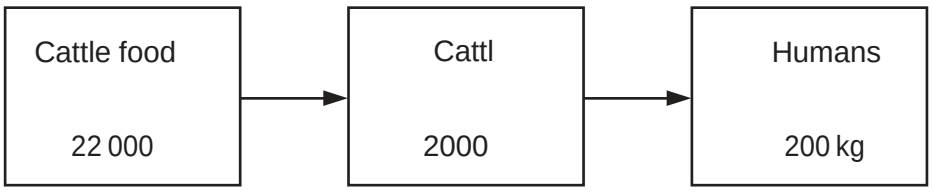
GCSE Biology A (Gateway)

J247/04 Biology A B4-B6 and B7 (Higher Tier)

Question Set: 15

1 The diagram shows the flow of biomass through an agricultural food chain.



(a) **(i)** Calculate the percentage efficiency of transfer of biomass between the cattle food crop and humans.

(22/22 000) × 100 = 0.9%

[2]

(ii) Write down **two** ways that biomass is lost from the food chain.

Egestion and Excretion

[2]

(b)* High levels of light intensity can damage plants. To prevent damage, plants have a protection mechanism.

When light intensity levels get **too high**, the protection mechanism switches on. This stops the plant absorbing too much light.

When the light intensity drops to safe levels, the protection mechanism switches off **slowly**.

Explain why this mechanism would **reduce** the biomass available to humans.

[6]

Photosynthesis requires light energy so this mechanism reduces photosynthesis. Less photosynthesis means the plants will make less food for their own growth. Therefore the plant will grow less and overall biomass of plants will be reduced. This will mean there will be less food for humans and other animals in the food chain.

(c) Switching off the protection mechanism described in part **(b)** involves the plant making a **protein**.

Scientists have put extra copies of the gene for this protein into the plants. This makes the plant make more mRNA molecules.

(i) Explain why making more mRNA will switch off the mechanism faster.

[2]

mRNA carries the code for proteins so more protein will be made which will switch off mechanism faster

(ii) Scientists have found that the genetically modified plants make 20% more biomass.

Use the agricultural food chain on page 21 to calculate the increase in biomass this would provide for humans.

$\frac{20 \times 700}{100} = 40$

[2]

(iii) Inserting extra copies of a plant's gene into a plant is a type of genetic modification (GM).

Another example of GM involves inserting a bacterial gene into a plant which makes the plant produce an insecticide.

People are more likely to support genetic modification involving extra copies of the plant gene, rather than inserting the bacterial gene.

Suggest reasons why.

New method uses plants own genes.
There is concern that plants with bacterial gene might be harmful to humans. **[2]**

Total Marks for Question Set 15: 16