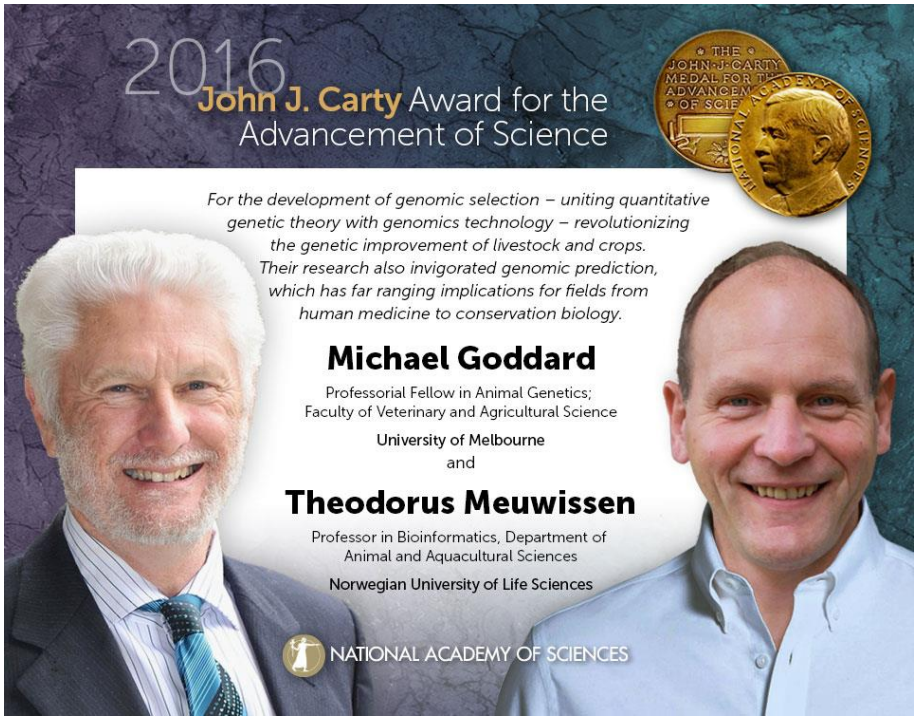

For the past 10,000 years or so, humans have used selective breeding to domesticate and improve livestock and crop species, from corn to cattle. Animals or plants with desired traits were selected and bred, gradually producing species, breeds, or strains with specific qualities, such as dairy cattle that produce more milk or the many forms of cabbage, from cauliflower to kale. By the late 20th century, genetics promised to enhance this type of breeding by letting people select for specific genetic markers associated with a trait. But this approach proved to be inefficient and only captured a small amount of the genetic variation associated with a trait. Instead, a technique called genomic selection has come to dominate.

The principles of genomic selection come from a landmark paper published in *Genetics* in 2001 by Goddard and Meuwissen, along with Ben Hayes of La Trobe University in Australia. The trio showed that it should be possible to identify individuals with high genetic value by using thousands of molecular genetic markers covering the entire genome. At the time, genomic technology was inadequate because there was no way to assay animals for thousands of markers at reasonable cost, but, with the development of "SNP chips," it soon caught up. Genomic selection first became widely adopted in the dairy cattle industry where breeders found that they could identify bulls with high genetic value early in life, rather than waiting years to see if they produced offspring with required traits, saving much time and money. Genomic selection has now been applied to other animal species, such as pigs and poultry, as well as plants, such as cotton, rice, and wheat. And the concepts behind genomic selection have even proved useful in the field of human genetics and the search for predictors of disease.