



QUESTION WORKBOOK

Artificial selection and selective breeding

Evolution and speciation · Unit B19

OCR A 6.1.2 · CAIE 17.2

15 questions · 53 marks

NAVY SCREEN EDITION

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SECTION A · Short, 1 to 2 marks**A1**

ASB-Q15

State one example of a resistance allele from a wild relative being bred into a modern crop, and state where such genetic material is stored to keep it available for future breeding.

[2]

SECTION B · Standard, 3 to 5 marks**B1**

ASB-Q7

A wild grass related to wheat is found to carry a gene giving resistance to a fungal disease that is destroying a high-yielding commercial wheat variety. Describe how plant breeders could use this wild plant to produce a resistant variety that keeps the high yield of the commercial variety.

[5]

B2

ASB-Q8

Broiler chickens selected intensively for rapid growth now reach slaughter mass in about half the time they took fifty years ago, but with higher rates of leg and heart problems, because their skeletons and hearts have not been improved to keep pace with their growth rate. Discuss the arguments for and against continuing to select broiler chickens for faster growth. [5]

B3

ASB-Q1

Describe how a farmer could use selective breeding to increase the mean mass of wool produced per sheep in a flock. [4]

B4

ASB-Q2

Maize breeders self-pollinate plants for several generations to produce inbred lines, then cross two inbred lines together. Explain why the inbred lines are low yielding and why the cross between them is not. [4]

B5

ASB-Q3

Some dog breeds have been selected for a very short, flat face. Discuss the arguments for and against continuing to breed dogs to such a standard.

[4]

B6

ASB-Q9

A poultry breeder selects the highest-egg-laying hens as parents for six generations. Egg number rises for the first four generations and then stops increasing, even though the breeder continues to select the highest layers each generation. Suggest two reasons the response to selection slowed and then stopped.

[4]

B7

ASB-Q10

A maize breeder starts self-pollinating a plant that is heterozygous at a particular locus. Assuming the proportion of heterozygotes halves with each generation of self-pollination, calculate the percentage of heterozygotes remaining after 5 generations of selfing, starting from 100%.

[4]

B8 Explain why bulls used to improve the milk yield of dairy herds are chosen by
ASB-Q4 progeny testing rather than by measurement of the bull itself. [3]

B9 A wheat variety bred for the highest possible yield is grown across a whole region.
ASB-Q5 Suggest why plant breeders keep collections of wild relatives and old local varieties of wheat. [3]

B10 Compare natural selection with artificial selection, using the agent of selection, the
ASB-Q6 characteristics favoured and the effect on genetic diversity. [3]

B11 A small captive-breeding population of an endangered animal shows increasing
ASB-Q11 rates of inherited disease after several generations of breeding between close relatives. Explain, in terms of alleles and genotypes, why this happens. [3]

B12 One bull of high breeding value for milk yield can father tens of thousands of calves through artificial insemination, and embryo transfer lets one cow of high breeding value produce far more calves than she could carry naturally. Explain how these two technologies increase the rate at which a dairy herd's milk yield can be improved, compared with natural mating. [3]

ASB-Q12

B13 Some cattle breeds carry a dominant allele that prevents horns growing, the polled trait, removing the need to disbud (remove the horn buds of) calves. Suggest why breeding for the polled allele is an example of selective breeding that improves rather than harms animal welfare, and suggest a cross that would show whether a polled bull is heterozygous for the allele. [3]

ASB-Q13

B14 Compare disease-resistance breeding in wheat with milk-yield improvement in dairy cattle, referring to how the desired individuals are identified and how their alleles are then multiplied through the population. [3]

ASB-Q14

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