

CASE STUDY 10

Characterization of genetic diversity conserved in the gene bank for Dutch native cattle breeds

Leading IMAGE partner: WR

Other IMAGE partners involved: none

Other non-IMAGE partners and actors involved: the Dutch-Flemish cattle improvement co-operative (CRV)

IMAGE WP and Task: WP6.2/WP2

Objectives

Since the beginning of the 1990s, genetic material from the Holstein Friesian cattle breed and from Dutch native cattle breeds has been collected and stored in the Dutch gene bank. For the Holstein Friesian breed, 25 straws have been stored for each AI bull. For native breeds, storage of material has been less systematic. The aim of this case study was to characterize genetic diversity in the gene bank for Dutch native cattle breeds

Material and methods

A total of 715 bulls from seven native breeds and a sample of 165 Holstein Friesian bulls were included. Genotype data (35k) were used to calculate genomic similarities. Optimal contribution selection (OCS) was used to construct core sets of bulls with a minimized similarity.

Results/output

Based on the genomic similarities, most breeds were clearly differentiated, except for two breeds (Deep Red and Improved Red and White) which have recently been derived from the MRY breed, and for the Dutch Friesian and Dutch Friesian Red which have frequently exchanged bulls. The composition of the gene bank was found to be partly optimized in the semen collection process; i.e. the mean similarity within breeds based on the current number of straws per bull was 0.32% to 1.49% lower than when each bull would contribute equally. The mean similarity could be further reduced within core sets by 0.34% to 2.79% using OCS. Material that is not needed for the core sets can be made available for supporting in situ populations and for research. These findings provide insight in genetic diversity in Dutch cattle breeds and help to prioritize material in gene banking.

More information

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