

Instructional Scenario

Understanding Basic Genetics



Course/Duty Area: Biological Applications in Agriculture/Understanding Basic Genetics

Scenario:

You are a young agricultural scientist working with a local farming community. Farmers in your area are struggling with challenges like unpredictable weather, animal health issues, and the need to produce enough food for a growing population. They have asked for your help in understanding how genetics can improve crops and livestock while keeping farming sustainable.

Big Question:

How can genetic modification play a role in crop and livestock productivity?

Focused Questions:

- How can Mendel's principles of inheritance help farmers develop better crops and animals?
- How does DNA act as the "recipe" for life, and why is it important in agriculture?
- How do farmers use selective breeding and genetic engineering to improve food production?
- How does plant mutation breeding improve crops? How might this influence the future of farming?

Project-Based Assessment Options:

- Students will create and share different Punnett square activities to determine the expected percentages of different genotypes in the offspring of two parents and to predict the percentages of phenotypes of the offspring of a cross from known genotypes.
- Students will create a presentation about the environmental effects of genetically modified plants (e.g., superweed, superpests, threats to native and wild plants, loss of biodiversity).
- Students will host a debate on the benefits of using genetic engineering in agriculture (e.g., increased crop yields, reduction in pesticide usage, greater food security) and the disadvantages of using genetic engineering in agriculture (e.g., cross contamination, increased weediness, poisoned wildlife, creation of new or worse viruses).

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