Biology

Selective breeding

- Selective reading sounds difficult but it is very simple
- you choose best plants or animals and breed them together
- this helps you get better off spring
- this is called selective breeding

What is selective breeding

- Selective breeding is when human chose which plants and animals will breed
- This is done so that genes for certain characteristic stay in the population
- Organisms are selectively bred but to develop features that are useful or attractive

Examples of selective breeding

- Animals that produce more meat or more milk
- Crops that are resistant to the disease
- Dogs with good and gentle temperment
- Plants that produce bigger fruit

The basic process of selective breeding

1. From the animals or plants you already have select the ones with the characteristics you want

2. Breed these selected organisms together
3. Select the best off spring
4. breed the best off string together again
5. repeat this process over many generations

Over the time the desired characteristics becomes stronger eventually all of spring will have the characteristic

- Selective breeding is not new
- Humans have been doing it for thousands of year
- This is how we got edible crops from wild plants and animals like cows and dog

Why selective breeding is useful

In agriculture

Selective breeding is very important in farming
This is genetic variation so some cattle are better at producing meat then others
For example some are larger in size

A farmer can

- select cows and wools with large size
- breed them together
- select the best of spring

- repeat this for many organism

After this former will get cows with a very high meat yield

In Medical Research

selective breeding is also used in Medical Research

for example in studies about alcoholism

- Some rats are bred to have a strong reference for alcohol
- some rats are bred to have weak preference for alcohol

Scientist compare the two group groups of rats they study differences in behaviour and how their brain works

Disadvantages of selective breeding

reduce the gene pool

- The main problem is that selective breeding reduces the gene pool
- The gene pool is the number of different alleles in the population
- This happens because the same best plants or animals are always used
- they are closely related
- this is called inbreeding

Health problems

- Inbreeding increases the chance of harmful genetic effects
- this is because there is less genetic variation
- some dogs breeds have health problems due to inbreeding
- for example pugs often have breathing problems
- this causes ethical concern especially when animals are bred with negative characteristics for Medical Research

Disease risk

- If a new disease appears there can be serious problems
- because there is little variation
- there may be no resistance allele
- if one organism dies may others also die
- this is because they are closely related

Example of dogs

- different dogs breeds come from selective breeding

for example

- someone bred a small wolf like dog with another similar one

- after thousand of generations we got dogs like poodles

Genetic engineering

Genetic engineering means changing and organisms DNA to add useful characteristics

- This uses enzymes and vectors

Enzymes in genetic engineering

Restriction enzymes

- Restriction enzymes recognise specific DNA secrets
- they cut DNA at these points
- the cut DNA has sticky ends

Ligase enzymes

- Ligase enzymes join two pieces of DNA together
- they join DNA at the sticky ends
- when two different pieces of DNA join it is called Recombinant DNA

Vectors in genetic engineering

- A vector is something that moves DNA into a cell
- There are two types
- plasmids and viruses

Plasmids

- small circular pieces of DNA
- it is found in bacteria

- it can move between bacteria

Viruses

viruses insert DNA into the organisms they infect

Steps of genetic engineering

- the gene you want for example (human insulin gene)is cut out using a restriction enzyme
- The vector DNA is cut open using a small restriction enzyme
- both DNA pieces now have sticky ends
- They are mixed together with ligase enzymes
- ligase joins the DNA to form recombinant DNA
- The Recombinant DNA is put into other cell such as bacteria
- these cells now use the new gene to make a protein

For example

- bacteria with human insulin gene are grown in large numbers
- they produce insulin for people with diabetes

Uses of genetic engineering

In agriculture

- crops can be genetically modified to be resistant to herbicides
- herbicides are chemicals that kill plants

herbicide resistant crops allow of farmer

- kill weeds only
- not damaged the crop
- this can increase the crop yield

In medicine

- Bacteria or genetically engineered to make human
- Human genes are put into sheep and cows

these animals can produce useful protein such as human antibodies
these are used to treat

- Arthristis
- small cancer
- multiple sclerosis

The proteins are taken from animals for example from milk
In future animals may be made with organs suuitable for human transplants