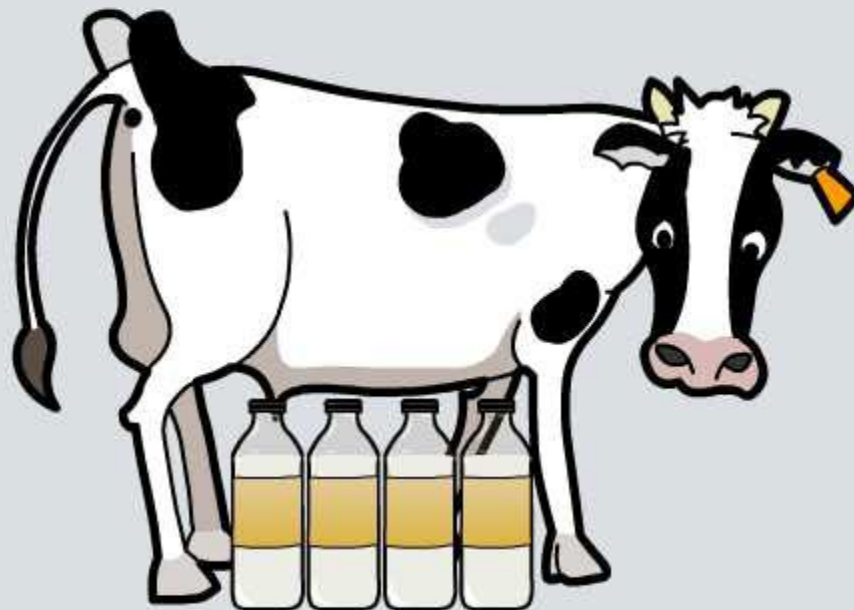# Selecting Characteristics

Selecting desirable characteristics

Farmers, horticulturalists and scientists may want to produce plants or animals with useful characteristics.

There are several ways of doing this:

- **Selective breeding** – this involves breeding individuals with desirable characteristics over generations to produce organisms with certain qualities.

- **Genetic engineering** – this involves changing an organism's genetic material to produce useful characteristics.

Selective breeding

Selective breeding is a process humans use to produce animals or plants that have useful characteristics.

Milk farmers choose cows with the highest milk yield to breed with a suitable bull. Continuing to do this over several generations can produce a whole herd of cows with a very high milk yield.
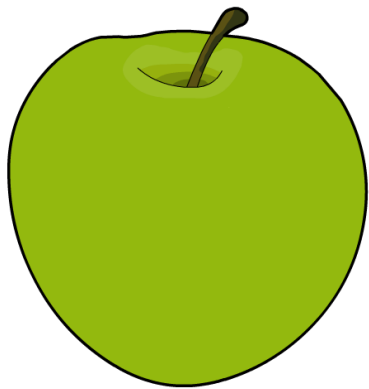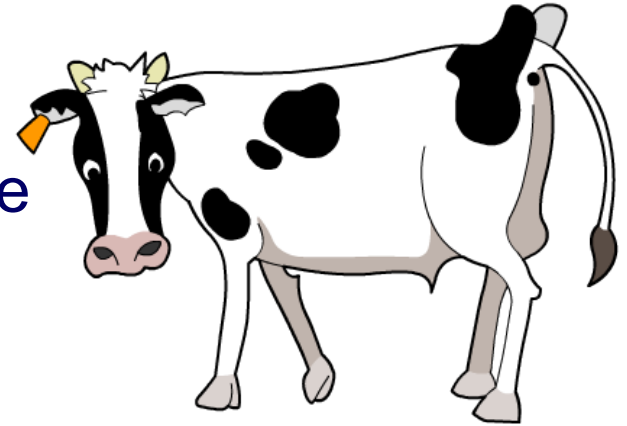
Apple growers want to produce a type of apple that is tasty and resistant to disease. This can be done over several generations by crossing a variety of apple known for its taste with another variety that shows strong resistance to disease.
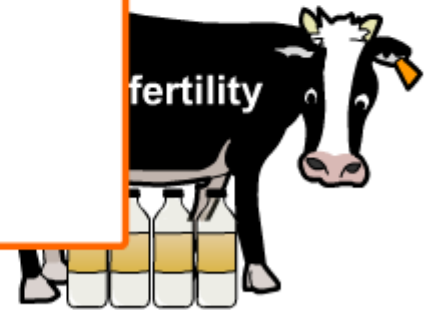
Selective breeding of cows

Choose the most suitable cow

Farmer Jones wants to produce a h... cows that have **good milk yie**... **high fertility** a... his favorite col... **brown**. Which... should he bree... his bull?

Farmer Jones wants to use selective breeding to produce the best herd of cows.

Click **"start"** to help him choose which cow he should use.

start

fertility

fertility

Selective breeding

Are these statements about selective breeding true or false?

Selective breeding produces animals and plants that have characteristics which are useful to humans.

Natural selection produces animals that are well adapted to their environment.

Can you tell which animals and plants are produced by selective breeding?

Click **"start"** to try this true-or-false quiz.

start

Genetic engineering

Genetic engineering involves changing an organism's genetic material. This can result in a change in the organism's characteristics.

Genetic engineering is used to produce **genetically-modified (GM)** organisms that have useful characteristics.

For example, microbes can be genetically engineered to produce vaccines for human diseases.

How are GM crops useful to humans?
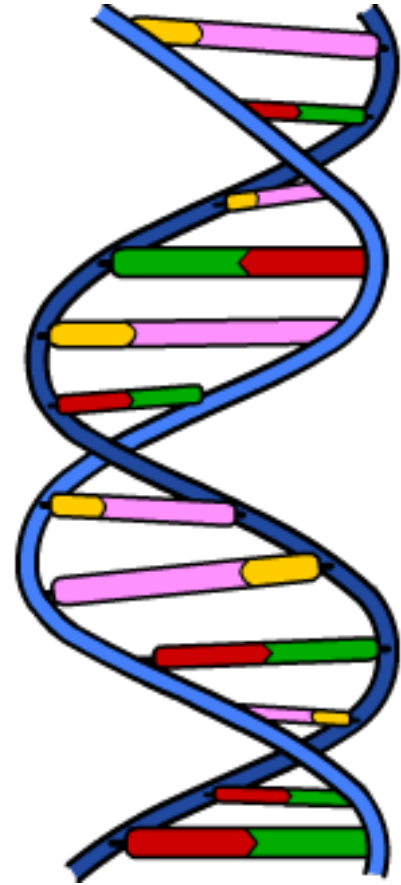
Why use genetic engineering?

Some crops plants can be genetically engineered to be **disease**, **herbicide** or **frost-resistant**. These crops could produce larger crop yields.

Crops, such as golden rice, have been engineered to contain **extra vitamins**. These could be useful in countries where malnutrition is a problem.

Golden Rice Humanitarian Board

Why do some people think that GM crops are unsafe?

Disadvantages of genetic engineering

GM organisms have characteristics that do not occur naturally, so it's very hard to predict the effect they may have on the environment and wildlife.

It is possible that GM crops could cross-pollinate with naturally-occurring plants. For example, this could result in weeds with herbicide resistance that would be very hard to get rid of.

Also, GM crops could cause people to have unknown or unforeseen allergic reactions.

Should we use GM crops?

0 **yes**

0 **no**

0 **unsure**