GM organisms in production

Student activity • observation and reasoning

YEAR 11 / LESSON 100 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

How can a transferred gene support a useful product, and what must be evaluated?

Use the supplied examples, record your reasoning and correct it using evidence.

Equipment

- Student booklet, pencil and ruler
- Insulin-production process cards and fermenter diagram

Paper, modelling and written reasoning only. No chemicals or biological samples are handled.

Course coverage: Shared Biology / Double Award: 5.14–5.16. Insulin production, crops and transgenic organisms.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Sequence an appropriate human insulin coding sequence in a bacterial expression system, growth in a controlled fermenter, and recovery/purification of the product.

2. Explain why the gene construct must be suitable for bacterial expression rather than assuming an unprocessed human gene will automatically work.

3. Identify controlled fermenter variables including temperature, pH, nutrient supply and appropriate oxygen conditions.

4. Compare a GM crop trait such as pest resistance with potential benefits and context-dependent risks.

5. Define transgenic as transfer of genetic material between species in the course model.

6. Evaluate the fictional claim “a pest-resistant crop will always yield more and never affect other organisms”; identify the yield comparisons, environmental observations and product-quality evidence needed to test it.

Cleanup

- Return models and keep the corrected work.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Engineered bacteria can produce human insulin-related protein for processing and purification under controlled manufacture. GM crop effects depend on the trait and farming context. This lesson is a process model, not a biotechnology production protocol.

Example / trial	Observation / evidence	Explanation / limit
Evidence / comparison		
Explanation		
Limit / correction		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Where are production bacteria grown?

2. Why control temperature and pH?

3. Can unpurified bacterial culture be used as insulin medicine?

4. Give a possible beneficial crop trait.

5. What does transgenic mean here?

6. Why assess applications individually?