

Manipulating Genes

INVESTIGATION

IN THIS ACTIVITY you will gather information about two ways that people are intentionally affecting evolution to produce plants and animals that have traits that are desirable to us. One method, called **selective breeding**, involves selecting and breeding parent organisms with desirable traits. This method has been used for thousands of years to improve animals and plants used for food. The second method, **genetic modification**, involves modern biotechnology techniques to change one or a small number of genes in an organism. Genetic modification has been developed and improved over the past 20–30 years.

GUIDING QUESTION

How have humans manipulated genes in other organisms?



These Holstein cows are bred for milk production.



This "golden" rice has been genetically engineered to produce beta carotene, a precursor to Vitamin A.

MATERIALS

For each pair of students

- 1 computer with Internet access
- 1 Student Sheet 1, "Manipulating Genes Research"

PROCEDURE

1. Decide which topic - selective breeding or genetic modification - you will research first.
2. Visit the *SEPUP Third Edition Evolution* page of the SEPUP website at www.sepuplhs.org/middle/third-edition for the Manipulating Genes activity to find references about your topic.
3. Use Student Sheet 1, "Manipulating Genes Research," to record the information you obtained from your references.
4. When you have completed Steps 2 and 3, research the other topic.
5. Compare and contrast your findings for each topic.

ANALYSIS

1. How has understanding the cause-and-effect relationship between genes and traits led to advanced methods of changing traits in organisms?
2. Compare and contrast the use of selective breeding and genetic modification for manipulating the traits of other organisms researched by the class. Be sure to include
 - a. how they are similar.
 - b. how they are different.
 - c. the advantages of each method.
3. Any method that changes the heritable traits in a population has an effect on the evolution of that population. Do you think people should intentionally manipulate genes and evolution in this way?

EXTENSION

Medical researchers are exploring ways to manipulate human genes to treat certain health conditions, such as some cancers and genetic conditions. This is called *gene therapy*. Visit the *SEPUP Third Edition Evolution* website at www.sepuplhs.org/middle/third-edition, and go to the gene therapy links to learn more about recent developments in this field. Develop a brief presentation to share what you learn.