

Selective breeding

4.6.2.3 · Inheritance, variation and evolution · revision notes

Selective breeding (artificial selection) is humans breeding plants and animals for particular genetic characteristics. You need the steps, examples and the problem of inbreeding. Questions include 'describe how a farmer could breed...' and explaining or evaluating its impact.

Key facts

- Selective breeding = artificial selection: humans breed organisms for particular genetic characteristics
- Examples: disease-resistant crops, more meat or milk, gentle dogs, large or unusual flowers
- Natural selection: the environment decides which individuals survive to breed. Selective breeding: humans choose
- Steps: choose parents with the characteristic → breed → select the best offspring → breed → repeat over many generations
- Inbreeding → breeds prone to disease and inherited defects

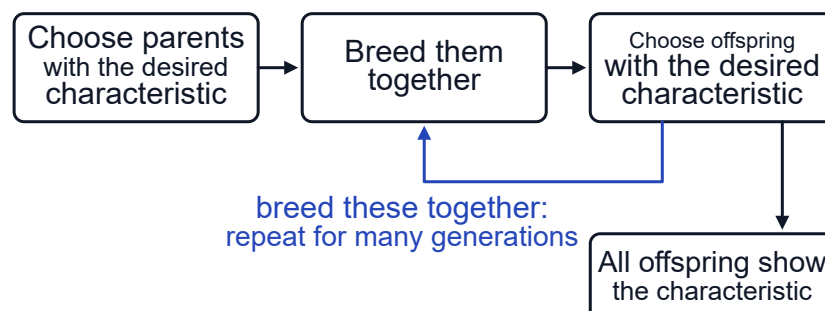
Notes

What selective breeding is

- **Selective breeding** (artificial selection) is the process by which humans breed plants and animals for particular genetic characteristics.
- Humans have done this for **thousands of years**, since they first bred food crops from wild plants and domesticated animals.

The steps

- Choose **parents** with the desired characteristic from a mixed population.
- **Breed** them together.
- From the offspring, choose those with the desired characteristic and breed them together.
- Repeat over **many generations** until all the offspring show the desired characteristic.



Selective breeding: select, breed, repeat.

Characteristics that are chosen

- Characteristics can be chosen for **usefulness** or for **appearance**.
- **Disease resistance** in food crops.
- Animals that produce **more meat or milk**.
- Domestic dogs with a **gentle nature**.
- **Large or unusual flowers**.

Problems

- Selective breeding can lead to **inbreeding** (breeding closely related individuals), so some breeds are particularly **prone to disease or inherited defects**.
- With little variation, a new disease or a change in the environment could affect all the individuals in a breed.

How to answer each type of question

Describe how to selectively breed for a characteristic

3 to 4 marks

Grade 5

1. Choose parents that show the characteristic.
2. Breed them together.
3. Select the offspring with the characteristic and breed them.
4. Repeat over many generations.

Example. A farmer wants to produce a herd of cows that produce a large volume of milk. Describe how the farmer could use selective breeding to do this. [4 marks]

Model answer. Choose the cows that produce the most milk, and a bull from a line of high-yielding cows (1). Breed these cattle together (1). Select the offspring that produce the most milk and breed them together (1). Repeat this over many generations (1).

Don't lose marks

- ✗ Leaving out 'over many generations'. Selective breeding takes a long time.
- ✗ Confusing selective breeding with genetic engineering. No genes are moved between organisms in selective breeding.
- ✗ Saying selective breeding creates new alleles. It only selects from the variation that already exists.
- ✗ Saying inbreeding directly causes disease. It makes inherited defects more likely because variation is reduced.

More tips

Memory tricks

- Selective breeding recipe: select, breed, select, breed... for many generations.
- Inbreeding = breeding within the family: less variation, more inherited defects.
- Artificial selection = humans choose; natural selection = the environment chooses.

Exam technique

- In 'describe' questions, give the steps in order, including selecting the offspring and repeating.
- Use the organism and characteristic in the question (e.g. 'cows that produce the most milk').
- For 'evaluate' questions, give benefits and problems, then a conclusion.

What each grade needs

What you need to be able to do, from the first marks up to the top grade.

Grade 3

Define selective breeding

Humans breeding plants and animals for particular genetic characteristics.

Grade 4

Give examples of chosen characteristics

Disease resistance in crops, more meat or milk, gentle dogs, large or unusual flowers.

Grade 5

Describe the steps of selective breeding

Choose parents with the characteristic, breed them, select the best offspring, and repeat over many generations.

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