



Update on Genomic Reliability (GREL) Methods

Background

Breeding values are statistically calculated estimations of the genetic abilities of individual animals, allowing farmers and breeding companies to rank their animals and select the best ones for breeding. Reliabilities are an estimation of how accurate the breeding values are, providing information on the correctness of the animal ranking and thus the breeding animal selection. In the case of genomic selection, it has been shown that reliability for young, genotyped animals is often overestimated, and several methods for approximation of reliabilities to correct such overestimation have been developed, one of which within the framework of the Interbull Genomic Reliability Working Group (Liu et al. 2017, 2019, 2024).

Work performed and achievements

The Genomic Reliability Working Group have established a collaboration between LUKE Institute (Finland) and the University of Georgia (USA) in order to compare three different methodologies for genomic reliability approximations and assess the impact of using theoretical reliability versus the exact reliability calculated by matrix inversion. The three methods included in the comparison is:

- The LUKE method, Gao et al. 2023
- The Interbull Method, Liu et al. 2024
- Method from University of Georgia, Bermann et al, 2022

The software for each reliability approximation method has been shared between the project partners to test on their local dairy cattle data. The three different methods will thus be tested on three populations (FIN, DEU, USA) with different population structures. The expectation is that the three methods would be found very similar and that the application of one over the others would be more related to the data structure than to any main differences in the methodology applied by the three software.

Results and Impact:





Preliminary results from the Finnish cattle population were presented at the Interbull Open Meeting in Louisville, Kentucky in June 2026, followed by a publication in the Interbull Bulletin (Gao et al., 2026). These preliminary analyses showed that both LUKE and Interbull methods were providing very similar results on the Finnish population, with the LUKE method performing only slightly better than the Interbull method. Analysis will continue through 2026 and into 2027 with the two other methods also performed on the Finnish data, as well as all three methods performed on data from Germany and USA.

References

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