

# Animal Breeding



**The area of science focused on getting improved offspring who, on average, are better than the previous generation by selecting the parents with a higher frequency of certain genes.**

Mankind's association with domesticated animals goes back more than 10,000 years. During this period a variety of animal species has been adapted to suit our needs. The animals that best fitted our needs were used as parents for the next generation of animals. In the beginning the best animals were probably the animals that were most docile and easy to manage. This led to the formation of a number of different breeds and all these different breeds were adapted to the local circumstances.

More recently, as farming became less for subsistence and increasingly a business/economic endeavor, the more specialized breeds were used for selective breeding with the focus being more on traits that maximized production (hence more income for the farmer). In the beginning this was done through phenotypic selection, i.e. the animals with the best performance were selected as parents for the next generation. Improvements were mainly made on traits that were easily observed and with a reasonable heritability.

Animal breeding or genetics is the area of science where experts are trying to influence the frequency of certain genes by combining the most superior (or desired) individuals to be the parents of the next generation. This process is focused on getting improved offspring who in theory should then, on average, be better than the previous generation. Sophisticated models are used to compute the differences in genetic merit between animals and predict the genetic values/merit of their offspring before they are even born. Sophisticated statistical models like BLUP (Best Linear Unbiased Prediction) and increasingly better computing capability have made it possible to predict an animal's genetic merit with much higher levels of accuracy compared to

years past. Information and data from all types of measurements can contribute simultaneously to increasingly more reliable breeding values. On the whole the science and practice of animal breeding has been a major contributing factor to the improvement made in livestock production.

As a rule of thumb improvements of 1-3% per annum are achieved for traits under selection. These results illustrate what can be achieved through traditional breeding methods. The efficiency of these methods reduces substantially when traits are either difficult to measure, cannot be measured on the animal itself, or when traits have a low heritability. Genomic selection is opening a new world of possibilities to select more accurately on these traits.