

Integration of MACE breeding values into domestic multi-trait test-day model evaluations

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The integration of information for bulls from Multiple Across Country Evaluation (MACE) into the domestic test-day model (TDM) is demonstrated by blending MACE yield indices into the Nordic TDM. The 9-trait TDM includes simultaneously test-day records of milk, protein and fat from the first three lactations. The official 305d lactation total yield indices for milk, protein, and fat are calculated from the TDM solutions. Each yield index is a weighted average of 305d breeding values of the three parities. Yield indices and corresponding reliabilities are submitted to Interbull which performs MACE and returns MACE yield indices and reliabilities.

In this study, we included MACE information for EUROGENOMICS bulls into the Nordic TDM. A bull was considered to have additional information in MACE if its reliability for milk, protein and fat indices in MACE were at least 0.01 units higher compared to the Nordic TDM reliability. The TDM gained additional information for almost 28 000 bulls.

The integration process had three steps. 1) The multitrait reversed reliability approximation was used to obtain effective record contributions (ERC) for the selected 28000 bulls. The ERC was approximated first using reliabilities from the Nordic TDM, and then using reliabilities from MACE. 2) Yield indices and ERC were used to calculate multitrait deregressed proofs (DRPs) separately using the Nordic TDM and MACE data. To avoid double counting of information, correlations between the evaluated milk, protein and fat indices were accounted during the ERC and DRP calculations. 3) Based on the two DRPs and two ERCs, pseudo-observations were calculated for the selected 28000 bulls. Pseudo observation approximates the external record information in MACE.

Original TDM models breeding values of milk, fat and protein in three lactations by 15 random regression coefficients. Three new covariable sets were added to model which describe the three new pseudo-observations. After including MACE information, the correlations between MACE and Nordic yield indices were 0.99, 0.99, and 0.99, prior inclusion they were 0.72, 0.77, and 0.67, for milk, protein and fat, respectively.