

The background of the slide is a light green field populated with numerous cartoon-style sheep. Each sheep is depicted with a thick, textured brown woolly body and a white face and legs. They are scattered across the frame in various orientations, some facing left and some facing right. The overall style is simple and illustrative.

Adaptation, Evolution and Human Intervention

Adaptation



Read and discuss the following statements.
Are these statements true or false? Explain why to your partner.

Some living things have a greater number of adaptations.
TRUE

All adaptations enable living things to survive better.
FALSE



Click the statements to see if they are true or false.

All living things have a similar number of adaptations.
FALSE

Not all adaptations give living things an advantage. Some can cause disadvantages as well.
TRUE

Adaptation and Evolution

Remember that **adaptation** is the result of mutations which occur **randomly**.

These can result in **adaptive traits** which confer the living thing with a function that enables it to survive better.

However, the adaptive trait could also do the complete opposite and involve losing a function.

In some cases the adaptive trait neither confers an advantage or disadvantage. It has a neutral effect!

Adaptation and Evolution

Adaptation by natural selection results in evolution if the following 3 conditions are met:

1) The mutation causes a variation in an existing trait.

(The trait exists already, not an entirely new one which is rare).

2) This trait is heritable.

(It can be passed on from parent to offspring. Some traits are dependent on DNA in more than one gene. If the offspring does not inherit all of those genes and DNA then the trait will not be passed on to them.)

3) This version of the trait enables a greater chance of survival than other versions of the trait.

(Having thicker fur is an adaptation that has enabled animals in colder parts of the world to survive better so animals with thinner fur became extinct in those parts of the world. Being taller or shorter as a human confers no advantage in terms of survival and therefore the different versions of this trait have continued to exist.)

Living Fossils

All living things have not adapted or evolved to the same extent.

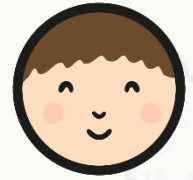
A living fossil is a living species that is highly similar to its ancestors found in fossils. These living things have either had little occurrence of adaptation or the adaptations that did occur did not prove to be an advantage so died out.

Examples of living fossils include:



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Advantages and Disadvantages of Adaptation







It is rare that an adaptation will have a completely positive or negative effect on the living thing. Often the adaptive trait confers an advantage but can cause other disadvantages, even if these do not harm the chances of the living thing's survival.

Use Activity Sheet 1 on our class page to match the advantages and disadvantages caused by specific adaptive traits.

Advantages and Disadvantages of Adaptation

Cut out and match an advantage and a disadvantage for each adaptive trait.

Advantage	Adaptive Trait	Disadvantage

Can eat leaves from tall trees.	 Forward facing eyes	Have to rest more often as can't rest one leg at a time.
Can grow on land that is not always wet.	 long neck	Does not allow a wide view of the environment.
Frees up limbs to carry food.	 Vascular Plants can transport water and food via roots, stems and leaves.	More vulnerable to attack when drinking water.
Allows accurate judgement of distances.	 Brown bear	More likely to desiccate (dry out) and lose more water.

Evolution and Human Intervention

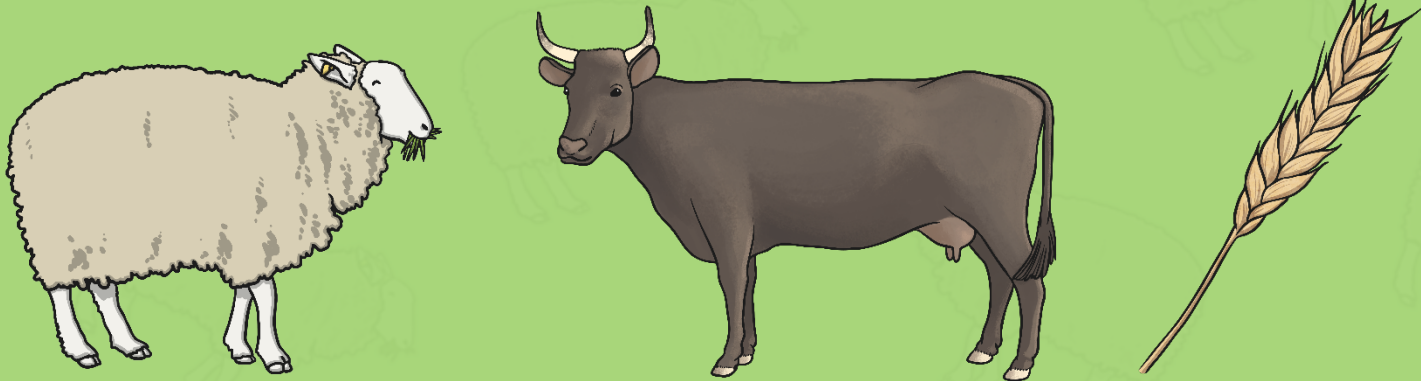
Human beings are unique among living things in their ability to affect the evolutionary process of natural selection. They have done this through a process called **selective breeding**. There is evidence from as long ago as 7000BC that farmers were selectively breeding plants and animals.

Selective breeding (or **artificial selection** as it is sometimes referred to) involves humans deliberately breeding plants and animals to produce **particular characteristics**. This results in **new varieties** of plants or **breeds** of animals.

Evolution and Human Intervention

Examples of selective breeding include cows that can produce more milk, sheep with thicker coats of wool, wheat that produces more grain and different colouring in flowers.

There is **no evolutionary advantage** to the living thing from the selective breeding process. If there had been, these characteristics would have occurred through the natural selection process.

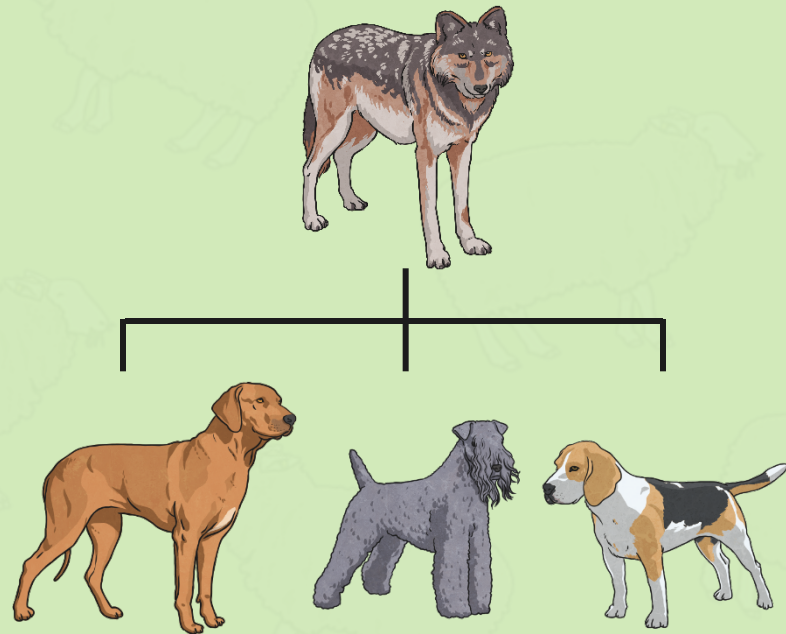


Selective Breeding

Process of Selective Breeding:

1. Decide which characteristic is important e.g. amount of milk produced.
2. Find parents who show this characteristic.
3. From their offspring, choose the ones who share this characteristic and only let them reproduce.
4. Repeat the process continuously.

Selective breeding produces new varieties of an existing species, not new species.



Cross Breeding



Cross breeding is a process through which two parents from the same species are bred in order to combine particular characteristics from each parent.

The process is very similar to the selective breeding process, except the offspring must have the selected characteristics from **both** parents.



Poodle

+



Labrador

=



Labradoodle

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Cross Breeding



Fragaria Chiloensis

+



**Fragaria
Virginiana**

=



**Garden
Strawberry**

Can you find any more examples of food or animals that are a result of cross breeding?

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Genetic Modifications



Selective and cross breeding was limited and was not successful in all cases. Typically the living things would have to be from the same species or at a push the same genus. However, some attempts a breeding did not work. Breeding did not result in a successful embryo or plant. At other times, there were offspring but they were sterile (therefore could not reproduce).

Advances in genetics and technology has pushed the science of breeding to a new level.

- **Genetically Modified Foods (GM Foods)**
- **Cloning**
- **Animals growing human parts and organs**

Genetic Modifications



Should humans intervene in this way? Why? Why not?
What effect will this have on living things in the future?



Genetically Modified
Foods (GM Foods)



Cloning



Animals growing human
parts and organs

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