Introduction

The latest routine international evaluation for workability traits took place as scheduled at the Interbull Centre. Data from eighteen (18) countries were included in this evaluation.

International genetic evaluations for workability traits of bulls from Austria-Germany, Canada, Denmark-Finland-Sweden, France, Great Britain, Italy, Netherlands, Norway, New Zealand, Slovenia, Japan, Switzerland, Poland, Czech Republic and Spain were computed. Brown Swiss, Holstein, Jersey and Red Dairy Cattle breed data were included in this evaluation.

Changes in national procedures

Changes in the national genetic evaluation of workability traits are as follows:

SVN (ALL)	Some changes in information due to changes in data base related to the pedigree completness and phenotypic data improvement
FRA (ALL)	Some drops in information due to corrections made in pedigree
AUS (ALL)	Decrease in information as a result of data clean up such as pedigree changes, causing also changes in type of proofs. Change of status of bull which leads to a good number of bulls no longer being qualified. Decreases in EDC due to rounding.
ITA (HOL)	Changed model, new effects are: HYSemester (random),parity (fixed),calving period (fixed), days in milk group (fixed),fat+protein used as covariate nested within days in milk group,PE (random),animal (random, decrease in information due to normal editing.
DEA (BSW)	Base change
POL (HOL)	The estimated breeding values are based on a slightly larger date set (compared to the last routine run) which containes Polish black and white cows with a minor share of Holstein-Friesian genes. In addition, the Snell transformation was applied to all data
JPN (HOL)	Drops in information due to parentage checks
CHE (HOL)	In-depth corrections and renewal of the database table containing bull information by one of our breeding associations lead to changes in status of bulls and type of proof as well as a fewer number of EBV delivered. Slight changes in number of daughters, number of herds and EDC are due to manual edits in the database.
NZL (ALL)	Daughter counts â\200\223 affects all traits. New Zealand has continuous DNA parentage testing so daughters will always change Herd Count â\200\223 affects all traits. Affected by continuous DNA parentage testing. EDCs â\200\223 affects all traits. Affected by continuous DNA parentage testing and a bug was found in the EDC calculation so a fix was applied

INTERBULL CHANGES COMPARED TO THE PREVIOUS ROUTINE RUN

Post-processing Windows:

According to the decision taken by ITC in Orlando (2015) to review the post-processing windows every 5 years, during the 2020 the relative working group has been re-activated and new windows have been identified.

As before, the upper bounds have been set to 0.99 as these were judged to have very little effect on evaluations while the lower values have been reduced to the 10th percentile. This reduction would provide post-processed correlations to be closer to the real estimated ones. Over the past five years, in fact, the previous adopted lower value (25th percentile) had been found too high causing estimated and post-processed correlations to differ significantly from each other.
The new lower values have been applied to all breeds and traits.

The weight assigned to the magnitude of the changes tested by each country has also been revised. The new weight will allow post-processed correlations to take more in consideration the value of the new estimated ones even when no changes are applied by the countries.
The new weights are as follows:
No changes   :: 2
Small changes:: 1
Big changes :: 0

More information can be read on https://interbull.org/ib/rg_procedure

DATA AND METHOD OF ANALYSIS

Data were national genetic evaluations of AI sampled bulls with at least 10 daughters or 10 EDC (for clinical mastitis and maternal calving traits at least 50 daughters or 50 EDC, and for direct calving traits at least 50 calvings or 50 EDC) in at least 10 herds. Table 1 presents the amount of data included in this Interbull evaluation for all breeds.

National proofs were first de-regressed within country and then analysed jointly with a linear model including the effects of evaluation country, genetic group of bull and bull merit. Heritability estimates used in both the de-regression and international evaluation were as in each country's national evaluation.

Table 2 presents the date of evaluation as supplied by each country

Estimated genetic parameters and sire standard deviations are shown in APPENDIX I and the corresponding number of common bulls are listed in APPENDIX II.

SCIENTIFIC LITERATURE

The international genetic evaluation procedure is based on international work described in the following scientific publications:

International genetic evaluation computation:
- Schaeffer. 1994. J. Dairy Sci. 77:2671-2678
- Klei, 1998. Interbull Bulletin 17:3-7

Verification and Genetic trend validation:
- Klei et al., 2002. Interbull Bulletin 29:178-182.
- Boichard et al., 1995. J. Dairy Sci. 78:431-437

Weighting factors:
- Fikse and Banos, 2001. J. Dairy Sci. 84:1759-1767

De-regression:
- Sigurdsson and G. Banos. 1995. Acta Agric. Scand. 45:207-219
- Jairath et al. 1998. J. Dairy Sci. Vol. 81:550-562

Genetic parameter estimation:
- Klei and Weigel, 1998, Interbull Bulletin 17:8-14
- Sullivan, 1999. Interbull Bulletin 22:146-148

Post-processing of estimated genetic correlations:
- Mark et al., 2003, Interbull Bulletin 30:126-135
- Jorjani et al., 2003. J. Dairy Sci. 86:677-679
- https://wiki.interbull.org/public/rG%20procedure?action=print

Time edits
- Weigel and Banos. 1997. J. Dairy Sci. 80:3425-3430

International reliability estimation
- Harris and Johnson. 1998. Interbull Bulletin 17:31-36

NEXT ROUTINE INTERNATIONAL EVALUATION

Dates for the next routine evaluation can be found on http://www.interbull.org/ib/servicecalendar.

NEXT TEST INTERNATIONAL EVALUATION

Dates for the next test run can be found on

http://www.interbull.org/ib/servicecalendar.

PUBLICATION OF INTERBULL ROUTINE RUN

Results were distributed by the Interbull Centre to designated representatives in each country. The international evaluation file comprised international proofs expressed on the base and unit of each country included in the analysis. Such records readily provide more information on bull performance in various countries, thereby minimizing the need to resort to conversions.

At the same time, all recipients of Interbull results are expected to honor the agreed code of practice, decided by the Interbull Steering Committee, and only publish international evaluations on their own country scale. Evaluations expressed on another country scale are confidential and may only be used internally for research and review purposes.

PUBLICATION OF INTERBULL TEST RUN

Test evaluation results are meant for review purposes only and should not be published.

^LTable 1. National evaluation data considered in the Interbull evaluation for Workability (December Routine Evaluation 2021).
Number of records for milking speed by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS			6479	1289	533	
BEL						
CAN	209		12798	748	847	
CHE	2811		2843	56		
CZE			1821			
DEA	4341					
DEU			12837		204	
DFS			12098	2017	6726	
ESP			3269			
EST						
FRA	380		17167			
FRM						
GBR			6020			
HUN						
IRL						
ISR						
ITA	2068		4243			
JPN			1978			
KOR						
LTU						
LVA						
NLD	116		13827	34		
NOR					3945	
NZL			6399	3972	513	
POL			8612			
PRT						
SVK						
SVN	326		585			
URY						
USA						
ZAF						
HRV						
CAM					35	
No.Records	10251		110976	8116	12803	
Pub. Proofs	8624	0	96281	7554	12371	0

^LAPPENDIX I. Sire standard deviations in diagonal and genetic correlations below diagonal

BSW msp

	CAN	CHE	DEA	ITA	NLD	SVN	FRA
CAN	8.90						
CHE	0.94	15.66					
DEA	0.91	0.96	11.71				
ITA	0.90	0.95	0.92	17.53			
NLD	0.93	0.95	0.93	0.90	5.83		
SVN	0.84	0.90	0.89	0.93	0.84	25.04	
FRA	0.93	0.93	0.85	0.89	0.95	0.82	0.83

HOL msp

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	SVN	NZL	ITA	JPN	ESP	CZE	POL
CAN	7.55														
CHE	0.93	12.40													
DEU	0.89	0.96	12.54												
DFS	0.94	0.95	0.95	14.41											
FRA	0.95	0.98	0.94	0.96	1.07										
NLD	0.95	0.98	0.95	0.97	0.98	5.11									
AUS	0.84	0.85	0.81	0.82	0.86	0.85	0.25								
GBR	0.79	0.79	0.78	0.80	0.82	0.80	0.78	0.19							
SVN	0.75	0.83	0.85	0.82	0.81	0.83	0.75	0.77	23.40						
NZL	0.86	0.88	0.81	0.83	0.88	0.87	0.89	0.73	0.69	0.34					
ITA	0.77	0.84	0.82	0.84	0.85	0.85	0.72	0.62	0.76	0.73	5.64				
JPN	0.96	0.93	0.89	0.93	0.97	0.96	0.87	0.82	0.78	0.85	0.83	2.16			
ESP	0.94	0.94	0.90	0.94	0.95	0.96	0.83	0.78	0.77	0.83	0.81	0.95	13.60		
CZE	0.87	0.91	0.92	0.90	0.89	0.90	0.80	0.72	0.77	0.77	0.76	0.84	0.89	17.47	
POL	0.61	0.61	0.57	0.61	0.61	0.61	0.61	0.61	0.61	0.54	0.48	0.61	0.61	0.61	14.92

HOL tem

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	NZL	ITA	JPN	POL
CAN	7.26											
CHE	0.68	10.32										
DEU	0.84	0.76	11.79									
DFS	0.77	0.84	0.87	13.12								
FRA	0.70	0.91	0.80	0.92	0.97							
NLD	0.86	0.76	0.89	0.86	0.81	5.47						
AUS	0.62	0.66	0.65	0.69	0.68	0.71	0.23					
GBR	0.63	0.80	0.68	0.78	0.84	0.69	0.65	0.16				
NZL	0.59	0.50	0.73	0.58	0.56	0.69	0.71	0.49	0.36			
ITA	0.15	0.09	0.13	0.09	0.08	0.16	0.09	0.12	0.10	5.65		
JPN	0.91	0.79	0.91	0.87	0.85	0.93	0.64	0.71	0.59	0.10	2.65	
POL	0.37	0.30	0.37	0.30	0.29	0.34	0.32	0.29	0.22	0.10	0.37	20.05

JER msp

	CAN	DFS	NLD	AUS	NZL	CHE
CAN	8.03					
DFS	0.90	13.85				
NLD	0.94	0.95	4.64			
AUS	0.78	0.79	0.86	0.24		
NZL	0.71	0.76	0.86	0.78	0.30	
CHE	0.92	0.94	0.96	0.82	0.78	11.50

RDC msp

	CAN	DEU	DFS	NOR	AUS	NZL	CAM
CAN	6.96						

DEU	0.87	11.43					
DFS	0.92	0.90	13.29				
NOR	0.80	0.74	0.95	14.80			
AUS	0.78	0.72	0.78	0.75	0.27		
NZL	0.84	0.78	0.85	0.80	0.84	0.37	
CAM	0.72	0.68	0.73	0.72	0.66	0.69	7.76

RDC tem

	CAN	DEU	DFS	NOR	AUS	NZL	CAM
CAN	6.35						
DEU	0.79	10.14					
DFS	0.70	0.77	11.07				
NOR	0.69	0.59	0.90	16.78			
AUS	0.63	0.53	0.66	0.61	0.25		
NZL	0.50	0.67	0.64	0.51	0.76	0.43	
CAM	0.58	0.55	0.55	0.56	0.43	0.49	7.63

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^LAPPENDIX II. Number of common bulls

BSW

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common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	NLD	SVN	FRA
CAN	0	112	124	114	37	29	73
CHE	98	0	567	446	62	63	156
DEA	114	480	0	612	88	86	194
ITA	101	385	514	0	82	81	173
NLD	30	60	80	67	0	30	53
SVN	26	61	81	79	29	0	46
FRA	64	117	142	134	43	44	0

BSW

GUE

GUE

HOL

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common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	SVN	NZL	ITA	JPN	ESP	CZE	POL
CAN	0	791	1662	1212	1382	1332	1025	1578	194	312	1217	385	1073	495	1149
CHE	718	0	827	559	559	748	454	662	122	186	532	140	452	215	473
DEU	1078	717	0	1681	1632	1997	871	1483	288	295	1216	352	1017	672	1616
DFS	908	506	1031	0	1396	1635	894	1296	211	377	946	223	717	552	1056
FRA	794	480	716	603	0	1686	959	1376	169	414	1010	305	866	563	1230
NLD	1215	738	1491	1227	881	0	1044	1541	234	503	1093	257	814	686	1294
AUS	889	382	546	506	525	810	0	1004	129	533	622	177	524	337	524
GBR	1644	657	1014	888	780	1277	758	0	202	395	1093	272	825	498	974
SVN	151	90	272	162	116	204	84	157	0	50	196	79	167	102	227
NZL	278	162	201	223	190	448	415	297	36	0	226	58	183	138	138
ITA	1136	491	868	762	599	946	476	967	168	187	0	300	785	450	924
JPN	147	78	120	105	98	118	105	119	37	42	128	0	305	147	347
ESP	651	340	558	496	559	634	350	590	119	128	598	106	0	371	772
CZE	238	107	321	217	211	476	119	198	65	50	253	58	178	0	472
POL	1059	375	1371	792	749	1131	358	775	204	100	801	144	491	280	0

HOL

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common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	NZL	ITA	JPN	POL

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  CAN    0  707 1589  947 1247 1269  992 1542  300 1208  385 1126
  CHE  637    0  695  409  509  614  398  607  161  495  139  449
  DEU  892  570    0 1361 1586 1908  853 1406  270 1180  330 1481
  DFS  605  351  657    0 1213 1300  805 1105  359  779  171  816
  FRA  786  439  682  492    0 1579  904 1320  380 1005  305 1213
  NLD 1154  606 1250  796  847    0 1036 1520  497 1075  257 1262
  AUS  867  348  483  404  522  802    0 1005  532  619  177  519
  GBR 1610  592  871  647  776 1261  757    0  392 1088  272  961
  NZL  270  143  180  200  188  441  414  296    0  225   58  137
  ITA 1127  460  802  564  598  925  475  967  187    0  299  909
  JPN  147   79  116   82   98  117  105  119   42  128    0  342
  POL 1053  355 1078  526  749 1119  358  775  100  795  144    0
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JER
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 common bulls below diagonal
 common three quarter sib group above diagonal
       CAN  DFS  NLD  AUS  NZL  CHE
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  CAN    0   63   10  179   66   26
  DFS   48    0   14   84   73   41
  NLD    7   10    0   16   14    8
  AUS  179   56   16    0  186   27
  NZL   66   52   12  170    0   22
  CHE   25   41    5   27   21    0
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JER
--------
RDC
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
       CAN  DEU  DFS  NOR  AUS  NZL  CAM
 ------------------------------------------------------------------------------
  CAN    0    6  147    6   36   27    0
  DEU    6    0   22    7   18    2    0
  DFS  149   14    0  112  119   46    0
  NOR    6    6   89    0   53   10    0
  AUS   33   17   91   44    0   36    8
  NZL   24    2   45   10   33    0    1
  CAM    0    0    0    0    8    1    0
 ------------------------------------------------------------------------------
RDC
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
       CAN  DEU  DFS  NOR  AUS  NZL  CAM
 ------------------------------------------------------------------------------
  CAN    0    8  124    6   36   26    0
  DEU    8    0   38   10   22    3    0
  DFS  126   32    0  109  119   46    0
  NOR    6   10   86    0   52    9    0
  AUS   33   22   91   43    0   36    8
  NZL   24    3   45    9   33    0    1
  CAM    0    0    0    0    8    1    0
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SIM
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SIM
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