Integration of external information from multiple traits into the national multitrait evaluations

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Background and Objective

- Inclusion of Interbull MACE information to national single-step genomic evaluations (blending) is crucial
- Frequently MACE is combined trait, national evaluations multi-trait models
- We tested the efficiency of blending combined indices (protein, milk, fat) to multi-trait multi-parity model

Data and Models

The blending method was studied using 305d milk, protein, and fat yields for first three lactations for Nordic (FIN, SWE, DNK) Holstein cows

- Three multi-trait evaluation models
  1. Domestic evaluation using **Danish data** (**DNK**)
  2. External Nordic evaluation using **Finnish, Danish,** and **Swedish** data (**DFS**)
  3. Domestic evaluation model including external information
- **9 traits** = 3 lactations,3 traits within lactation
- **Genetic correlation** between countries = **1**
- **Trait indices** were calculated based on breeding values for parities as

$$0.5 * EBV_1 + 0.3 * EBV_2 + 0.2\ EBV_3$$

- A **bull** was blended if
  1. **Reliability** of protein index in **DFS** was **>0.5** and was **0.05 units higher** compared to **DNK**
  2. **Birth year** of a bull was >**1989**
- In total **11738** bulls were selected to be blended

Steps for blending

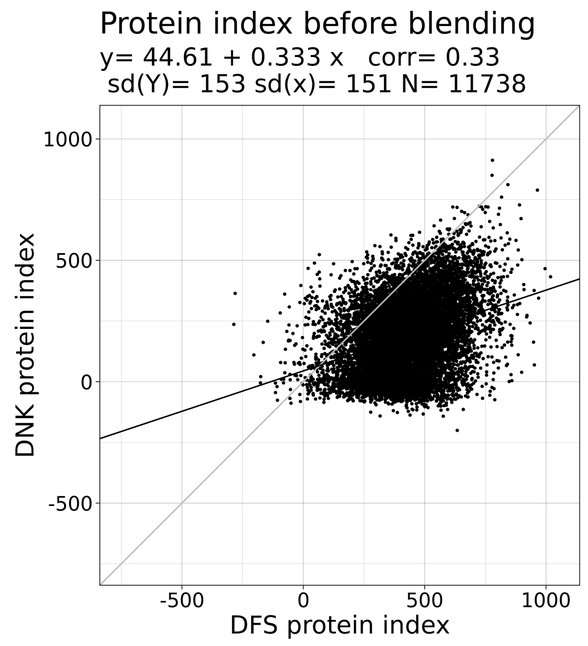
1. Calculate **multi-trait effective record contribution (ERC)** and **multi-trait deregressed proofs (DRP)** for domestic and external trait indices
2. Amount of external information

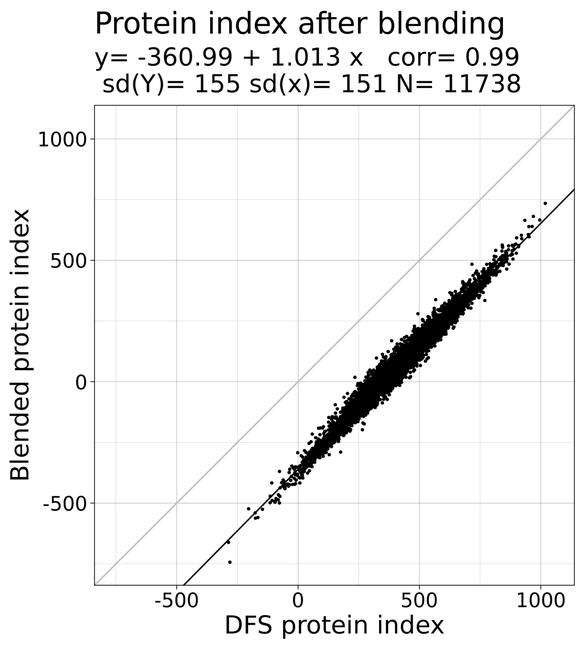
$$\boldsymbol{ERC_{bl} = ERC_{ext} - ERC_{dom}}$$

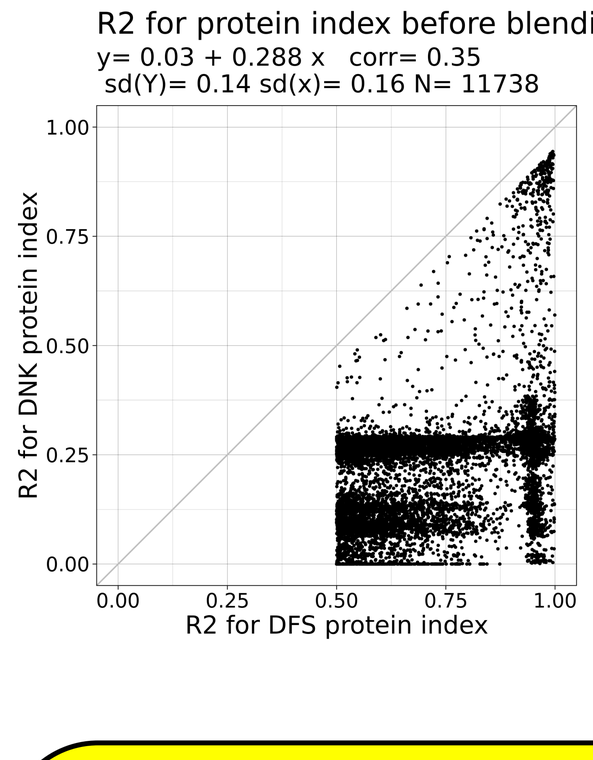
3. Pseudo observation

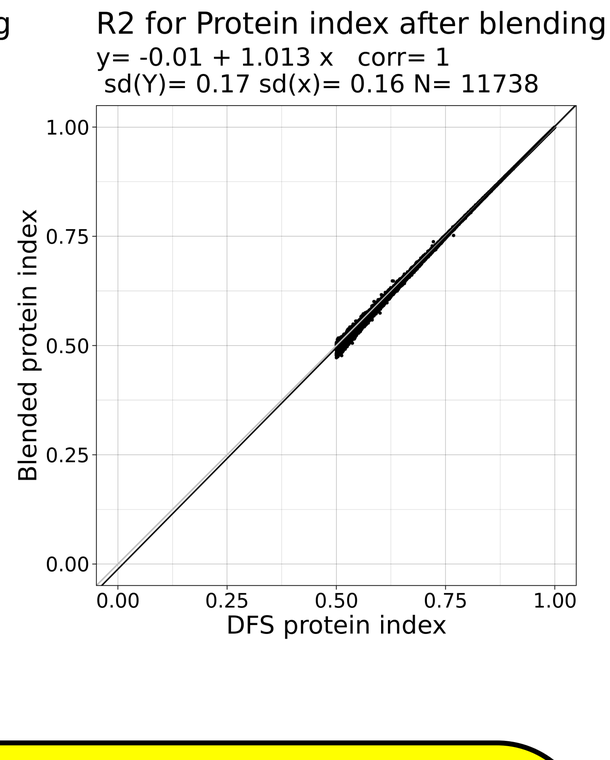
$$\boldsymbol{DRP_{bl} = \frac{ERC_{ext} * DRP_{ext} - ERC_{dom} * DRP_{dom}}{ERC_{ext} - ERC_{dom}}}$$

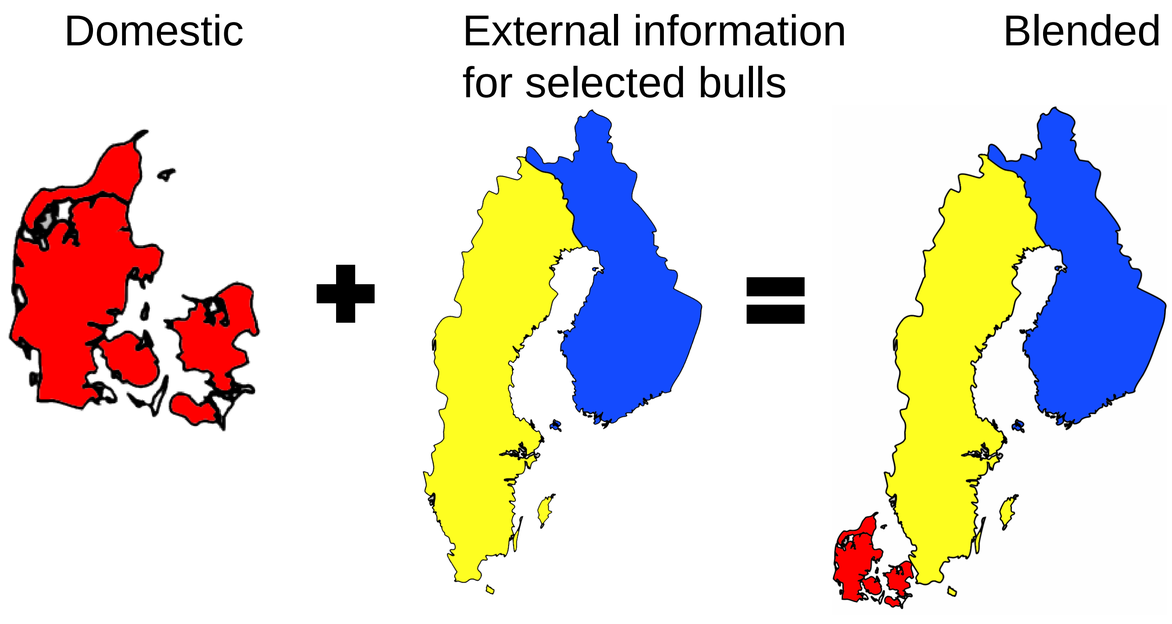
4. Include $\boldsymbol{DRP_{bl}}$ to domestic model as an observation using $\boldsymbol{ERC_{bl}}$ as a weight











Conclusions

- Blending of external information as trait indices to a multi-trait multi-parity evaluation model works
- The regression slope and correlation between blended and DFS protein indices are about 1
- No bias in reliability