

The impact of deregressed foreign breeding values on national beef cattle single-step genomic evaluation

Project motivation / Introduction

- Genomic evaluations in cattle breeding have shifted from purely national evaluations to multinational evaluations that consider relatives from other countries.
- Integrating International EBVs into national genomic evaluations presents challenges due to differences in methodologies and data sources.
- How do we blend EBVs obtained from two (overlapping) sources of information?

This study aimed to blend international EBVs with the national single-step genomic evaluation of German beef cattle populations.

Results

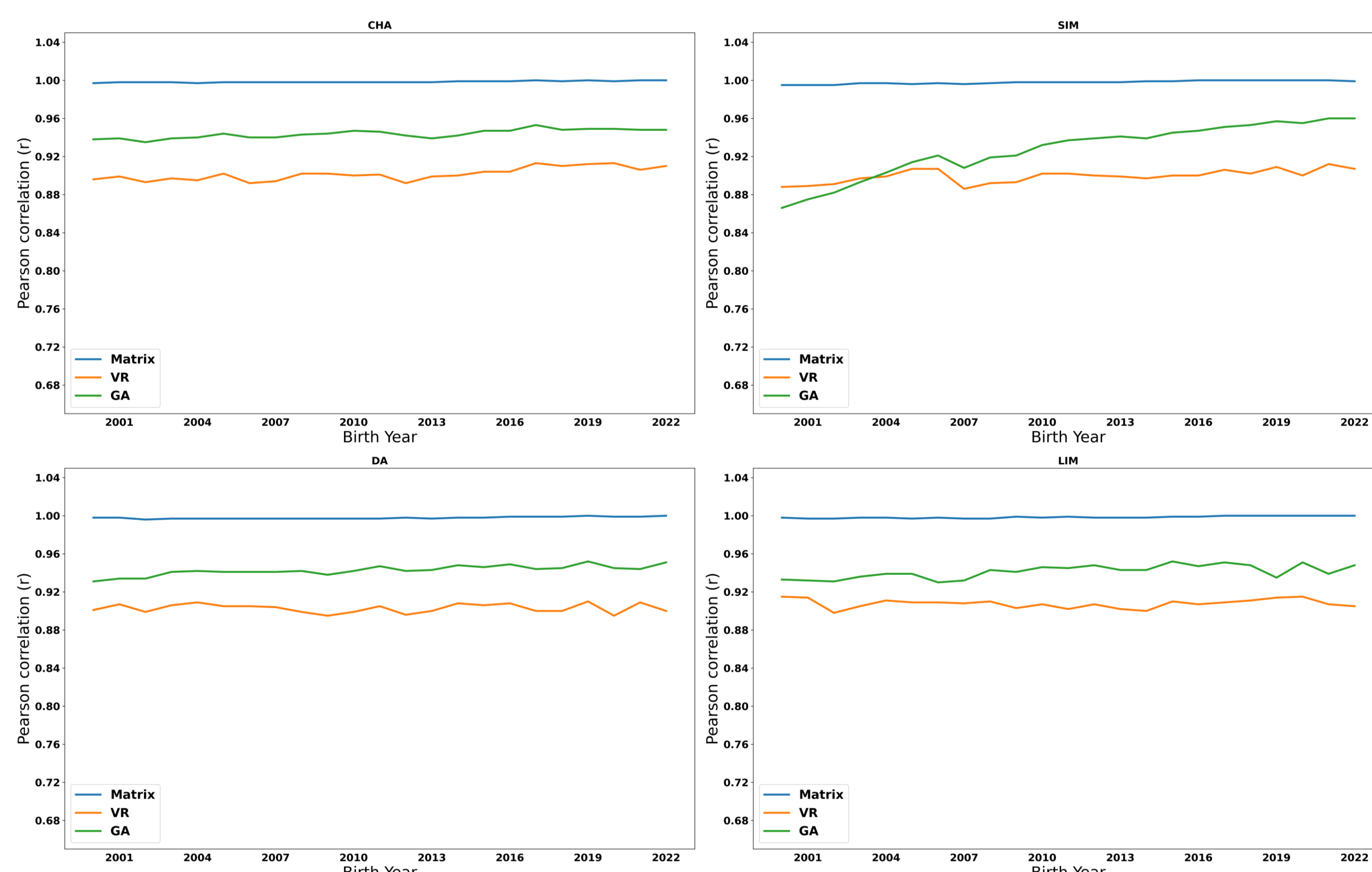
Table 1: Pearson correlation between GEBVs obtained from the truncated and full evaluations for the validation animals.

Traits	National				Nat + Foreign			
	CHA	LIM	SIM	DA	CHA	LIM	SIM	DA
BW	0.83	0.76	0.72	0.74	0.83	0.76	0.71	0.74
200-DW	0.78	0.78	0.76	0.77	0.79	0.78	0.62	0.77
365-DW	0.81	0.81	0.77	0.82	0.81	0.81	0.74	0.82
200-MS	0.80	0.76	0.75	0.70	0.80	0.76	0.70	0.70
365-MS	0.84	0.82	0.80	0.76	0.84	0.82	0.79	0.77
Mat effect	0.74	0.74	0.75	0.76	0.79	0.79	0.75	0.81

Table 2: Percentage increase in reliability obtained from the evaluation with foreign data (REL_{int}) and the evaluation with national data (REL_{nat})

No. Progenies	CHA	LIM	SIM	DA
0	3.47	3.89	2.22	4.34
1-5	4.95	5.04	4.24	5.46
6-10	5.02	4.72	4.59	4.88
11-15	8.11	7.33	7.58	6.44
16-20	12.81	12.37	11.78	11.78
> 20	13.73	13.83	12.39	14.02

Figure 1: Correlation between EBV obtained from Interbeef and EBV obtained from deregressed proofs (adjusted weaning weight)

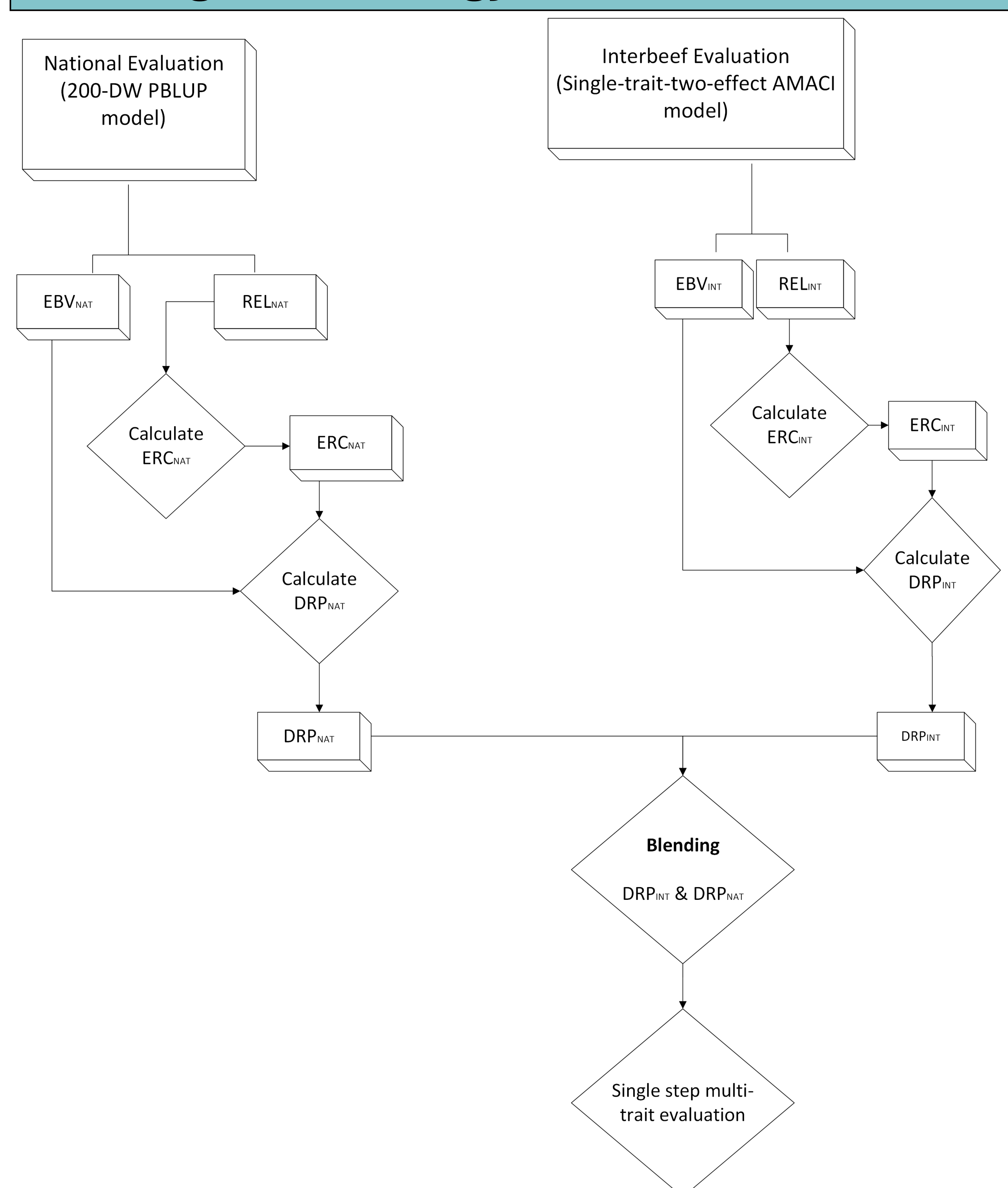


Conclusions

Across all breeds and traits, the matrix deregression approach outperformed scalar deregression approaches, exhibiting a higher correlation with the EBVs obtained from phenotypes.

Blending national and international EBVs increases the reliability and accuracy of national single-step GEBVs for all sub-groups of animals.

Blending Methodology



Dataset and Evaluation

- National:** 200-day weight national phenotype data from 4 German Beef cattle populations.

- Foreign:** Adjusted Weaning Weight (breeding values + reliabilities) from routine Interbeef evaluation.

- Pedigree:** German national pedigree

- Compared 3 deregression approaches
 - VanRaden
 - Garrick
 - Matrix deregression

- Evaluated deregression approaches by correlation with initial EBV: Figure 1

- Two single-step evaluations with
 - National data
 - National data with foreign data as correlated traits

- Evaluated with
 - Forward validation to compare the effect of blending: Table 1
 - Percentage increase in reliability: Table 2