Homework: Due Friday, December 9

Selective breeding is the traditional method for improving crops and livestock, such as increasing disease resistance.

Genetic engineering is a faster way, which transplants genes for a desired characteristic into an organism. However, genetic engineering offers many potential benefits but carries the risk of unexpected harmful effects.

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Selective breeding and genetic engineering:

Over the centuries humans have tried to breed better crops and livestock. Traditionally this was done by carefully choosing parents for breeding that show the required characteristics - **selective breeding**. More recently it's been possible to implant particular genes using **genetic engineering**. Both these techniques depend on there being **change and variation** in the genetic material – which is caused by **mutations**.

Mutation

Mutation means any **change** in the genetic material. Mutation occurs **naturally**. Most mutations are harmful to an individual, but occasionally a mutation can be beneficial. It's possible to speed up mutation rates artificially using radiation or chemicals. Mutations bring about changes in organisms by changing the sequence of bases in DNA. This causes a different protein to be made, or blocks the production of the protein completely.

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Selective Breeding

These are the steps in selective breeding:

1. Decide which **characteristics** are important
2. Choose **parents** that show these characteristics
3. Select the best **offspring** from parents to breed the next generation
4. Repeat the process continuously

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Examples of selective breeding

Wheat

Producing disease resistant wheat by crossbreeding wheat plants with disease resistance and wheat plants with a high yield

Dairy cattle

Increasing **milk yield** by selecting bulls from high yield herds and breeding them with cows that have the best milk production

Catfish

Producing large, disease resistant catfish that can survive in low oxygen water and are easy to catch

Selective breeding is a crucial element of any program to improve commercially important genetic traits, and tools such as genome maps can be indispensible to these efforts.   There are also drawbacks to selective breeding. For example, chickens have been genetically engineered to have bigger breasts. Because of this phenotype, they would be unable to survive in the wild. These chickens would be unable to fly or get away from predators easily.