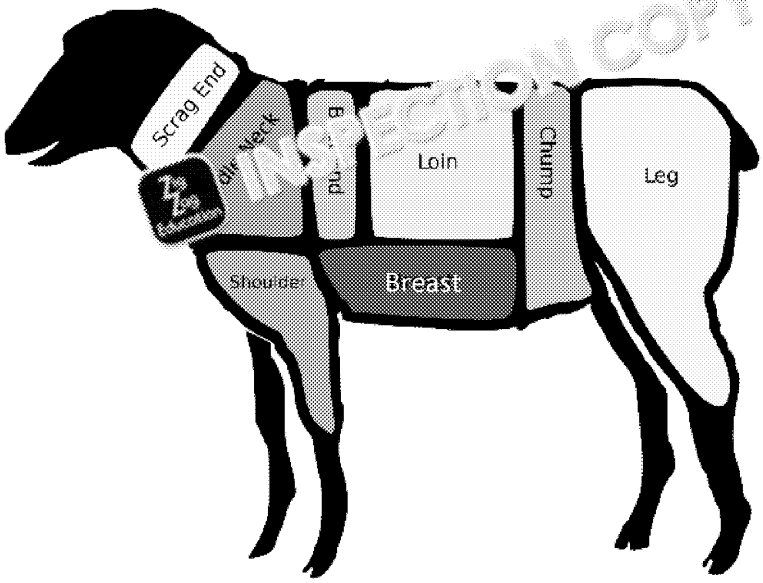
The origin of meat and the way the animal was reared determines its quality, fla… different cuts of beef, pork and lamb, and their culinary uses, are shown in the d…



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



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



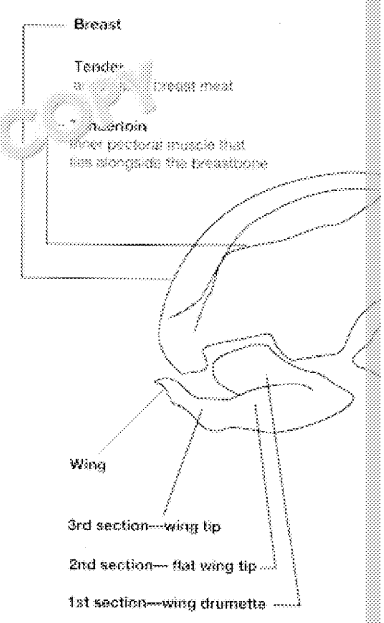
Scrag end a
braising, ro
Best end (r
Loin – grilli
Chump – g
Leg – roast
Breast – ro
Shoulder –
slow cooki

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

Research

Go to **http://www.yourarticlelibrary.com/home-science/meat/meat-me
and-classification/86567/** to see how lamb, beef and pork are further classifie

Poultry includes the meat of domesticated fowl, such as chicken, turkey, duck and geese. The diagram (right) shows the main cuts of poultry carcass.



The breast is usually the tenderest part, which requires only a short cooking time. The wings are rich in collagen, which makes them a suitable base for prepari[illegible] (savoury jelly). After marin[illegible] meat can be grilled, steamed, st[illegible] fried or roasted. The carcass that is left after portioning (consisting of the neck, backbone, ribs and tail) can be used as a base for preparing soups and stocks. It is important to remember that fat in poultry accumulates mainly under the skin, so removing the skin is a good way of reducing the calorific value of a dish.

Caught foods

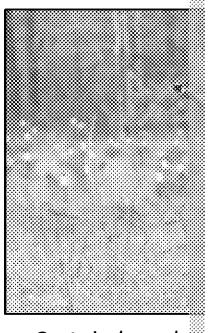
Caught foods include all wild animals that can be hunted and eaten. This includes game and wild fish that live in the seas and oceans (such as tuna, mackerel, herring and shellfish).

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. Meat from a deer can also be called *venison*.

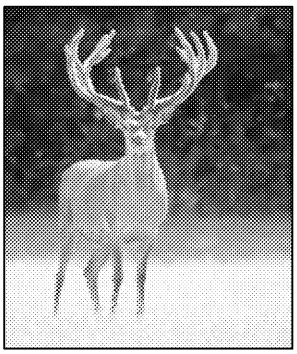
People have been hunting animals for centuries – either for food, horns and antlers, sport or entertainment. Since this has led to the extinction of many species, it is now often either forbidden to hunt certain species or it is allowed in certain seasons only.

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 it

An angler sho

Classification of fish and game

Caught animals can be divided into:

- small birds, e.g. thrush, quail
- winged game, e.g. pheasant, wild geese, 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 this reason, it is advisable to have them checked by a vet before as 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 (more

Examples of each type of fish are shown in the table below.

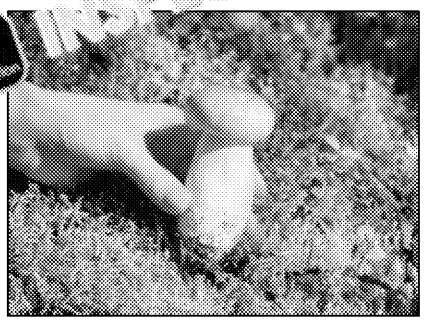
Criterion	Type of fish	Ex
Origin	Saltwater fish	Cod, mackerel, s
	Freshwater fish	Carp,
Shape	Flatfish	Sea brea
	Roundfish	Carp, s
Fat content	Lean fish	Cod, s
	Mid-fat fish	Halibu
	Oily fish	Herring,

Nowadays, more and more animals that have traditionally been classified as cau farms, such as oyster farms. This helps to control their quality and safety, as wel produced. It also helps to protect the environment and save wild animals from e

Did you know?

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

Herbs such as stinging nettles may then be used for production of he certain kinds of cheese, medicines and dietary supplements, cosmet animal feed. Mushroom picking is po especially in Eastern Euro where various kinds of mush are picked from early May (e.g. c late October (e.g. bo



Picking mushrooms and forest fruit is popular in many European co

Check your understanding: Where f

1. Cattle are reared for… *(1 mark)*

   a. meat ☐ b. milk ☐
   c. biofuel ☐ d. all of the above ☐

2. Reared foods do not include… *(1 mark)*

   a. salmon ☐ b. duck ☐
   c. hen ☐ d. triticale ☐

3. Which method allows year-ro… …ality of food? *(1 mark)*

   a. growing whe… …the field ☐
   b. growi… …w…rries in polytunnels ☐
   c. …ro…g apples in orchards ☐
   d. …owing lettuce in the field ☐

4. Name two examples of foods which can be both reared and caught. (2

   .....

   .....

5. Explain two reasons behind rearing fish in fish farms. *(4 marks)*

   1 .....

   .....

   2 .....

   .....

6. Evaluate the advantages and disadvantages of growing plants in polytu…

   .....

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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 t her conditions
- artificial fertilisers
- *or all of the ab*

Conventiona ing usually leads to deterioration in soil quality, which means t
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
high-yield crops and, therefore, produces a larger amount of food for a greater n
used more and more often since it increases production and raises 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

The use of a
pigs has led t
many bacter

This is dange
will be no a
to help peo

Factory farming

Factory farming is an agriculture method in which a large amount of **livestock** is k
increase production of meat, milk or eggs, and to lower possible costs and invest
profit is the most important consideration, factory farms can choose to rear certa
biodiversity) and use antibiotics to prevent potential diseases. Other practices m
include cutting birds' wings or beaks to prevent them fighting with each other, w
welfare activists and organisations.

Organic farming

As opposed to conventional and factory farming, orga rming is focused on producing food while maintaining soil quali y, eco ems, natural resources and biodiversity. Organic f in ubject to many legal restrictions; it can only use va estr ted chemicals – not including artificial fertilisers, pe ides, herbicides – and cannot use preventive antibiotics, **ca modified (GM)** crops or animal feed made with the use of GM c armers can sustain their crops through the use of natural methods such as crop rotation and natural fertilisers (e.g. manure) to support soil health. Antibiotics can only be used in case of disease (to cure it,

The way we grow and rear our food is very important due to health and environ

Organic farming means that fewer fertilisers and pesticides are used (under restr
are naturally based.

Study Tip

'Organic' means:

- fewer pesticides
- no artificial colours or preservatives
- the highest standards of animal welfare
- no routine use of antibiotics
- GM free

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
as naturally occurring plants have va
water, sunlight and warmth, farmers
different varieties, as others would s
conditions.

Research

Find out more about organic food at **http://www.organic kfood.com/**

Soil Association organic symbol

EU organic log

Organic farming in the United Kingdom is promoted by the Soil Association, whic
standards and is a certification body for farmers. Specific and detailed restrictio
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

Research

Visit the website **http://www.greenpeace.org/.../oceans/what-we-are-do
seafood/sustainable-seafood-frequen...-questions** and list fish spe
endangered due to overfishing. T... research fish species which are sust

Seasonal and locally produced foods

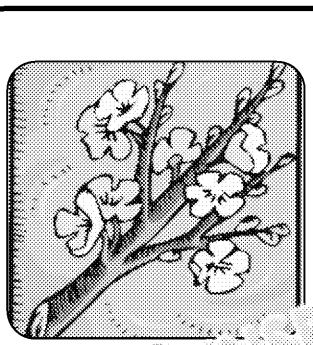
Before the development of modern technologies, people had to eat what was av
environment. This forced them to eat only seasonally growing, **local foods** (for e
no lemons or oranges). Today, some people are turning back to the idea, claimin

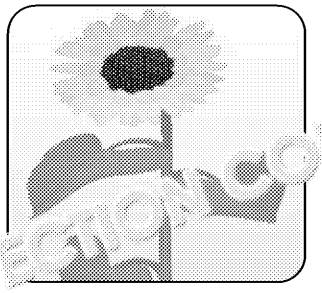
There are four main seasons of the year, and each can be characterised by different food products.

- In spring, most plants start to bloom and produce their first shoots. As June approaches, the first fruits 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 harvested. Also, while the crops last, f
produced for the winter.
- In winter very few plants produce any food, and, therefore, the diet is based
kept during the whole year – thus, Christmas pudding is full of dried fruit!

Did you

This is close to
'five flavours', w
what's locally a





Spring	Summer	Autumn
...ots	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 imports and new technologies have allowed people to bypass these rules. Thanks to these developments, tomatoes, for example, can be produced in polytunnels and oranges can be brought from overseas, and some fruit and vegetables (such as strawberries) are available all year long!

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.

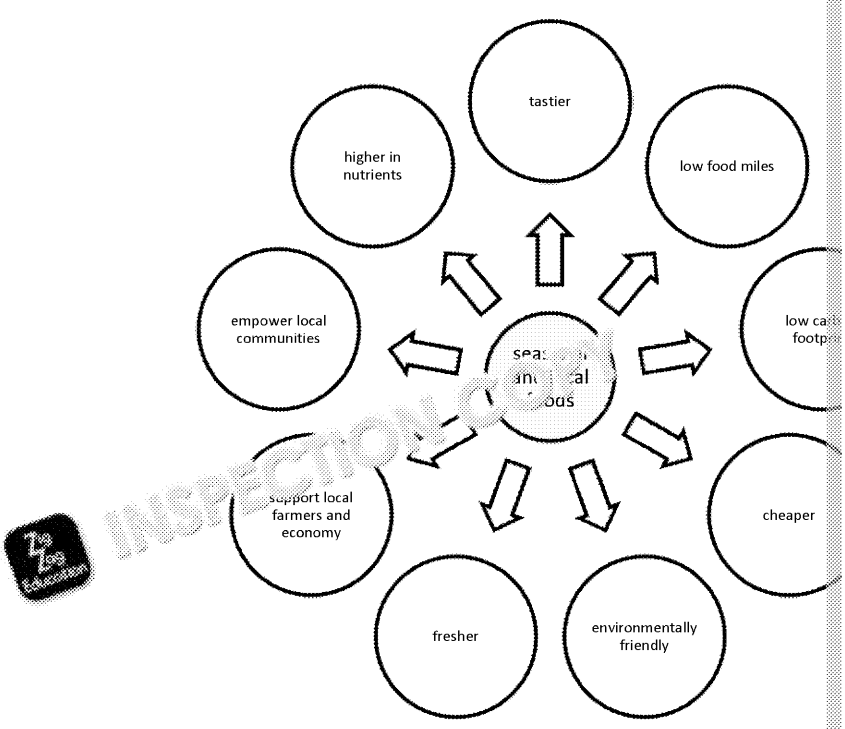
Also, cheese production has, for hundreds of years, been linked to the lactation p cows and sheep produce milk between March and October only and, therefore, t is tastier then. However, intensive farming methods allow production of milk all y enjoy tasty, fresh cheese whenever we wish.

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 scallo

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 we
natural conditions, with access to water, nutrient-rich soil and natural sunlight. A
produced locally and, therefore, there is no need to pick them prematurely to tra

For this reason, the foods are fresher, because there is no need to store them fo
because they don't have to travel long distances from producer to customer.

Because the foods are often left to ripen naturally, they are higher in sugars and
them tastier.

Local production is also environmentally friendly because it reduces the food mil
footprint (you will learn more about these later on in this chapter).

Low transport costs is a factor that affects the final price of the food, usually mak

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 of g
to plants)
- lack of diversity
- unpredictability – weather changes
or droughts and vermin may lead
quantities of crops, which may result in food shortage or food waste and the
storage)
- loss of
because you can eat or cook only what's just growing
have s
dinner (unless there are rice crops nearby)
- need fo
ativity – so that your meals aren't boring (after all, you
only have a couple of ingredients to use)

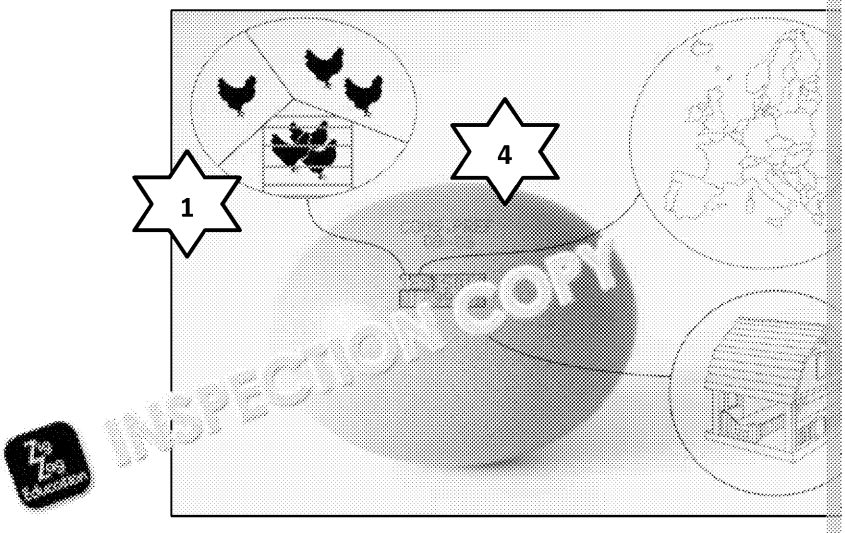
Ap

Research

Visit the website **http://www.eattheseasons.co.uk** to list the foods which are characteristic of the current season. Are any of them produced in y

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



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

Did y

The advo
organic e
happier a
tastier, h

1. The first information in the code is **method of production**. This refers to the way the hens were reared and shows whether they were kept in cages, allowed to move around the barn or allowed outside.

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

Method of production	Description
Cage	• Hens are kept in tight cages placed on top of each • 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 a t e barn • Hens can have c t i s o prevent them from fly • Hens h t i mmed beaks to avoid fights • i tivity–sleep time is regulated by artificial li
Free-range	• Hens are let outside for at least part of the day • Space per bird is increased (stocking density is nine metre) • Perching space provided for each hen • Hens have access to natural sunlight for at least pa • Second most popular method in Great Britain
Organic	• Has to respect all criteria for free-range rearing • Birds have to be fed organic feed only

Did you know?

In the United Kingdom, animal welfare can be ensured by following the standa
the Royal Society for the Prevention of Cruelty to Animals (RSPCA). The log
be found on foods where animals have had a better life. This applies to meat a
poultry.

The code on the label also indicates:

2. The country of origin. This is indicated by the letters following method of production and uses commonly recognised country sy ols; for example, U means United Kingdom, ES means Spain, DE st as r Germany and NL is th Netherlands.

3. The farm ID. This all trace which farm produced the egg; this is e important fo ing occurs, because it can help stop further spread o diseas

4. Best before date.

Some people prefer to buy eggs directly from local farmers. This may affect the s the eggs because they often do not perform antimicrobial tests (or don't wash th for example), which puts them at risk of spreading *Salmonella*. Spreading of the is prevented in the UK by vaccinating hens, following the rules of the British Lion scheme.

Did you know?

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

Apply

While shopping, check the labels on eggs and make notes about their origin a Which ones are the most popular?

Research

Visit the website **https://www.egginfo.co.uk** and find out differences in the q

Check your understanding: How f

1. Which of the following statements about organic farming is TRUE? *(1 m*

   a. It allows the use of artificial herbicides. ☐ b. It allows rout
   c. It allows the use of GM feed. ☐ d. None of the a

2. Which of the following is TRUE about free-range hens? *(1 mark)*

   a. They live in cages. ☐ b. They are allow
   c. They live in barns. ☐ d. They only eat

3. Which of the following is TRUE? *(1 mark)*

   a. Locally [illegible] foods decrease emission of greenhouse gases.
   b. Locally produced foods are always organic.
   c. Seasonal foods are often more nutritious than non-seasonal foods
   d. Seasonal foods are usually less expensive than non-seasonal foods

4. State two advantages and two disadvantages of organic farming. *(4 ma*

   Advantage 1 .....

   Advantage 2 .....

   Disadvantage 1 .....

   Disadvantage 2 .....

5. State two benefits of sustainable farming. *(2 marks)*

   1. .....

   2. .....

6. Evaluate the impact that farming method has on the quality and safety

   .....

   .....

   .....

   .....

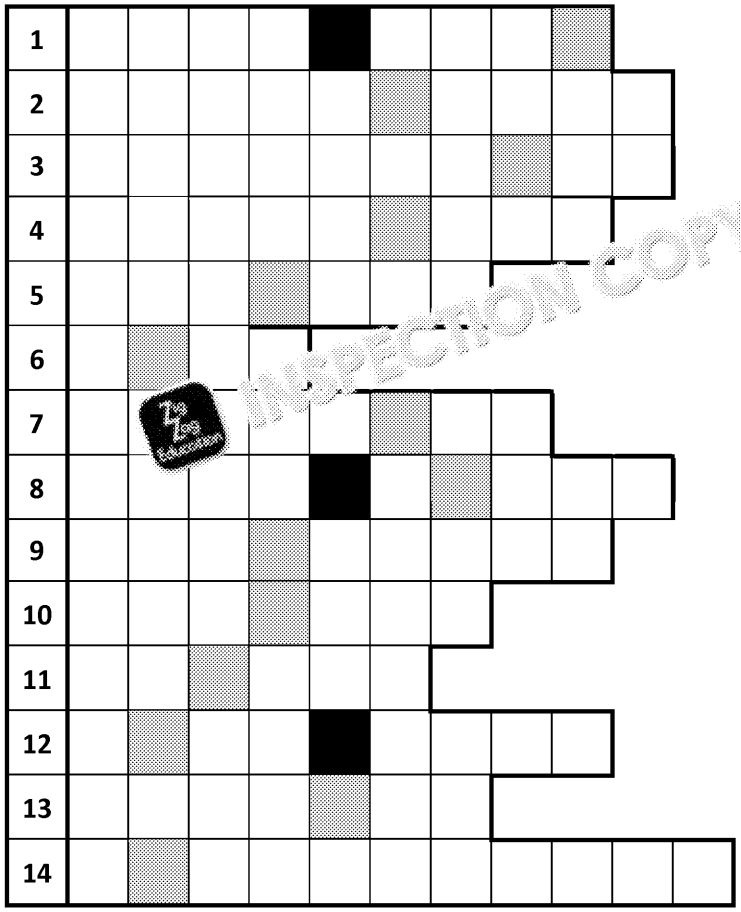
   .....

   .....

   .....

   .....

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



1. Greasy pâté made of goose liver (4,4)
2. Growing food in this allows availability all year long (10)
3. Used to improve soil quality (10)
4. All farm animals are referred to as this (9)
5. Ingredients and foods produced without or with very little artificial substanc
6. Cereal grain that is most commonly used around the world (4)
7. Characteristic of a given time of year (8)
8. Farmed animals and birds which are allowed to roam outside (4-5)
9. Used to kill weeds (9)
10. The meat of a deer (7)
11. Oily fish caught for its characteristic pi... (4)
12. Enclosed area in which oyste... can be reared (4,4)
13. Domesticated birds ... and ducks are referred to as this (7)
14. Growing ... which plant roots are put directly into water (11)

The shade... squares reveal this word:

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

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

Global warming and sustainability of food

Earth's climate changes in cycles – just like seasons. Temperatures on Earth have
years, causing the ice to form or melt, depending on the stage of a given cycle. B
experienced six glacial periods!

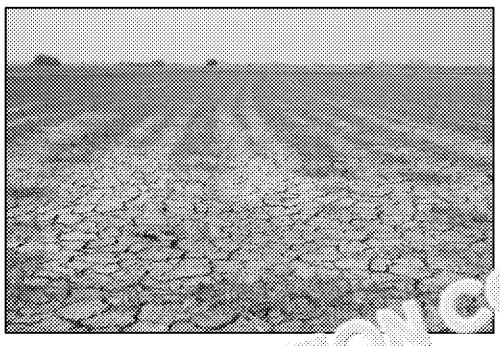
For centuries, climate change was caused by variations in Earth's orbit and in solar activity, which then determined the amount of warmth the planet received from the Sun. The Sun's rays pass through the atmosphere and are then reflected by Earth's surface. In normal conditions, the heat would spread 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:

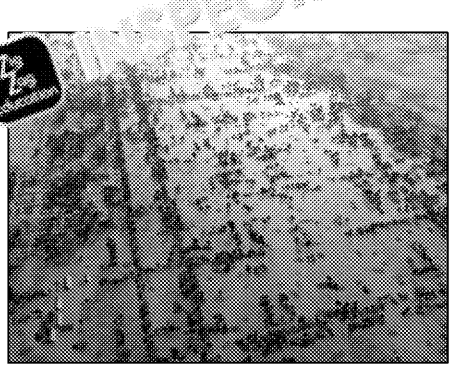
- burning coal, oil and wood to obtain energy, and also for food production and transportation between countries
- deforestation to obtain fuel and land for agriculture

Global warming is dangerous. It can lead to:

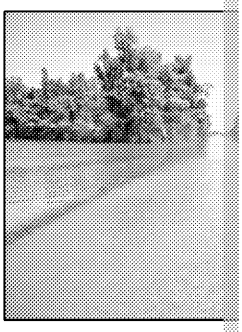
- melting of glaciers and a rise in sea levels
- a rise in global temperatures
- warming of the oceans
- extreme events such as hurricanes, intense rainfall, heatwaves, droughts an
- acidification of the oceans



Droughts and floods are both examples of climate change and have a devastatin



A flooded farm



A farm which is so ba
it's a far

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
climate change on food security and availability is discussed later on in this Cours

As the world population grows, more and more food has to be produced to mee
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 resources such as water and
generate a lot of waste and pollution. Intensive farming a shing can lead to t
species and to soil exhaustion. For these reasons of **sustainable food** is
important. The point of sustainable food is se e available resources only to
overexploit them and allows ther o e ienished.

The main pri es sustainability are:

- reducing waste of food and packaging
- eating more vegetables and fruit, and less meat and dairy to limit the amount of
- 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 supported by the European Union, which created a '
Europe'. The aim of the policy is to reduce waste, impro iciency of resource
consumption in order to protect the environment.

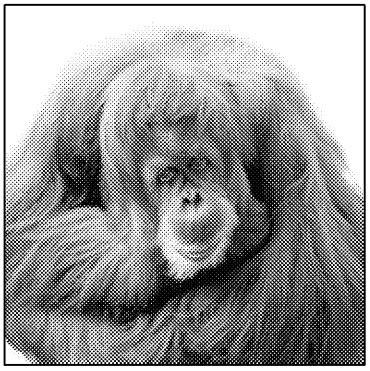
Research

Discover more abo in ility of food at **http://ec.europa.eu/environ**

An example o ow the policy is implemented is **fish farms**.

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

Why is sustainability of resources important?



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

Did you know?

Sustainability means the ability to keep harvesting or using a product without causing long term damage or harm to the environment, the animal or to the economy or livelihood of developing countries.

A

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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-Whittingstall campaigned for Marine Conservation Zones (also known as Marine Protected Areas) to help protect the 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 wildlife, including the orangutan (over 80% according to the Orangutan 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 in the An wi On soy hu fee on soy co ca me
Research*:* Take a look at **zzed.uk/8258-defra-marine** to see a map of Marine Protected Areas.	**Research:** Take a look at the Orangutan Project at **zzed.uk/8258-orangutan-palm-oil**	**Re** Wi **zze**

Case study – sustainable fishing

Fish is a source of complete 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 Fish[illegible]y was implemented. It states the way (especially in wild fisheries) [illegible]nat rate – this is important to avoid extinction them to regain the [illegible]ation.

Sustainable [illegible] farms should implement two general rules: ensure the health of t adjust the catching method. Fish farms help to protect wild fish and other species oceans, while producing enough food to feed the growing population.

Fish farms allow producers to rear fish and seafood for meat, caviar, pearls, anim

Fish can also be sustainably obtained from wild fisheries (those naturally occurrin

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 othe this often leads to by-catch
- **longlining** means fishing with the use of a long line to which other lines are a with a hook; this is not a sustainable method of fishing as it often attracts u sea animals (e.g. turtles) leading to a significant by-catch
- **bottom trawling** means pulling a large net along the seabed, used to catch s this can damage the fish habitats and permanently affect the fish populatio
- **harpooning** in which harpoons are thrown at individual fish; this is a sustainable fishing method since only the intended fish are caught (no by-catch)
- **floating traps** in which traps and weirs are suspended in water, attracting individual fish; the fish are then trapped inside a box, but are not harmed. Once the box is removed from the [illegible], the catch is removed and may be released back to the se[illegible]n't the intended fish or shellfish

B
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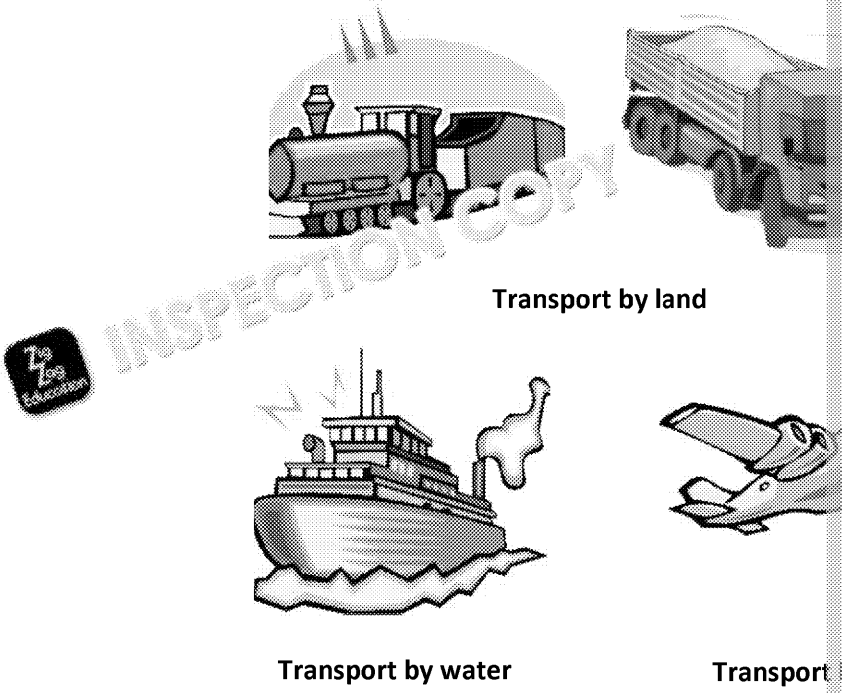
Carbon footprint and the food miles

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).



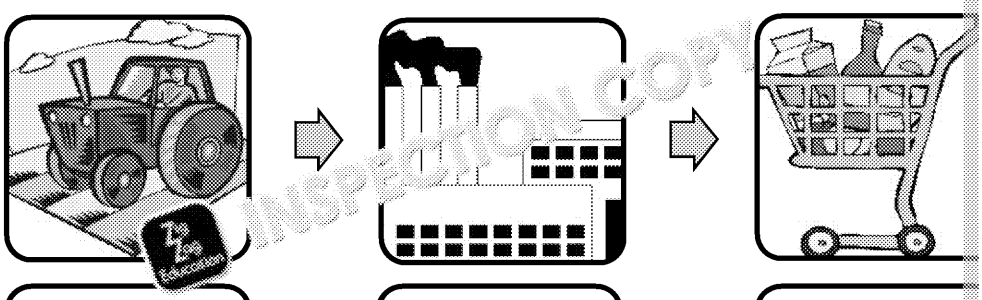
Transport by land

Transport by water **Transport**

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

An important effect of rising global transportation (and consumption of fuels) is
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
carbon footprint. It also reduces **food miles** – the distance which food has to tra



The farmer uses fuel to run his tractor and gather crops, and transport them to the factory.

The factory uses fuel and energy to process the food.

The shop uses fue to transport the food from the factory, and energ to run the shop, cash desks, etc.

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

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

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

Research

Visit the website **http://footprint.wwf.org.uk/tips** and discuss how YOU ca
footprint.

Packaging and the environment

Packaging as we know it became very popular after World War II – before that p
or paper containers to carry all kinds of food. Plastic bags gained popularity in th
and convenience.

Food can be packed in various types of container: bags, sacks, boxes, bottles… Foo

- paper and/or cardboard
- plastic
- glass
- steel
- aluminium (tins and cans)
- wood (baskets and crates)

The materials can also be combin , f mple, to insulate cardboard boxes so

They are sp d , to:

- protec od from external factors (such as light, oxygen, dirt or microor
- inform the consumer about the product (information)
- attract consumers to the product and tempt them to buy it (marketing)
- increase the shelf life of a given product (preservation)

How does packaging affect the environment?

Packaging has a big impact on the environment – from the moment it is produced to the time it is discarded or destroyed.

Landf

- Production of packaging – no matter what material is used – entails the use of water, electricity, detergents, labour and other resources.
- Then, the packages have to be transported to the factory, where the food is packed – that contributes to the carbon footprint.
- After the food is eaten, packages are discarded – ideally, into recycling containers. Unrecycled packaging creates pollution of air, earth and water.
- Landfills cause pollution, and require a lot of space and money to be run efficiently.
- Packaging which is not disposed of correctly can be swallowed by fish, birds death.

British people buy 22 million metric tonnes of food every year – and all that food important to dispose of the packaging properly, so it c cycled or destroye environmentally friendly way. This is because ma eri uch as glass or plastic w process will take a very long time (see ta le p. 29). For this reason, the gover organisations strive to limit th mb r of plastic bags used (introducing the 5p halved the number!) [1]

Did you know?

In 2013, British consumers took home 7.4 billion plastic bags from supermark

Source: **https://www.gov.uk/government/news/plastic-bag-numbers-rise-for-**

[1] *http://www.bbc.co.uk/news/uk-34346309*

Material	Time tak
Paper	2
Food	1
Milk cartons	
Cigarette butts	1
Batteries	
Aluminium cans	8
Nappies	25
Plastic bottles	
Plastic bags	10-
Glass	Mil
S	

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 **https://www.recyclenow.com** and create a poster in which and how you can recycle in your area.

Typical colour of the bin	What goes into it	Wh
Blue	Paper, aluminium tins, metal cans, glass bottles and jars, plastic bottles, plastic food trays and yoghurt pots	The materials packages, re
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

[2] *https://www.thebalance.com/how-long-does-it-take-garbage-to-decompose-2878033*
[3] *https://www.thurrock.gov.uk/household-waste-and-recycling/what-goes-in-your-bins*

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.[4]

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.[5, 6]
2. **Wasting food is environmentally unfriendly**. Many resources – water, electricity, produce and transport it. Not to mention the energy they used, but, in the meantime, a
3. **Wasting food is unecological**. Many people were involved in the process of paid for. The Waste Resources Action Programme estimates that each family simply by avoiding food waste.[7]
4. **Wasting food requires organisation**. After all, someone has to pick up the rubbish from your home and either recycle it or store it 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 (plastic) and cooked (carbon dioxide again). All the by-products of food production and consumption find their way into the environment and contribute to the overall pollution of the planet.

Did you kn

The top five waste Kingdom are:

- bread
- potatoes
- apples
- meat and fish me
- vegetable meals

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

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

[4] *http://www.wrap.org.uk/sites/files/wrap/UK%20Estimates%20October%2015%20%28FINAL%29*
[5] *http://www.who.int/mediacentre/factsheets/fs311/en/*
[6] *https://www.thelifeyoucansave.org/Causes/Hunger-and-Nutrition?gclid=CPPwk4nIvNACFUNmGv*
[7] *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

- **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 has to fulfil international standards, as otherwise it can't be sold in shops.
- **Faulty methods** – faulty methods of production, e.g. in factories, may lead to the waste of many foods

These

Limiting food waste at these stages might not be easy, as it may require legal changes, but there are a couple of ways which can help to limit the wastage.

- Farmers may choose to use pesticides or herbicides, or to grow foods in polytunnels to limit the damage 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, packaging – producers can maintain proper conditions to prevent spoilage caused by microbes.
- Factories can use packaging to protect food from external factors – modern 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. This might be due to:

- 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.
- Controlling storage conditions, both in the storeroom and in the sales hall – this applies 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 won't be safe to eat beyond that 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. This 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 – this applies especially to meat and fish, and to cooked meals. Vegetables have to be blanched or pre-cooked before freezing.
- Serving 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 **https://www.lovefoodhatewaste.com** and try to list five w may contribute towards lowering food waste.

Apply

Think of w such as pota

Things to think about

Discuss how food waste, transportation and packaging contribute

Impact on global markets and communities

Your food choices affect not only you and your family, but also people in often d
the food we buy is often imported; for example, oranges are imported from Spai
rice from Thailand. As you pay for your shopping, the money is divided between
drivers who transported it from the factory, food factory workers and farm work
larger the price – so even if production of rice is very cheap, the price paid at the
the wages paid to the farmers are often very low and encourage human exploita

Although slavery was banned in 1833, modern societies tend to overexploit their
resources – including labour – in order to produce more goods and create a bigg
profit. In many countries, children are forced to work, and people are not paid f
for their work – which leads to high poverty rates in such countries as China,
Indonesia and India.[8]

Fairtrade is a global movement which helps to stop modern slavery. It has the
following benefits:

- fair prices and wages for producers, farmers and farm workers – buying Fairtrade products is one way of improving their lives
- 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 mon
allows them to make choices about their lives and send their children to sch
- enables local growth and sustainability (e.g. schools and health centres can
money to pay for the medical care, etc.)

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

The most popular Fairtrade products include:[9]

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

Did you know?

The United Kingdom is the largest Fairtrade market in the world!

Apply

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

Research

Research and prepare a presentation
Fairtrade standards are…

Fairtrade is also linked to sustainability of food. As the farmers and farm work
are able to grow more healthy food for their families. The farm owners can also a
technologies to increase the amount of food produced. Fairtrade farmers are als
environmentally friendly practices in order to use resources wisely and mitigate

Research

Watch the video at **https://www.youtube.com/watch?v=gG3fd1Jg7Jk** and
supports sustainability of food.

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

Check your understanding: Sustain

1. Which of the following does NOT contribute to an increase in carbo

   a. using oil as fuel ☐
   b. using carbon as fuel ☐
   c. using wood as fuel ☐
   d. using solar panels ☐

2. Which of the following statements is TRUE about food waste? *(1 mar*

   a. The most food waste is produced by households. ☐
   b. The most food waste is produced by retailers. ☐
   c. The most food waste is produced in food factories. ☐
   d. The most food waste is produced by farmers. ☐

3. Describe what is meant by carbon footprint. *(2 marks)*

   ....

   ....

   ....

   ....

4. Suggest two ways in which food waste can be prevented at the stage o

   1. ....

      ....

   2. ....

      ....

5. Assess how fish farms help to ensure sustainability of resources. *(4 ma*

   ....

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Food security

According to the Food and Agriculture Organization of the United Nations (FAO), [illegible] given time and place, any person should have access to sufficient amounts of saf[illegible] growth of the human population means that more and more food has to be proc[illegible]

What makes food available?

- Sufficient production – means that enough food is made; intensive farming a[illegible] as GM) have made it possible, but unfortunately almost all that food stays i[illegible]
- Access to retailers – means that shops or farmers are close enough for peop[illegible] from them
- **Affordability** – means that a person has enough mone[illegible] buy the food she [illegible]

What threatens food availability?

- Climate change and the effe[illegible] warming
- Droughts, which ma[illegible] plants impossible
- Floods[illegible] the crops
- Pollut[illegible] by production and transportation of goods
- Insufficient land for growing food – there are more and more people to feed
- Lack of resources, such as water or fossil fuels
- Overexploitation of soil, which decreases its usefulness for growing plants
- Poverty and lack of money

In developed countries, such as the UK, there are also other factors, such as the [illegible] 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 of important macro- and microelements, which are crucial for the proper growth, development and functioning of the body. The food should, therefore, be rich in nutrients such as proteins, fats, carbohydrates, vitamins and minerals. The abundance of cheap, low-quality food in developed countries has led to the situation where 1.9 billion people worldwide are overweight or obese,[11] and at the same time 30% of them are undernourished.[12]

[10] *http://www.fao.org/fileadmin/user_upload/suistainability/Presentations/Availability.pdf*
[11] *http://hungerreport.org/2016/infographics-2/*
[12] *http://drhyman.com/blog/2012/02/29/how-malnutrition-causes-obesity/*

Food poverty

Food poverty means that a person or a family doesn't have enough money to buy sufficient amounts of quality (healthy and nutritious) food. In many areas, especially in developing countries, this is the cause of famine, diseases and deaths. UNICEF states that half of the deaths among children under five are caused by undernutrition.[13] Food poverty is not restricted to poor countries only. Even rich, developed countries such as the United Kingdom struggle with the problem. According to OXFAM, 2 million British citizens are malnourished, while another 500,000 rely on food parcels from charities to feed their families.[14]

Effects of food poverty

Food poverty usually results in malnutrition, a condition in which the balance b a person doesn't have enough nutri or has too much of some of them. Lack various health issues, such

- hunge nce, noticeable loss of body mass
- loss of tissue, weakness
- lack of immunity
- vitamin and mineral deficiencies
- protein deficiency, often leading to kwashiorkor
- inability to focus and learn
- poor bone and dental health
- increased risk of heart disease, obesity and type 2 diabetes, as low-quality f
- stress and social exclusion
- depression

…and many others. It is estimated that around half a million British citizens use f of ability to put food on their table.

What can be done to make food available?

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

Resea –

Read the r on **http://www.manchesterfoodpoverty.co.uk/sites/default/files/Facts%20 verty%20Report.pdf** and list the reasons and outcomes of food poverty in G

[13] *http://data.unicef.org/topic/nutrition/malnutrition/*

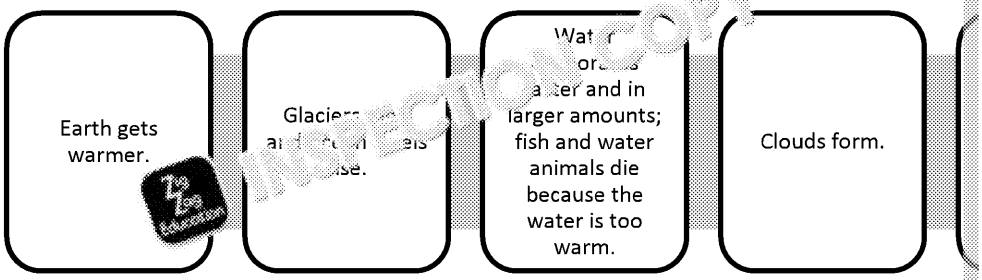
[14] *http://policy-practice.oxfam.org.uk/our-work/inequality/food-poverty#contentprimary_0_ctl00_*

How climate change affects food security

The effects of global warming that have been observed over the past 50 years ar

- They cause the mass extinction of many animal and plant species, as many o the new conditions (such as high temperatures or lack of water).
- They lead to the disappearance of land and whole countries under water, si land which can be used for planting crops or grazing farm animals.
- They can cause food shortages and famine by causing crop failure (due to b
- They change the pattern of the seasons, which can affect plants' life cycles a

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, e from fossil fuels to water or solar power, limiting transportation and using m limiting the use of packaging, lowering food waste, recycling and reusing go
- adapt to the changes that have already happened – this involves making the experience, such as a prolonged summer which allows more crops to grow; t modern technologies to produce genetically modified foods, which are resis and the use of modern storage and packaging methods to extend the shelf l

Research

Visit the website **http://climate.nasa.gov** and list things you and your family emission of greenhouse gases and lower your contribution towards climate ch

Additional reading: Genetically modified foods and food security

All food comes from living organisms – plants, fungi or animals – and, therefore, e
unique DNA code. DNA contains genes, which determine all the features of a giv
colour and nutritional value. Modification of DNA – replacing one or more of th
the development of various plant and animal species that grow larger, are resista
muscle tissue.

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 or 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 longi
long time, e.g. 50 years). European Union law allows for GM crops of cotton, ma
sugar beet.

Did you know?

The so-called 'Golden Rice' was developed to prevent widespread vitamin A
countries. However, it wasn't very successful at the beginning because peopl
unnatural-looking yellow rice!

Many people oppose GM foods because:

- there is no scientific proof that long-term use of GM food is healthy and saf
- they believe GM food increases the risk of allergies and cancer
- they may contribute to increased body mass and so to the recent growth in
  around the world
- they may lead to antibiotic resistance
- GM seeds mix with naturally occurring plants and may cause their extinctio
  decreased)
- genetic modifications often require the use of viruses or bacteria, such as *E.*
  creation and spread of new diseases

On the other hand, genetically m ds have multiple advantages, and sci
hard to ensure the newly species are not only environmentally friendly,