New Zealand Genetic Evaluation (NZGE) upgrade (V6) - 2024

Technical Note

Subject:	**NZGE genotype inclusion criteria changes (Version 6)**
Relates to:	NZGE genomic breeding values, NZGE genotype inclusion
Date:	November 2024

Summary

- The NZGE has been upgraded, and the new version (NZGEv6) will be available in SIL and nProve from 2 December 2024.
- The V6 upgrade uses the latest innovations available to calculate genomic predictions. This change extends the capability of the NZGE to allow more genotype data from diverse breeds to be included in a single evaluation. The additional genotype data provides increases in BV accuracy.
- More diverse genotypes in NZGEv6 means that genotypes from both Terminal and Maternal breeds can be evaluated in one evaluation. Hence, the NZGEv5 (maternal) evaluation and Research NZGE Terminal will be rolled into one single evaluation (NZGEv6).
- The genotype restriction rules in NZGEv6 are less stringent compared to NZGEv5, and will be more consistent over time (i.e. there will be reduced need to drop genotypes when animals reach a certain age, which has previously caused some movement in BVs)
- Changes in BVs between NZGEv5 and NZGEv6 should be expected, particularly in genotyped flocks.

Background

The New Zealand Genetic Evaluation (NZGE) has been upgraded after extensive testing via forward validation (where recent phenotype data is held back to assess how accurately the BVs predict those withheld phenotypes). Version 6 of the NZGE uses a new innovation in the maths used to predict breeding values, where there is both pedigree and genotype data. Version 6 allows genotypes from more diverse breeds to be included in the same evaluation, optimises genomic enhancement of BVs and provides further increases in BV predication accuracy. It also allows more efficient analysis of large numbers of genotypes and reduces the need to restrict genotype numbers, even in traits for which there is limited phenotyping.
The change in genomic prediction method of itself has minimal impact on breeding values. However, as it allows processing of much higher numbers of genotypes than previously, the inclusion of the additional genotype data will result in some re-ranking of animals. Breeders with more genotypes included in the analysis will notice more of a shift in their animal's BVs. Extensive investigations have been carried out to understand the differences in V5 and V6 BVs and to ensure and validate continued increases in accuracy.

NZGEv6 genotype inclusion criteria

An animal must meet all the following genotype, breed, and pedigree criteria for its genotype to be included in the NZGEv6 evaluation.

Genotype

- The animal has a genotype loaded to SIL by a B+LNZ Genetics approved lab and,
- The genotype meets the genotype QC criteria.
- The year of birth of the animal is greater than or equal to 2010

Breed

Genotypes from the maternal breeds included in NZGEv5 will be included, as well as Highlanders. The genotypes from breeds in the Research NZGE Terminal evaluation will also be included.
Genotypes from animals that meet the following breed criteria may be included in the NZGEv6 analysis if:

- The animal has a SIL breed of ≥ 75% Texel, Romney, Coopworth, Perendale, Highlander, SufTex, Suffolk, South Suffolk, White Suffolk, South Dorset, Poll Dorset, Dorset Horn, Dorset Down, Ranger, Primera or Lamb Supreme or,
- The animal has a combined SIL breed of ≥37.5% Texel, SufTex, Suffolk, South Suffolk, White Suffolk, South Dorset, Poll Dorset, Dorset Horn, Dorset Down, Ranger, Primera or Lamb Supreme, or,
- The animal has a SIL breed of Composite with >30% Romney, Coopworth or Perendale, or,
- The animal has a SIL breed of Composite with >30% Texel and > 40% Romney, Coopworth or Perendale (or composite) background.

Pedigree Status

- The animal has at least one recorded or DNA assigned parent.

Goal Trait Group records

For all traits except Survival and Stayability, an animal's genotype will be included in the Goal Trait Group (GTG) NZGEv6 analysis if the above Genotype, Breed and Pedigree Status criteria are met.

For Stayability: No genotypes will be included in the GTG analysis, only pedigree will be used to inform BVs.

For Survival: Genotypes will be included in the GTG analysis if the above Genotype, Breed and Pedigree Status criteria are met and

- The animal is a sire or,
- The animal is a dam and is less than 6 years old

Changing from NZGEv5 to NZGEv6

- The final Research NZGE Terminal evaluation will be run on 29 November 2024.
- Weekly NZGEv5 evaluations will continue to be run until late February 2025.
- New genotypes will not be added to the NZGEv5 evaluations after 29 November 2024.
- nProve.nz will display NZGEv5 values until early April 2025.
- nProve Breeder will show NZGEv6 values by default from 02 December 2024.

As the selling season has already begun, breeders may wish to continue using NZGEv5 results for sale catalogues, especially if the flock is not genotyping and not related to genotyping flocks. NZGEv6 results represent an improvement in accuracy and will be available ongoing, so it is recommended that selection decisions for 2025 matings consider the NZGEv6 BVs.

The Genotyping Decision Tree provides more detail on which NZGE to report from and is available from the SIL website.