



Handling Genomic Pre-Selection Bias

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Introduction

With the spreading of genomic evaluations applied by an increasing number of countries, national genetic evaluations' results, and therefore also international results, have started accumulating a new source of bias due to genomic pre-selection (GPS). One of the main advantages of genomic selection, in fact, is the possibility to identify above average bulls, within a family, at their early age and way before them entering a progeny testing scheme. This practice has altered the distribution of breeding values for AI bulls and caused a fast accumulation of the GPS in the data. The amount of this bias varies from country to country, depending on the level of pre-selection applied (*Sullivan et al., 2023*).

Work performed and achievements

The international MACE model was modified to account for non-random within-family GPS of AI bulls. A method to derive the effects of GPS directly from the data has been developed. The method allows for expression of different GPS intensities across traits, breeds, countries of selection and time, and the accumulation of differential effects of GPS across multiple generations in a bull's ancestry, and across international borders. Studies are being conducted to assess the differences between EBV from the modified MACE model (the so called GPS-MACE) versus the current official MACE model. At the moment, results from studies for three breeds (Holstein, Brown Swiss, and Jersey) and eight traits (milk fat, milk protein, conformation score, udder score, somatic cell score, fertility interval, cow conception, and milking speed) on the GPS estimation have been carried out. Such preliminary results showed that effects of GPS were generally largest for countries that have shared genotypes of proven bulls to improve national genomic predictions. Research continues to modify the current MACE model also in relation of how the different variances will be partitioned by the model.

Results and Impact:





International Bull Evaluation Service

INTERBULL is a permanent sub-committee of ICAR (www.icar.org)

Interbull aims to identify the best way to account for the different levels of genomic pre-selection from countries and, consecutively, on developing a new MACE software able to properly model it.

References

Sullivan et al., INTERBULL BULLETIN NO 57. May 30 -June 3, 2022, Montreal, Canada.

Sullivan et al, INTERBULL BULLETIN NO. 58. February 14 - 15 2023, Rome, Italy

https://interbull.org/ib/2021_genomic_free_ebv_webinar



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