Impact of preselection on genetic evaluations using single step GBLUP

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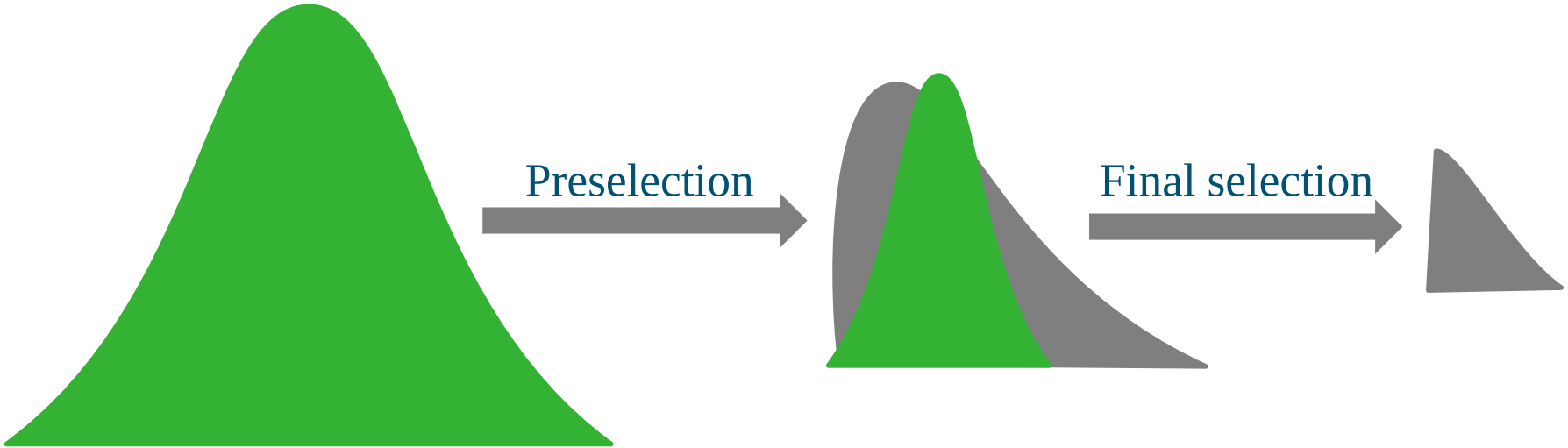
100years
1918 — 2018

Acknowledgements

Preselection and the models



Problem

Limited literature on preselection in pyramidal breeding programmes

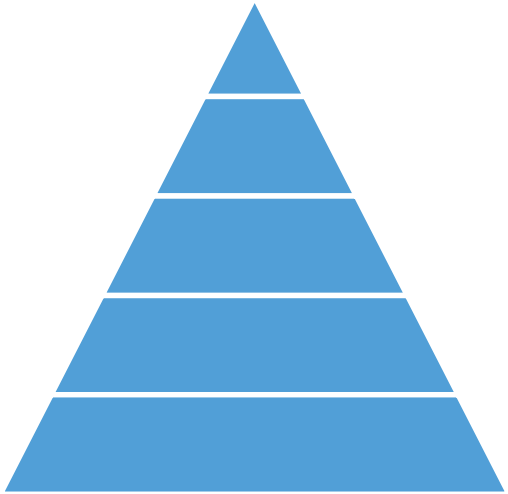
Aim

Investigating the impact of preselection on genetic evaluations in pyramidal breeding programmes, using single step GBLUP

Data

A pyramidal breeding programme simulated

- single-trait breeding goal
- $h^2 = 0.1$
- 15 recent generations with selection
- complete pedigree
- phenotypes: last 5 generations
- genotypes: last 3 generations
- replication: 10 times



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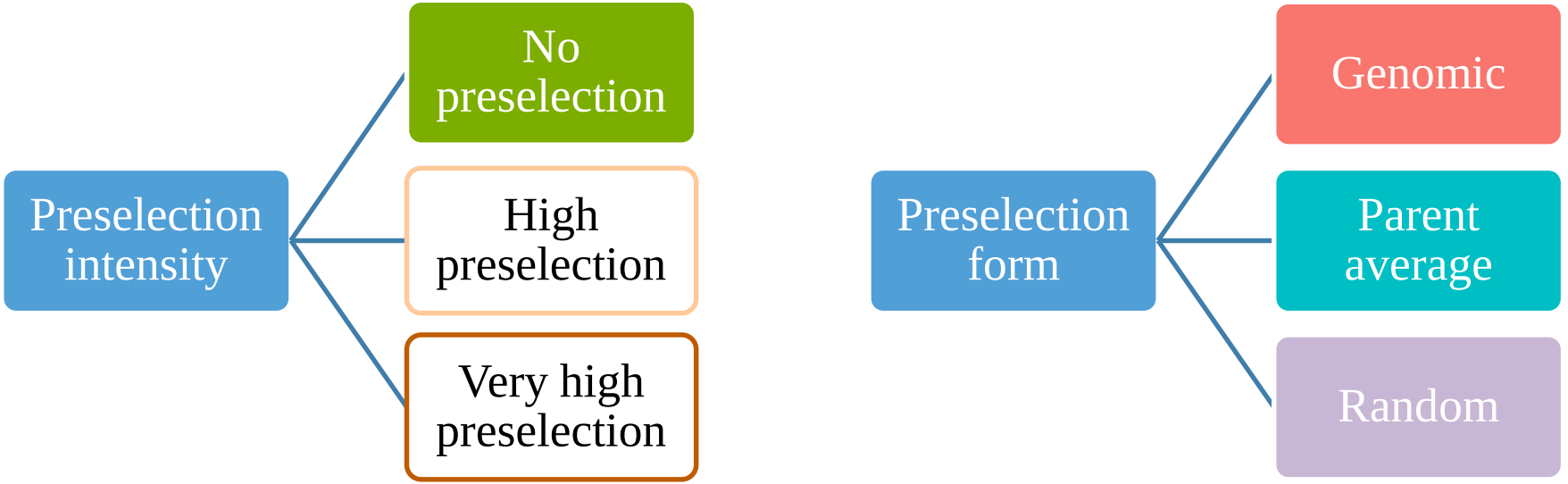
QMSim

Implementation of preselection



All pair-wise combinations of intensity and form implemented

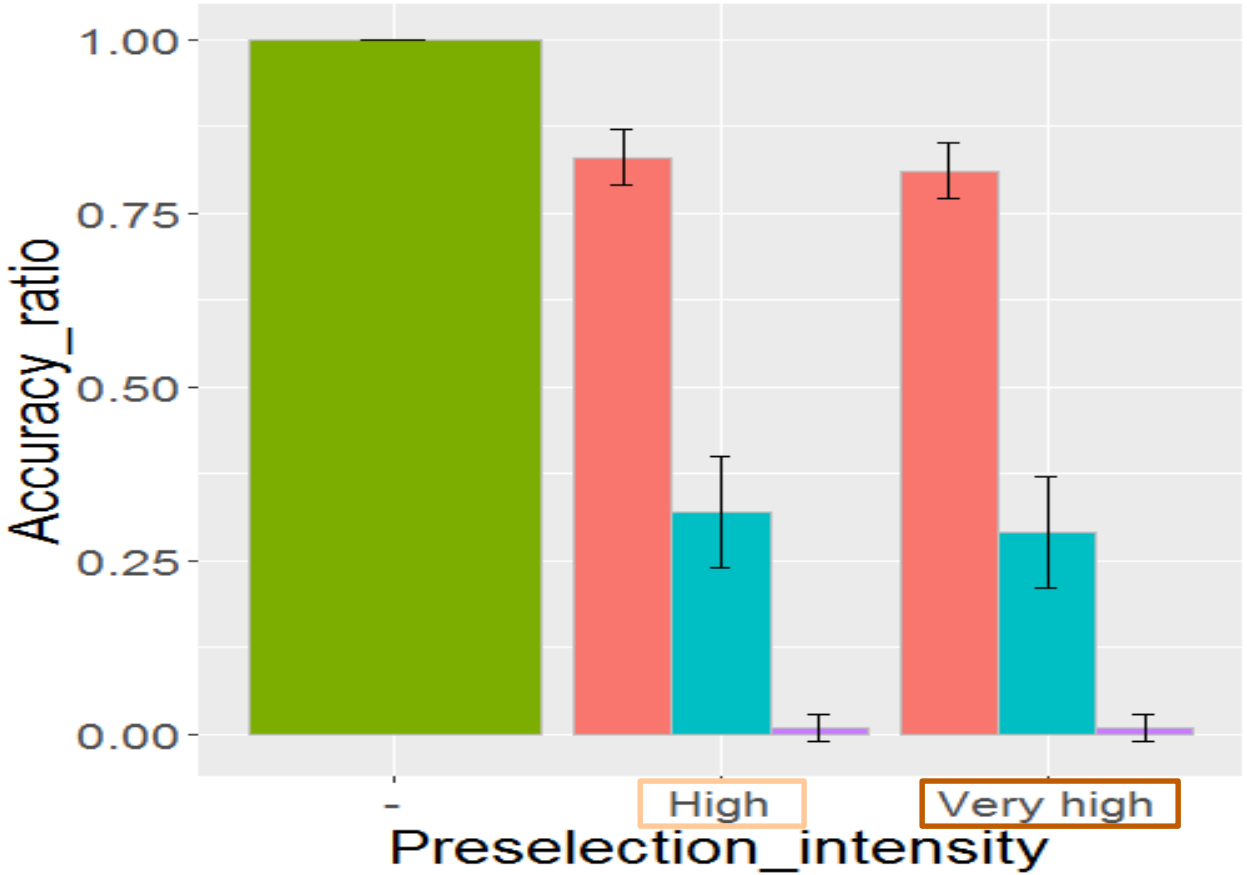
The model

- ssGBLUP used whenever applicable

- $y_i = \mu + animal_i + e_i$

- $$\mathbf{H}^{-1} = \mathbf{A}^{-1} + \begin{bmatrix} 0 & 0 \\ 0 & (0.9\mathbf{G} + 0.1\mathbf{A_{22}})^{-1} - \mathbf{A}_{22}^{-1} \end{bmatrix}$$

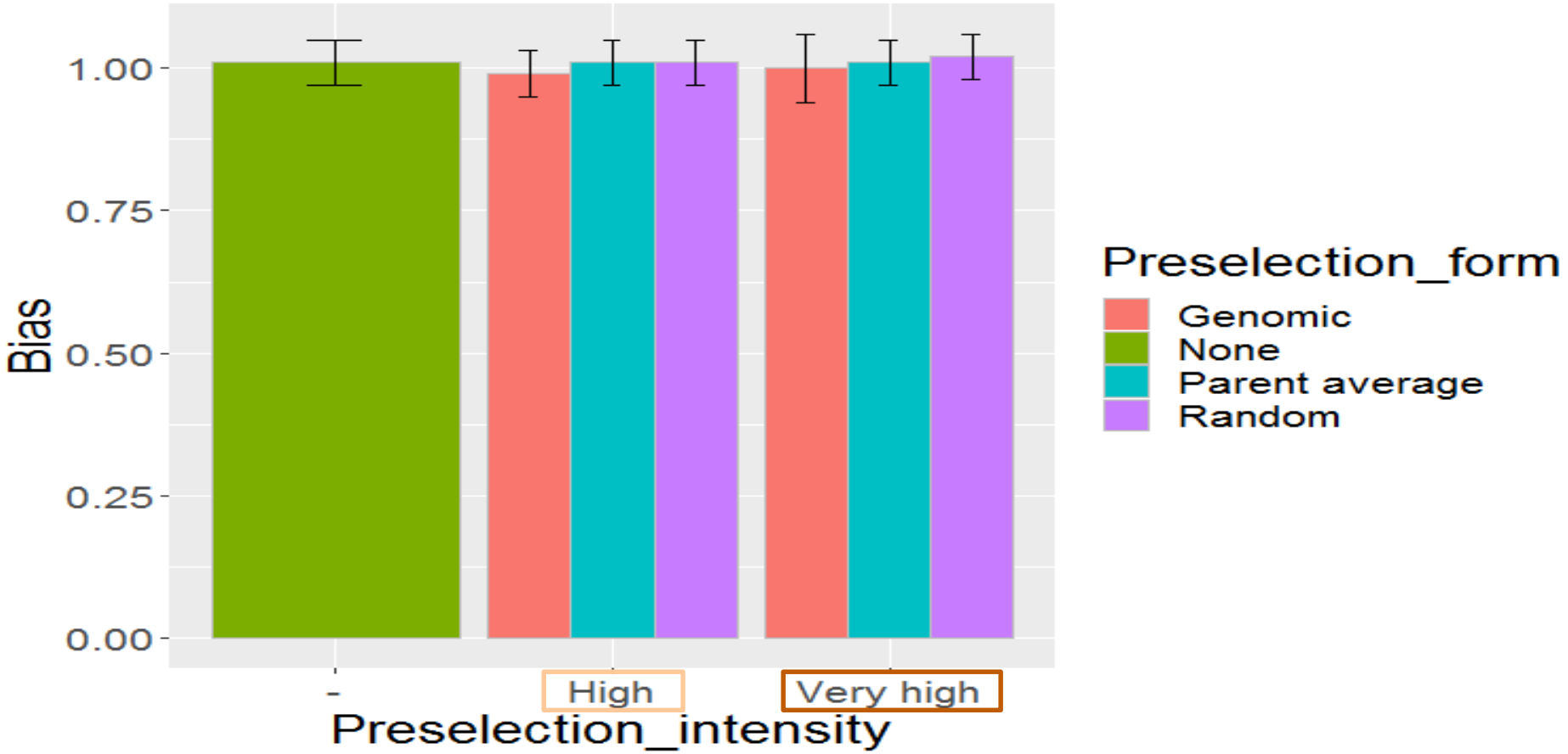
Results: Selection accuracy



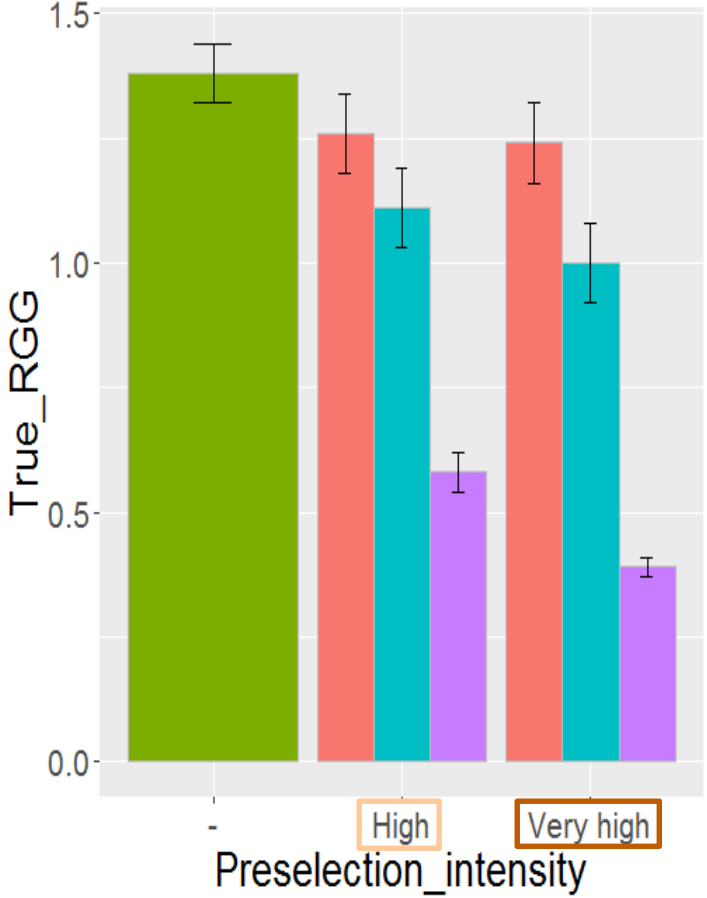
Schrooten *et al*. (2005), J. Dairy Sci. 88:1569–1581. DOI:10.3168/jds.S0022-0302(05)72826-5

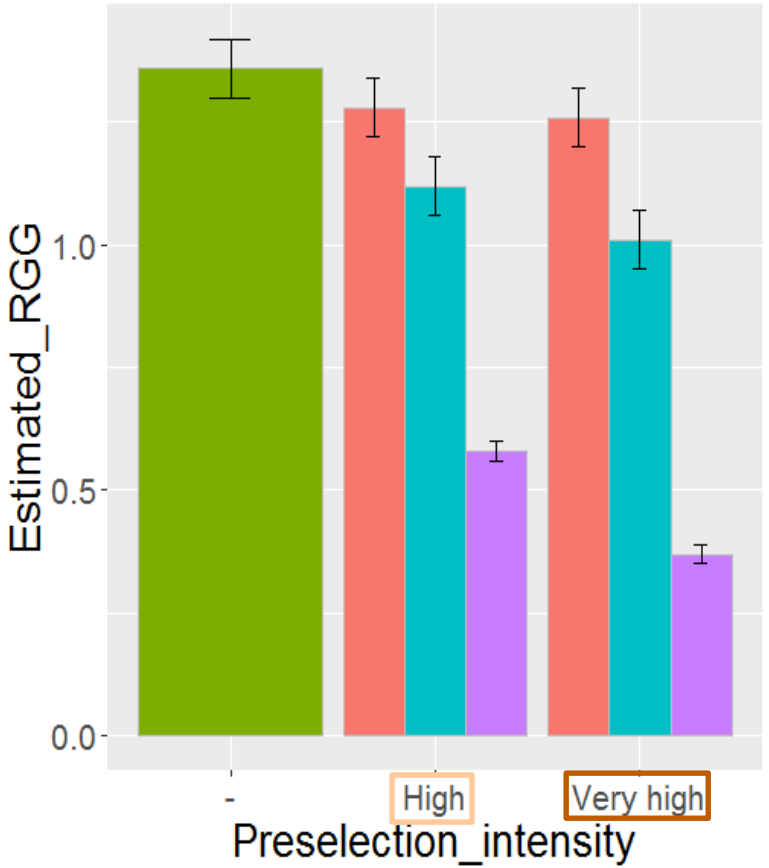
Preselection_form
Genomic
None
Parent average
Random

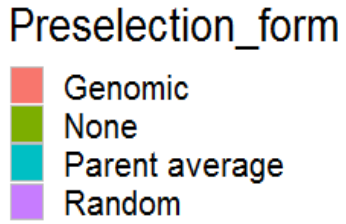
Results: Bias



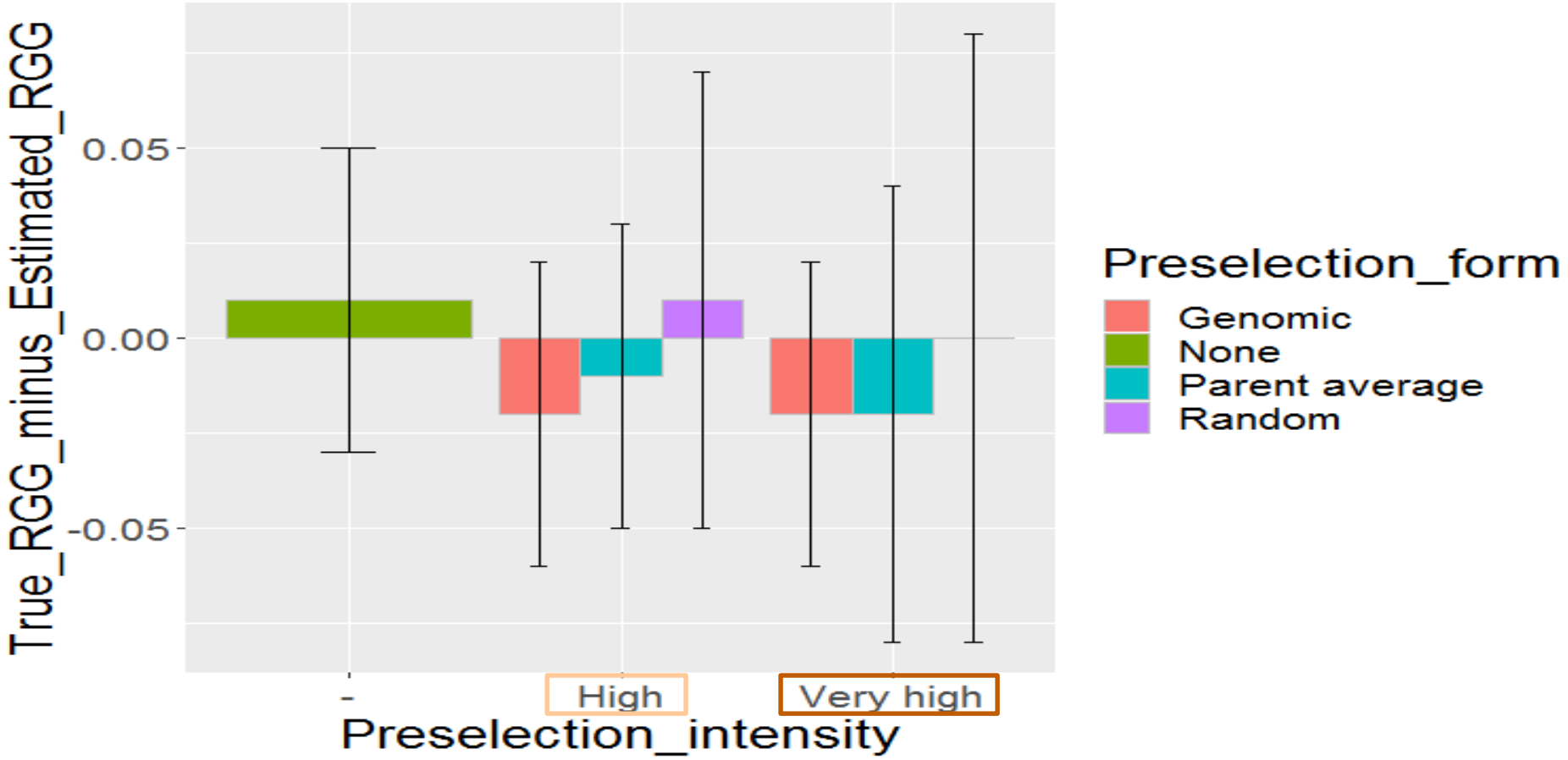
Results: Realised genetic gain (RGG)







Results: Correctness of the estimated genetic gain



Take-home messages

- With ssGBLUP in the final genetic evaluation, genetic gain decreases ...

  ... with higher preselection intensity, and with lower accuracy ratio

- With ssGBLUP in the final genetic evaluation ...

  ... no significant bias, and genetic gain correctly estimated

- With GPS, genetic gain only marginally lost and ...

  ... the cost of raising and phenotyping the preculled animals saved

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