

Value of gene bank material for the commercial breeding population of Dutch Holstein Friesian cattle

J.J. Windig^{1,2}, H.P. Doekes^{1,2}, R.F. Veerkamp², P. Bijma² and S.J. Hiemstra^{1,2}

¹Wageningen UR, Centre for Genetic Resources, the Netherlands (CGN), P.O. Box 338, 6700 AH Wageningen, the Netherlands, ²Wageningen UR, Animal Breeding and Genomics, P.O. Box 338, 6700 AH Wageningen, the Netherlands;

jack.windig@wur.nl

Each year samples from Holstein Friesian bulls used for breeding have been stored in the Dutch national gene bank since the 1990s. Using the optimal contribution method we investigated whether old samples may contribute to the current breeding program. Optimal contributions can maximise genetic merit while constraining relatedness levels and loss of genetic diversity. Inclusion of cryobank bulls in the current breeding program, did not provide additional merit when total merit was maximised and relatedness restricted at high levels. At low levels of restricted relatedness inclusion of cryobank bulls did provide additional merit. For sub-indices yield, fertility and udder health additional merit was provided at any level. Optimal contributions were extended to constrain relatedness differently at different parts of the genome, or fix allele frequencies of single alleles, such as the allele for polledness in cattle, to a certain level. Using regional constraints we were better able to limit the loss of genetic diversity at parts of the genome further away from the allele under selection. Gene bank collections can thus be a valuable resource for commercial breeding populations, especially when loss in genetic diversity is to be constrained or in case of changes in the breeding goal.