Jersey Update and perspectives on international collaboration

Outline:

- Methods for cross validation
- Stability of DGV
- Results within son groups
- Summary

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Cross Validation

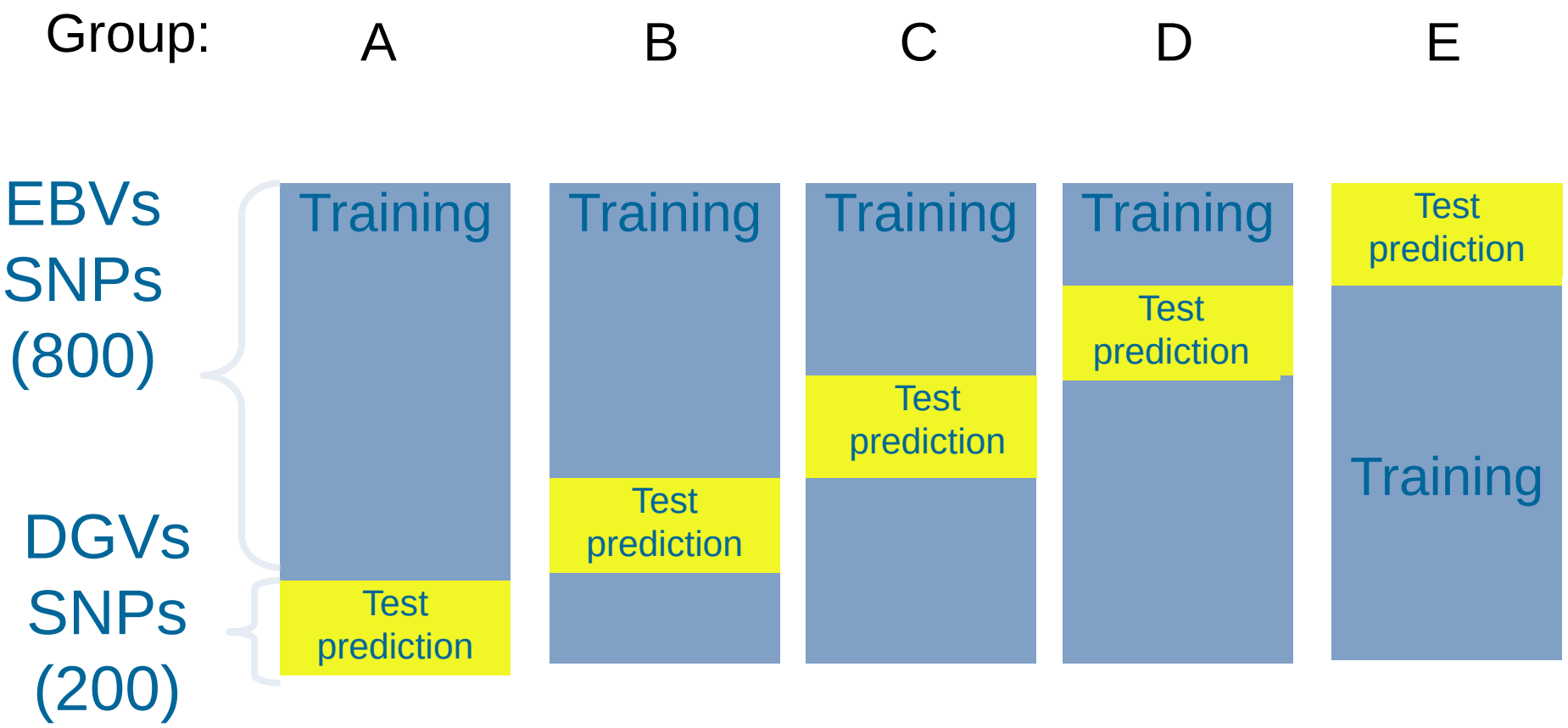
Aim

- Estimate reliabilities for DGV on candidates without own registrations
- Reliability of candidate without close relatives in reference population

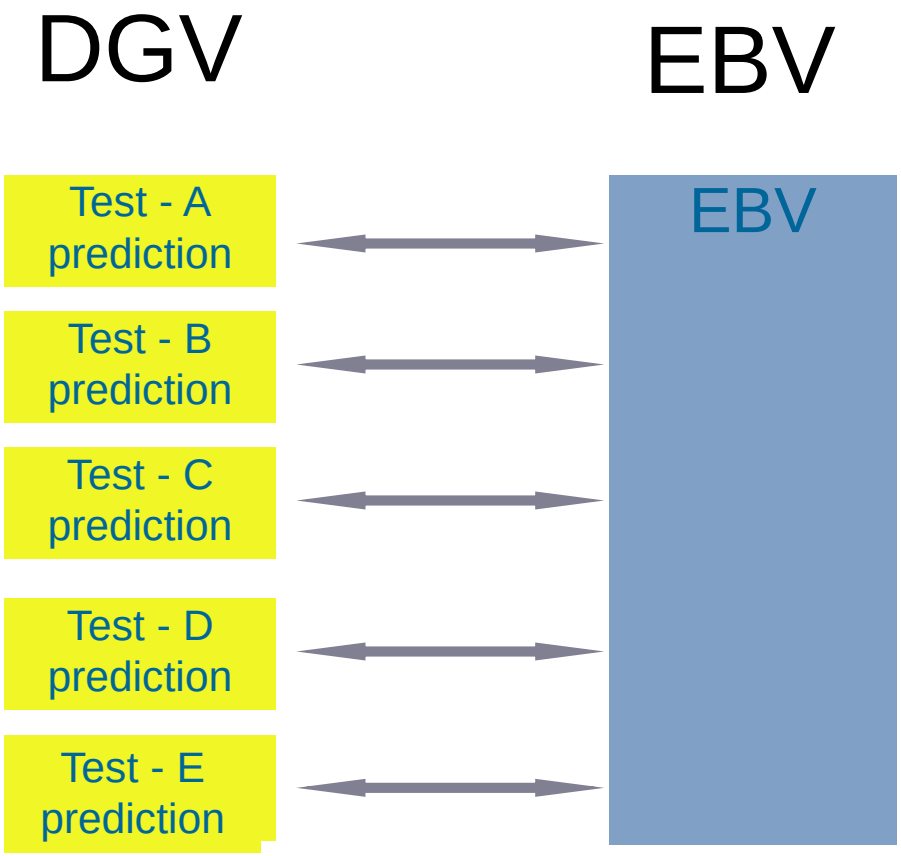
Methods for Cross Validation

- Prediction of last 3 years of bulls with EBV
- Reliabilities calculated direct from Bayesian model solutions of DGV on candidates
- Fivefold cross validation

Fivefold Cross Validation



Fivefold Cross Validation



Cross Validation Groups

Group	Birth year of sons	Number of families	Number of sons
A	85-91	21	185
B	92-94	15	225
C	95-97	19	207
D	98-00	24	202
E	00-04	27	184
Total		106	1003

Criteria for reference animals: Nordic test for EBV

- Production traits - 1003 bulls
- Other diseases - 887 bulls

Within year R^2 between EBV and DGV

Test bulls with sons in reference group excluded

Trait	All bulls	Sire in reference n=662	Sire not in reference n=307
Protein	0.24	0.27	0.20
Udder health	0.51	0.55	0.41
Fertility	0.25	0.25	0.23
Other diseases	0.43	0.45	0.40
Calving ease	0.48	0.53	0.38
Udder	0.25	0.26	0.22
Average (16 traits)	0.30	0.33	0.24

Last 3 Years Validation

Bulls with EBV
in 2006 (860 bulls)

Bulls with EBV 2009
(130 bulls)
Birth year 02-03-04

Prediction of last 3 years of bulls with EBV

Trait	R^2	Reliability on EBV for test-bulls	Corrected R^2
Protein	0.26	92	0.29
Udder health	0.25	59	0.43
Fertility	0.29	56	0.52
Other diseases	0.32	46	0.69
Calving ease	0.19	50	0.38
Udder	0.29	80	0.36
Average (16 traits)	0.25		0.42

Bayesian Reliabilities of DGV for Candidates

Trait	Reliability
Protein	0.41
Udder health	0.63
Fertility	0.45
Other diseases	0.54
Calving ease	0.42
Udder	0.47
Average (16 traits)	0.44

Gains in R^2 from Parent Average to DGV

Trait	Gain
Udder health	+ 0,34
Other diseases	+ 0,31
Calving ease	+ 0,31
Temperament	+ 0,10
Longevity	+ 0,09
Legs	+ 0,08
Milk-index	+ 0,06
Milking speed	+ 0,06
Fertility	+ 0,04

Further Improvements

- Improvement of results through international collaboration
  - Increased reference group
  - Gain in reliabilities for production and conformation traits
  - Await experience from Holstein

International collaboration

Country	Number of reference bulls	Genetic correlation to DFS for Protein	Genetic correlation to DFS for Mastitis
NZ	1600	0.76	0.37
USA	1800 (1200)	0.92	0.68
AUS	500	0.77	0.44
DFS	1050		

Status - Jersey

- Calculation of DGV in May – July – September

- Changes from May to July
  - Same EBV
  - Reduction in number of markers from 38134 to 33524
  - Only one sire added to the reference group (DJ May)

- Changes from July to September
  - EBV updated
  - 11 new sires in reference group
  - 887 to 1040 sires in reference group depending on trait

- First batch of GenVik+ bulls selected in September

Comparisons of DGV for candidates between runs

250 to 350 candidates

	May-July	July-September		
Trait	**Correlation**	**Correlation**	**No of animals with change >2**	**Max change DGV**
Protein	0.99	0.99	17	3.4
Fertility	0.99	0.98	30	3.6
Udder health	0.99	0.99	1	2.0
NTM	0.96	0.97	48	4.9

Differences between best and worst within half sib group

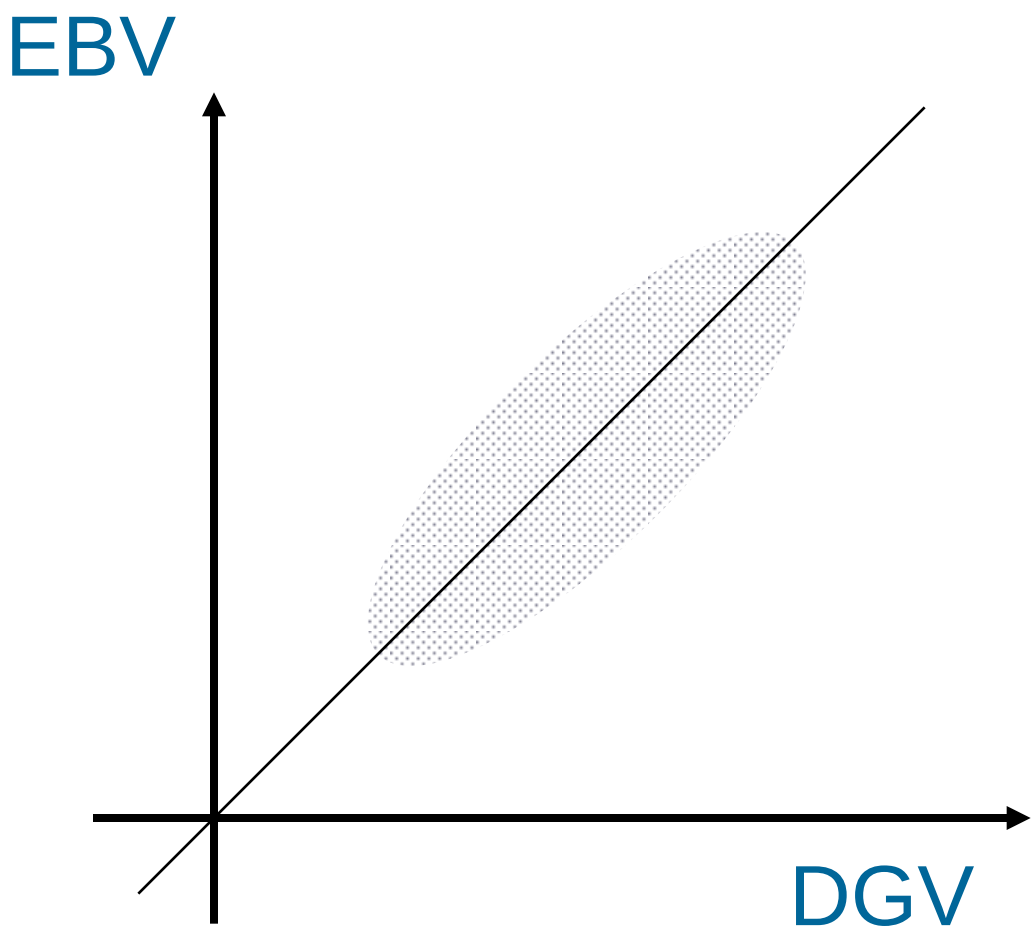
Group	Source	Y-index	Udder health	Fertility	Udder	NTM
Q Hirse (19 sons)	Parent Average	**4.3**	**10**	**11**	**6**	
	DGV	**13.5**	**14**	**21.7**	**12.7**	**8.4**
DJ May (17 sons)	Parent Average	**7.0**	**10**	**9.3**	**6**	
	DGV	**15.9**	**17.6**	**17.0**	**7.1**	**15.0**

Summary

- Estimates of reliabilities of DGV depend on method used
  - Reliabilities on average 30 to 40 %
  - Powerful selection tool within full and half sib families
- Reliabilities on EBV based on daughter groups 40 to 90 % - re-ranking will occur
- DGV stable across runs - only small amount of information added
- First batch of GenVik+ bulls selected in September
- Improvement of results through international collaboration

Reliabilities on DGVs

How accurately does the model predict bulls with EBV ?



R^2 ”=” Reliability

Reliabilities of DGV in Jersey – dependent on method

Trait	Model Rel.	Last 3 years	Bulls sire in ref.	Trait	Model Rel.	Last 3 years	Bulls sire in ref.
Milk	0.44	0.41	0.42	Birth	0.34	0.09	0.19
Fat	0.36	0.17	0.25	Calving ease	0.42	0.38	0.53
Protein	0.41	0.26	0.27	Body		0.28	0.36
Yield	0.39	0.16	0.22	Legs	0.45	0.43	0.32
Udderhealth	0.63	0.25	0.55	Udder	0.47	0.36	0.26
Fertility	0.45	0.29	0.25	Milking speed	0.40	0.57	0.30
Other diseases	0.54	0.32	0.45	Temperament	0.43	0.83	0.35
Longevity	0.50	0.24	0.27	NTM	0.39		0.31
				Average	0.44	0.42	0.33

Model reliabilities

$$\frac{V(DGV_{can})}{V(DGV_{can}) + Gns(SE_{can}^2)}$$