Effects of use of external information in Single-Step evaluations for linear type traits in Brown Swiss

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Motivation

- Genotypic information from males is exhausted
- Large potential of information increase from females
- Cow genotyping strategy has been started
  - ➔ December 2020: 68‘236 genotypes in total
  - ➔ 6‘055 bulls in the calibration (udder score)
  - ➔ 38‘972 genotyped females
  - ➔ 13‘239 genotyped cows with linear type phenotypes

Motivation

- Inclusion of cow genotypes in the system
  - ➔ Single-Step model
- Switch from Two-Step to Single-Step in April 2021
  - ➔ Use of external information in Brown Swiss
  - ➔ Two-Step since 2011: calibration set with de-regressed proofs of domestic and MACE bulls
  - ➔ Single-Step with inclusion of MACE information

Objective

- Present an overview about the inclusion of MACE information in the new single-step system

  ➔ Method used for integration of MACE-info

  ➔ Effects of the inclusion: validation reliabilities

Material and Methods

- Data status of Dec. 2016 (minus 4 years validation)
  - ➔ 23‘992 genotypes in total
  - ➔ 5‘757 genotypes from InterGenomics
  - ➔ 29 linear type traits
- Runs with and without MACE-info
  - ➔ From 2‘968 to 6‘607 bulls with MACE EBVs
  - ➔ Comparison of validation reliabilities

Material and Methods

- Guarini et al. (2019), JDS 102: 8175-8183

$$\mathrm{EBV}^{*} = \frac{\left[\left(\mathrm{DE_M} + k\right) \times \mathrm{EBV_M}\right] - \left[\left(\mathrm{DE_D} + k\right) \times \mathrm{EBV_D}\right]}{\left(\mathrm{DE_M} - \mathrm{DE_D}\right) + k}$$

$$\mathrm{Rel}_{\mathrm{EBV}^{*}} = \frac{\mathrm{DE_M} - \mathrm{DE_D}}{\left(\mathrm{DE_M} - \mathrm{DE_D}\right) + k},$$

$\mathrm{EBV_M}$ and $\mathrm{DE_M}$ ⟹ MACE EBV and r^2 from Interbull

$\mathrm{EBV_D}$ and $\mathrm{DE_D}$ ⟹ Domestic EBV and r^2 from a run with domestic info (conventional)

Material and Methods

- Final observations for the 29 linear type traits
  - ➔ Yield deviations of domestic cows
  - ➔ De-regressed corrected MACE EBVs of MACE bulls
  - ➔ Weighted by corresponding EOPs
- Some univariate and some multivariate models
  - ➔ Pseudo-phenotypes of MACE bulls for the target trait

Material and Methods

- Overall conformation score (OCS)
  - ➔ Multivariate model (overall rump, udder score, feet and legs, frame)
  - ➔ OCS is an index calculated from the multi-trait EBVs
- Integration of MACE-info in the OCS-model
  - ➔ Pseudo-phenotypes of MACE bulls for the four traits

Results

- Amount of information from MACE bulls
  - ➔ 5‘686 bulls contributing a pseudo-obs. for udder score
  - ➔ 5‘163 of them with genotype
  - ➔ 2‘879 of them with genotype and DE_D=0
  - ➔ 2‘454 of them with genotype and DE_D=0 and DE_M>20

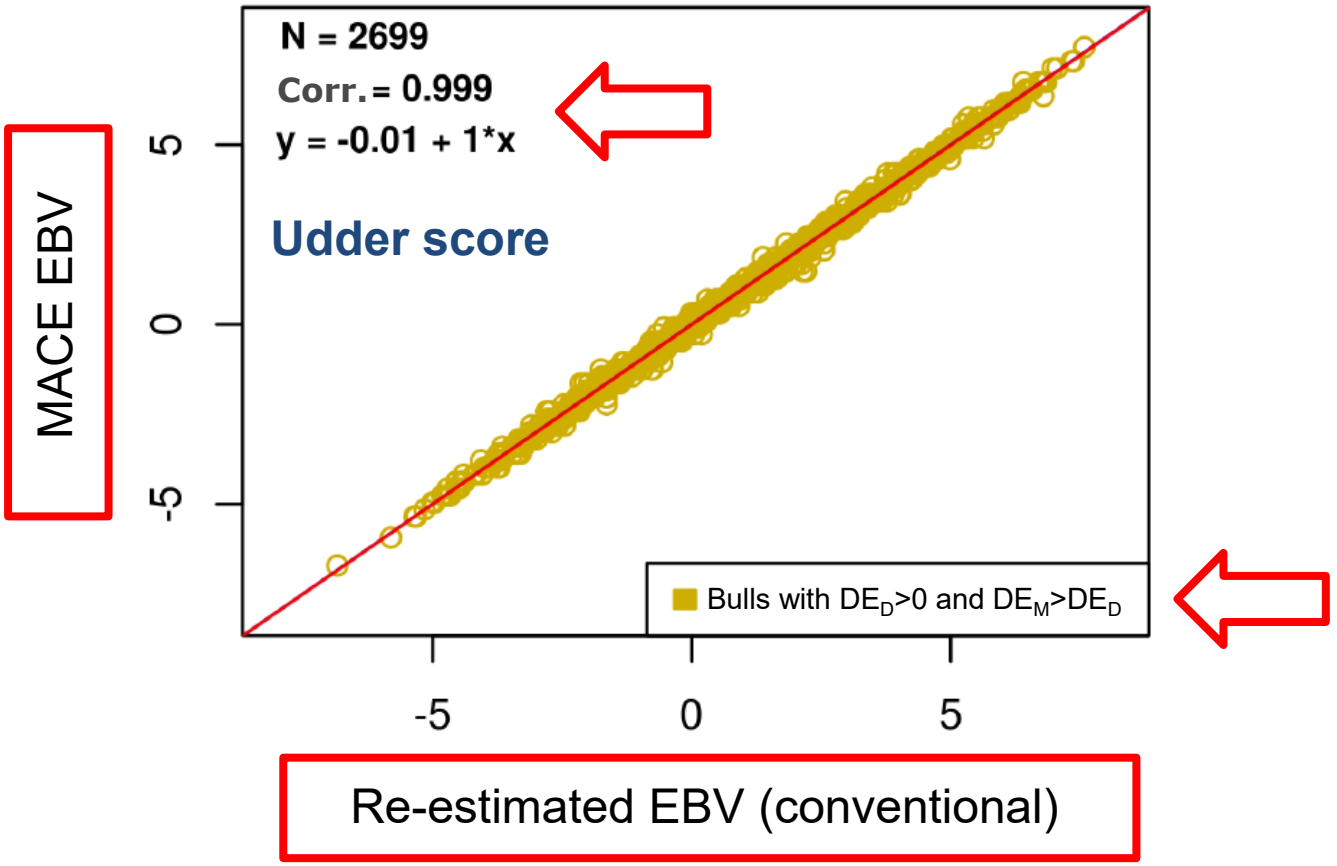
The total number of bulls with daughter information getting into the two-step calibration set in december 2016 was 5‘272

Results

- Checking the model with integrated MACE EBVs
  - ➔ How well the correction for double counting works
  - ➔ Conventional model including pseudo-phenotypes of MACE bulls (same as single-step model but without genotypes)
  - ➔ Comparison of the EBVs coming out of this model with the original MACE EBVs from Interbull

Results

- Checking the model with integrated MACE EBVs

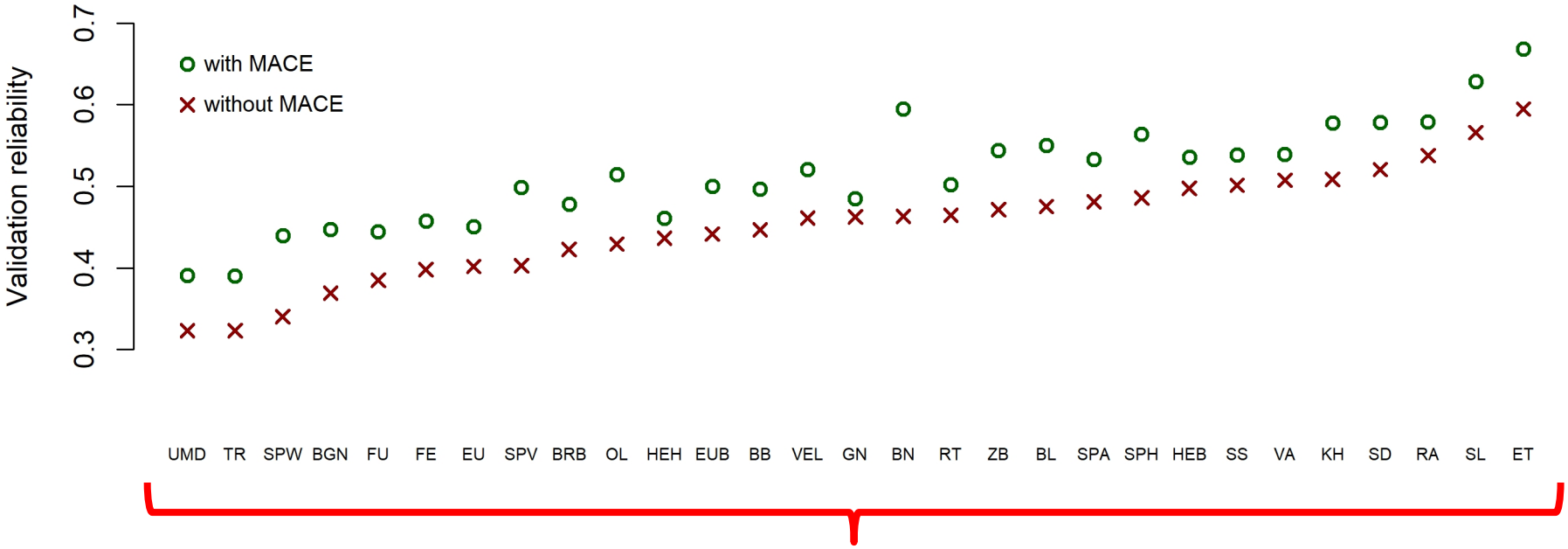


Results

- Validation study:
  - ➔ Historical runs with and without MACE-Info
  - ➔ De-regressed proofs from current run
  - ➔ Comparison of validation reliabilities

Results

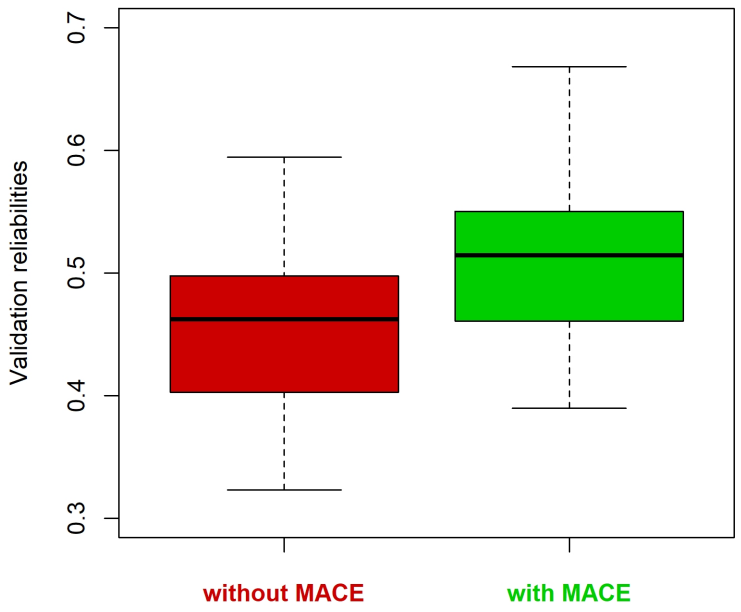
- Validation reliability:



29 linear type traits

Results

- Validation reliability:



Trait	without MACE	with MACE
Overall Rump	0.369 ⇒	0.447
Udder score	0.402 ⇒	0.450
Feet & Legs	0.385 ⇒	0.444
Frame	0.538 ⇒	0.579
OCS	0.463 ⇒	0.485

Conclusions

- Integration of foreign information in the new single-step system resulted in notable increase in validation reliabilities
- The method used for integration seemed to work well and allowed for a better combination of information in the overall conformation score

Aknowledgements

Thank you for your attention!