Genomics for the South African Beef industry

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Industry Sector: **Cattle and Small Stock**

Focus Area: **Livestock production with global competitiveness (2)**

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Establishing genomic selection for the South African beef industry

The project titled "Establishing genomic selection for the South African beef industry" was conducted at the University of Pretoria, Department of Animal & Wildlife Sciences in collaboration with South African Stud Book and Animal Improvement Association.

The overall aim was to use high throughput SNP technology to establish reference populations for the SA beef industry. To attain this goal, a process for the identification of high impact animals was established, guidelines for sample collection were compiled and genotyping were performed with the available funding using both 80K SNP and 150K SNP GeneSeek (GeneSeek GGP HD) bead chips at GeneSeek (USA. Population structure analyses were performed and parameters for genetic diversity and inbreeding were calculated.

Results has shown that breeds such as the Bonsmara and SA Hereford formed separate clusters while the other indigenous breeds such as the Tuli, Afrikaner and Drakensberger showed a closer relationship. These results are important for future across-breed analyses. The commercial chips also tended to be less informative for the indigenous breeds with regard to the number of SNPs available for analyses, but still had sufficient numbers for application in genomic selection. A substantial number of genotypes have been generated for Bonsmara cattle that have also been phenotypically recorded for the traits of interest.

In this project, the Bonsmara genotypes are currently being applied as a training set for estimation of Genomic Breeding Values (GEBV's). After GEBVs have been estimated for these animals, validation will commence followed by the roll-out of routine GEBV estimation. This genomic information will provide breeders with an additional, accurate tool for selection of superior stock.