WJEC England Biology GCSE

7.4 - Selective breeding and gene technology

Flashcards

What is selective breeding?

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The process by which humans artificially select organisms with desirable characteristics and breed them to produce offspring with similar phenotypes

Outline the main steps involved in selective breeding

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1. Identify desired characteristic e.g. disease resistance

2. Select parent organisms that show desired traits and breed them together

3. Select offspring with desired traits and breed them together

4. Process repeated until all offspring have the desired traits

What is the main advantage of selective breeding?

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Creates organisms with **desirable features**:

- Crops produce a higher yield of grain
- Cows produce a greater supply of milk
- Plants produce larger fruit
- Domesticated animals

Other than in agriculture, where else is selective breeding useful?

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- In medical research
- In sports e.g. horse racing

Outline the disadvantages of selective breeding (4)

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- Reduction in the gene pool (especially harmful if sudden environmental change occurs)

- Inbreeding results in genetic disorders

- Development of other physical problems e.g. respiratory problems in bulldogs

- Potential to unknowingly select harmful recessive alleles

What is genetic engineering?

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- The alteration of the genome of an organism by the insertion of a desired gene from another organism

- Enables the formation of an organism with beneficial characteristics

What are organisms that have been genetically engineered known as?

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Genetically modified (GM) organisms

Describe the process of genetic engineering (higher)

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1. Gene for desirable characteristic identified

2. Gene isolated using enzymes

3. Gene placed into vector (e.g. plasmid, virus)

4. Vector mixed with and 'taken up' by target cells

5. Modified cells identified, selected and cultured

What is a vector? (higher)

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A structure that delivers the desired gene into the recipient cell e.g. plasmids, viruses

Describe the benefits of genetic engineering (3)

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- Increased crop yields for growing population e.g. herbicide-resistance, disease-resistance

- Useful in medicine e.g. insulin-producing bacteria, anti-thrombin in goat milk

- GM crops produce scarce resources e.g. GM golden rice produces beta-carotene (source of vitamin A in the body)
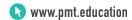
Describe the risks of genetic engineering (3)

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- Long-term effects of consumption of GM crops unknown

- Negative environmental impacts e.g. reduction in biodiversity, impact on food chain, contamination of non-GM crops forming 'superweeds'

- Late-onset health problems in GM animals

What are the ethical issues related to the use of gene technology? (3)

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- Is it ethical to change the genetic makeup of an organism?

- GM seeds are expensive. LEDCs (Less Economically Developed Countries) may be unable to afford them or may become dependent on businesses that sell them.

- Large companies could patent GM crops and charge extortionate prices for them