

Food Production Notes

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Food security: the ability of human populations to access food of sufficient quality and quantity.

Food security is very important! This has been highlighted with Brexit and panic buying in supermarkets at the beginning of the COVID19 pandemic.

Food security is **reduced** by the following:

1. **The increase in human population** – as birth rates are increasing and many people have better access to medical care. This means there are simply more people that need food.
2. **Increasing consumption of meat and fish** – more land must be cleared for herds to graze and more bays and inlets given over to fish farming.
3. **New pests and pathogens that attack crops and farm animals** – this could reduce farm output or lead to localised famine in some areas.
4. **Environmental changes such as global warming** – this can cause more extreme weather, more droughts or floods which will reduce crop yields.
5. **Increased costs of farming** – this could reduce the number of people farming. This could reduce the amount of land being used to produce food again resulting in less food being produced.
6. **Armed conflicts** – peace is vital for trade and safe transport of food. If an area is not safe people are not likely to bring food into it. Also armed conflict reduces how many people are able to work on farms.
7. **Sustainability** – more land is used for infrastructure and housing each year. This reduces the amount of land that is available for farming. This can reduce the amount of food that can be produced.
8. **Changing diets in developed countries** – food resources are exported from developing countries to meet the demands of more developed countries. Like exotic fruits for example. This can cause food shortages and drive up prices in the poorer countries where the food is actually grown.

Mycoprotein

In the GCSE exam it's quite common for them to ask questions about **Fusarium**. It's a fungus that is grown in huge fermenters, the fungus produces **Mycoprotein**. Mycoprotein is the fake meat thing that many people buy in shops, Quorn meats are an example of Mycoprotein.

Mycoprotein is suitable for vegetarians some brands of mycoprotein are also vegan.

The advantages	The disadvantages
1. It provides a more energy efficient method of providing protein than animal farming.	1. It can be expensive to build the fermenters and the facility.
2. The fermenters can be built anywhere, even in areas that it is difficult to farm animals.	2. The mycoprotein must be kept sterile otherwise microorganisms will spoil the protein.

Biotechnology

Biotechnology: the use of biological processes or organisms to produce products.

A lot of food products that we eat are made using a biotech approach. Many medical treatments also use biotech to produce their products or to improve a type of treatment. Many biotech processes involve genetic engineering.

Genetic modification: a technique to change the characteristics of a plant, animal or micro-organism by transferring a piece of DNA from one organism to a different organism.

Genetically Modified (GM) Crops

We have already covered the process of genetic engineering on page 87 and 88. We won't be going through the stages for that here but we will look at the advantages and disadvantages of genetically modify crops 😊

What are genetically modifying crops? These are crop plants that have had their DNA altered by having a gene from another species inserted into their genome. This is done to give the plant a new desirable characteristic.

What sort of characteristics are we talking about here? Check out the list of possible ones below 😊

- **Herbicide resistance:** The plant survives weedkiller, so farmers can spray the whole field, killing only the weeds and reducing competition.
- **Pest/insect resistance:** The plant produces its own mild toxin that kills insects trying to eat it, protecting the yield.
- **Disease resistance:** The plant is resistance to certain viruses or fungi.
- **Improved nutritional value:** The plant is engineered to have extra vitamins like Golden Rice producing vitamin A.
- **Drought resistance:** The plant can survive and grow with very little water.

Advantages of GM crops:

1. **Increased crop yields** – we can engineer crops to be resistant to insects (so pests don't eat them) or resistant to herbicides (so farmers can kill weeds without harming the crop). This means more food is successfully grown and harvested.
2. **Improved nutritional value** – crops can be engineered to contain extra vitamins. For example, Golden Rice has been genetically modified to produce a chemical that turns into Vitamin A in the body, helping to prevent blindness in developing countries.
3. **Growing in harsh conditions** – crops can be modified to survive in extreme environments, such as droughts or flooding.

Disadvantages and concerns:

1. **Impact on wild populations** – there are concerns that GM crops could cross-breed with wild plants to create "superweeds", or that pest-resistant toxins could harm innocent insects (like bees), reducing biodiversity.
2. **Human health concerns** – some people are worried about eating GM foods because the long-term effects on human health have not been fully explored yet.

Exam note: If a question asks you to "**evaluate the use of GM crops**", make sure you give at least one advantage and one disadvantage to get the marks 😊