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:

FRA (HOL, BSW)	Base change
SVN (HOL, BSW)	Base change. Decrease in information due to changes in pedigree completness as well as phenotypic data improvement.
JPN (HOL)	Some decrease in infromation due to pedigree changes
AUS (ALL)	Decrease in information due to pedigree updates, and status changes of some bulls which then leads to no longer being qualified for the >10 threshold
CAN (ALL)	Base change
DEU (HOL, RDC)	Base change
ITA (BSW)	base change
NZL (ALL)	Changed pedigree extract so that Holstein and Friesian breed proportions re-balanced for all animals based on a more realistic assumption of Holstein and Friesian ancestry. Specifically, any HF animals from NZ, Australia or the UK in the pedigree which have one or both parents missing, instead of merely assuming the missing parent(s) to have no Holstein genetics, now assumes a mixture of Holstein and Friesian genetic equal to the average of their herd contemporaries. These changes are also carried down to all progeny in the pedigree. Updated days-in-milk to include all data collected up to 305 days of lactation. Excluded any records where a cow has not calved within 365 days of her last parturition.
CHE (ALL)	Improvements in recording of pedigree validity and handling of animals with uncertain parentage on the database as well as the recomputation of breed percentages for all animals born after 01.01.1990 led to (great) changes in all pedigrees and in consequences in all genetic evaluation results.
NLD (ALL)	Model changed with the inclusion of data from the automatic milking systems in the flow. Heritability increases from .23 to .51. Base change

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 (April Routine Evaluation 2023).
Number of records for milking speed by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS			6574	1310	555	
BEL						
CAN	213		13215	775	866	
CHE	2895		2978	58		
CZE			1992			
DEA	4473					
DEU			13307		212	
DFS			12337	2041	6823	
ESP			3415			
EST						
FRA	427		17936			
FRM						
GBR			6237			
HUN						
IRL						
ISR						
ITA	2122		8490			
JPN			2139			
KOR						
LTU						
LVA						
NLD	128		14319	44		
NOR					4010	
NZL			6616	4071	518	
POL			9121			
PRT						
SVK						
SVN	242		567			
URY						
USA						
ZAF						
HRV						
CAM					37	

No.Records	10500		119243	8299	13021		
Pub. Proofs	8791	0	100238	7714	12566	0	

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

BSW msp

	CAN	CHE	DEA	ITA	NLD	SVN	FRA
CAN	9.09						
CHE	0.94	15.67					
DEA	0.91	0.96	11.71				
ITA	0.86	0.93	0.91	17.46			
NLD	0.93	0.95	0.92	0.85	5.89		
SVN	0.83	0.88	0.87	0.90	0.82	30.28	
FRA	0.93	0.93	0.86	0.87	0.95	0.83	0.82

HOL msp

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	SVN	NZL	ITA	JPN	ESP	CZE	POL
CAN	7.58														
CHE	0.93	12.45													
DEU	0.89	0.96	12.63												
DFS	0.94	0.95	0.95	14.40											
FRA	0.95	0.97	0.94	0.96	1.07										
NLD	0.95	0.98	0.95	0.97	0.98	4.94									
AUS	0.83	0.83	0.78	0.80	0.84	0.83	0.25								
GBR	0.74	0.74	0.74	0.76	0.79	0.77	0.74	0.20							
SVN	0.77	0.86	0.91	0.88	0.85	0.87	0.70	0.68	26.73						
NZL	0.87	0.88	0.80	0.82	0.88	0.86	0.89	0.73	0.73	0.33					
ITA	0.75	0.81	0.79	0.81	0.82	0.82	0.69	0.60	0.76	0.71	5.61				
JPN	0.96	0.93	0.88	0.93	0.97	0.95	0.85	0.79	0.79	0.85	0.81	2.15			
ESP	0.93	0.93	0.90	0.93	0.95	0.95	0.81	0.73	0.81	0.84	0.79	0.94	13.04		
CZE	0.88	0.92	0.93	0.91	0.90	0.91	0.76	0.63	0.81	0.76	0.75	0.85	0.89	18.17	
POL	0.52	0.53	0.51	0.52	0.52	0.51	0.53	0.51	0.52	0.53	0.48	0.53	0.53	0.53	14.84

HOL tem

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	NZL	ITA	JPN	POL
CAN	7.66											
CHE	0.68	10.35										
DEU	0.84	0.75	11.76									
DFS	0.77	0.84	0.86	13.09								
FRA	0.71	0.91	0.79	0.92	0.97							
NLD	0.86	0.77	0.90	0.86	0.81	5.49						
AUS	0.58	0.65	0.63	0.68	0.68	0.70	0.23					
GBR	0.60	0.80	0.67	0.77	0.84	0.69	0.61	0.16				
NZL	0.59	0.51	0.72	0.59	0.57	0.69	0.72	0.49	0.36			
ITA	0.11	0.09	0.10	0.09	0.08	0.14	0.09	0.09	0.10	5.61		
JPN	0.92	0.80	0.91	0.87	0.85	0.93	0.64	0.74	0.62	0.10	2.60	
POL	0.25	0.16	0.27	0.16	0.15	0.21	0.21	0.14	0.20	0.09	0.27	19.91

JER msp

	CAN	DFS	NLD	AUS	NZL	CHE
CAN	7.79					
DFS	0.89	13.76				
NLD	0.93	0.94	4.39			
AUS	0.74	0.75	0.83	0.24		
NZL	0.67	0.72	0.83	0.77	0.30	
CHE	0.92	0.93	0.95	0.79	0.74	11.45

RDC msp

	CAN	DEU	DFS	NOR	AUS	NZL	CAM
CAN	6.76						
DEU	0.87	11.49					
DFS	0.92	0.90	13.29				
NOR	0.79	0.75	0.95	14.67			
AUS	0.77	0.72	0.75	0.73	0.27		
NZL	0.86	0.77	0.85	0.80	0.84	0.38	
CAM	0.68	0.68	0.70	0.68	0.61	0.68	7.60

RDC tem

	CAN	DEU	DFS	NOR	AUS	NZL	CAM
CAN	6.24						
DEU	0.79	10.02					
DFS	0.67	0.75	11.06				
NOR	0.65	0.55	0.89	16.70			
AUS	0.60	0.46	0.63	0.56	0.25		
NZL	0.48	0.66	0.65	0.51	0.76	0.43	
CAM	0.55	0.50	0.50	0.51	0.42	0.49	7.60

^LAPPENDIX II. Number of common bulls

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	NLD	SVN	FRA
CAN	0	115	127	116	37	23	82
CHE	101	0	595	461	68	53	179
DEA	117	505	0	632	94	68	229
ITA	103	400	531	0	89	63	201
NLD	30	66	85	72	0	28	60
SVN	21	49	65	59	28	0	38
FRA	74	140	182	164	50	38	0

BSW

GUE

GUE

HOL

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	839	1759	1288	1552	1449	1074	1680	188	324	1685	408	1113	567	1276
CHE	766	0	880	596	674	793	478	701	111	198	681	150	477	231	502
DEU	1183	767	0	1777	1896	2152	910	1571	285	311	1900	365	1069	738	1762
DFS	987	542	1118	0	1561	1729	929	1358	187	392	1280	236	750	596	1136
FRA	1070	622	1061	832	0	1930	1040	1538	184	441	1587	331	996	623	1451
NLD	1332	778	1658	1312	1244	0	1076	1651	213	531	1501	279	868	761	1434
AUS	934	400	582	538	645	834	0	1040	109	543	831	190	546	359	565
GBR	1752	699	1091	949	1035	1379	796	0	183	409	1461	289	859	553	1077
SVN	147	83	273	138	144	186	71	141	0	42	212	84	155	106	239
NZL	290	170	216	237	245	477	426	312	32	0	276	62	192	147	150
ITA	1460	627	1206	977	983	1232	600	1232	183	225	0	399	1095	591	1362
JPN	163	86	131	117	124	133	116	127	38	45	148	0	315	166	365
ESP	696	358	589	530	728	681	366	619	111	137	734	115	0	404	840
CZE	303	118	376	250	281	543	138	242	69	57	315	65	202	0	554
POL	1205	403	1521	875	1024	1278	393	879	217	107	1100	157	562	371	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	NZL	ITA	JPN	POL
CAN	0	755	1638	967	1420	1353	1042	1646	312	1672	408	1250
CHE	684	0	732	423	610	657	422	647	173	631	149	476
DEU	941	600	0	1392	1821	2017	885	1462	282	1830	341	1584
DFS	623	359	681	0	1325	1333	822	1128	371	1060	177	849
FRA	1055	559	981	651	0	1808	989	1485	412	1574	330	1427
NLD	1239	645	1360	827	1193	0	1068	1597	524	1465	273	1363
AUS	912	366	508	414	644	824	0	1042	542	830	190	558
GBR	1720	634	915	665	1024	1332	795	0	406	1458	289	1063
NZL	282	151	189	210	243	469	425	311	0	275	62	148
ITA	1447	580	1104	715	979	1194	600	1232	225	0	396	1325
JPN	163	86	125	86	124	130	116	127	45	148	0	360
POL	1199	382	1183	560	1019	1220	393	879	107	1085	157	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	DFS	NLD	AUS	NZL	CHE
CAN	0	65	11	186	67	28
DFS	50	0	21	86	79	42
NLD	8	17	0	18	16	9
AUS	187	58	18	0	188	30
NZL	67	58	14	173	0	25
CHE	27	42	6	29	24	0

JER

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	DEU	DFS	NOR	AUS	NZL	CAM
CAN	0	6	159	6	36	28	0
DEU	6	0	24	8	20	2	0
DFS	162	16	0	114	132	47	0
NOR	6	7	91	0	59	10	0
AUS	33	19	104	50	0	37	8
NZL	25	2	46	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	132	6	36	27	0
DEU	8	0	44	11	26	4	0
DFS	134	38	0	109	132	47	0
NOR	6	11	86	0	56	9	0
AUS	33	25	104	47	0	37	8
NZL	25	4	46	9	33	0	1
CAM	0	0	0	0	8	1	0

SIM

SIM