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:

AUS (ALL)	Drops in information due to data clean up such as pedigree changes, status change of a bull which leads to a good number of bulls no longer qualifying. Base change for RDC.
SVN (ALL)	Reduced the performance data to 2010-2022 and estimated variance components for all traits
DEA (BSW)	Base change. Bug correction causing changes in the ToP declaration for young bulls being previously wrongly assigned ToP 12 and now corrected to 11
JPN (HOL)	Some decrease in information due to pedigree correction
NZL (HOL,JER,RDC)	Continuous DNA parentage testing affecting numbers of daughters, herds and EDCs. Change in the extraction where data within 2 weeks from calving are now excluded (ICAR rule), this caused drops in information
CHE (HOL,BSW,JER)	Drops in information due to manual edits in database. The change of herd-year-season assignment of certain data records might also explain small changes in EDC and reliabilities for some bulls.
ITA (HOL)	Drop in information due to data editing
CZE (HOL)	MSP: decrease of reliabilty for few bulls caused by correcting a small error in last evaluation where one extra generation was accidentally used in pedigree construction.
GBR (HOL)	Minor changes in data due re-extraction at each run and changes introduced by data providers

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 2022).
Number of records for milking speed by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS			6554	1305	548	
BEL						
CAN	211		13110	770	862	
CHE	2868		2942	58		
CZE			1942			
DEA	4437					
DEU			13193		209	
DFS			12283	2037	6810	
ESP			3415			
EST						
FRA	424		17853			
FRM						
GBR			6185			
HUN						
IRL						
ISR						
ITA	2105		8488			
JPN			2134			
KOR						
LTU						
LVA						
NLD	118		14041	35		
NOR					3998	
NZL			6557	4030	513	
POL			8921			
PRT						
SVK						
SVN	237		543			
URY						
USA						
ZAF						
HRV						
CAM					36	
No.Records	10400		118161	8235	12976	
Pub. Proofs	8722	0	99692	7660	12520	0

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

BSW msp

	CAN	CHE	DEA	ITA	NLD	SVN	FRA
CAN	9.15						
CHE	0.94	15.63					
DEA	0.91	0.96	11.71				
ITA	0.87	0.94	0.91	17.52			
NLD	0.93	0.95	0.92	0.87	5.95		
SVN	0.83	0.88	0.87	0.90	0.82	30.37	
FRA	0.93	0.93	0.86	0.88	0.95	0.83	0.82

HOL msp

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	SVN	NZL	ITA	JPN	ESP	CZE	POL
CAN	7.60														
CHE	0.93	12.42													
DEU	0.89	0.96	12.60												
DFS	0.94	0.95	0.95	14.44											
FRA	0.95	0.98	0.94	0.96	1.07										
NLD	0.95	0.98	0.95	0.97	0.98	5.13									
AUS	0.83	0.84	0.79	0.81	0.84	0.83	0.25								
GBR	0.75	0.75	0.75	0.76	0.80	0.78	0.74	0.20							
SVN	0.77	0.86	0.91	0.88	0.85	0.84	0.70	0.68	26.37						
NZL	0.87	0.88	0.81	0.82	0.88	0.87	0.89	0.73	0.73	0.34					
ITA	0.75	0.81	0.79	0.82	0.83	0.83	0.70	0.61	0.75	0.71	5.61				
JPN	0.96	0.93	0.88	0.93	0.97	0.96	0.86	0.80	0.79	0.85	0.81	2.14			
ESP	0.94	0.93	0.90	0.93	0.95	0.95	0.81	0.74	0.81	0.84	0.79	0.94	13.04		
CZE	0.88	0.92	0.93	0.90	0.90	0.91	0.76	0.65	0.81	0.77	0.75	0.84	0.89	18.03	
POL	0.54	0.55	0.53	0.54	0.54	0.57	0.55	0.53	0.53	0.54	0.48	0.55	0.55	0.55	14.83

HOL tem

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	NZL	ITA	JPN	POL
CAN	7.50											
CHE	0.68	10.35										
DEU	0.84	0.75	11.77									
DFS	0.77	0.84	0.87	13.09								
FRA	0.71	0.91	0.79	0.92	0.97							
NLD	0.86	0.77	0.90	0.86	0.81	5.48						
AUS	0.59	0.64	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	0.58	0.56	0.69	0.71	0.49	0.36			
ITA	0.12	0.09	0.10	0.09	0.08	0.15	0.09	0.10	0.10	5.61		
JPN	0.91	0.80	0.91	0.87	0.85	0.93	0.63	0.73	0.61	0.10	2.60	
POL	0.28	0.19	0.30	0.19	0.19	0.29	0.25	0.16	0.22	0.09	0.30	19.87

JER msp

	CAN	DFS	NLD	AUS	NZL	CHE
CAN	8.05					
DFS	0.90	13.76				
NLD	0.94	0.95	4.53			
AUS	0.75	0.76	0.83	0.24		
NZL	0.67	0.73	0.84	0.77	0.30	
CHE	0.92	0.93	0.96	0.79	0.75	11.63

RDC msp

	CAN	DEU	DFS	NOR	AUS	NZL	CAM
CAN	6.88						
DEU	0.87	11.53					
DFS	0.92	0.90	13.30				
NOR	0.79	0.75	0.95	14.66			
AUS	0.77	0.72	0.76	0.73	0.27		
NZL	0.85	0.77	0.85	0.79	0.84	0.38	

```
CAM       0.69    0.67    0.70    0.68    0.61    0.68    7.57

--------------------------------------------------------------------------------
RDC     tem
--------------------------------------------------------------------------------
            CAN     DEU     DFS     NOR     AUS     NZL     CAM
CAN        6.36
DEU        0.79    9.95
DFS        0.68    0.75   11.07
NOR        0.66    0.54    0.89   16.68
AUS        0.61    0.48    0.65    0.58    0.25
NZL        0.48    0.66    0.65    0.51    0.76    0.43
CAM        0.55    0.50    0.50    0.52    0.42    0.49    7.59

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^LAPPENDIX II. Number of common bulls
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BSW
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
      CAN  CHE  DEA  ITA  NLD  SVN  FRA
 ---------------------------------------------------------------------
  CAN    0  113  125  116   36   22   81
  CHE   99    0  582  457   62   48  177
  DEA  115  495    0  623   87   63  227
  ITA  103  396  524    0   81   59  200
  NLD   29   60   79   66    0   24   56
  SVN   20   45   61   56   24    0   38
  FRA   73  138  180  163   47   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  827 1733 1271 1542 1383 1061 1658  180  318 1685  406 1113  543 1229
  CHE  756    0  866  589  668  772  470  691  105  194  678  145  474  227  489
  DEU 1153  754    0 1750 1875 2079  899 1550  274  301 1897  363 1061  715 1707
  DFS  971  535 1095    0 1551 1684  918 1344  185  384 1275  233  743  580 1104
  FRA 1061  618 1046  829    0 1898 1032 1529  182  438 1587  329  989  616 1419
  NLD 1268  759 1578 1279 1221    0 1062 1596  206  514 1465  269  846  730 1358
  AUS  921  392  571  530  637  822    0 1030  106  538  828  188  541  350  558
  GBR 1729  689 1069  935 1029 1323  785    0  178  402 1459  287  857  532 1038
  SVN  139   80  262  134  143  180   70  135    0   39  210   83  154  101  230
  NZL  284  167  207  229  242  460  420  306   30    0  272   60  187  143  144
  ITA 1460  624 1200  971  982 1200  598 1229  181  222    0  398 1094  580 1345
  JPN  160   83  129  115  122  128  114  125   37   44  147    0  314  162  359
  ESP  696  355  587  527  724  670  363  618  110  132  734  114    0  398  809
  CZE  282  114  355  237  274  520  135  225   66   53  304   64  198    0  519
  POL 1152  392 1467  848  988 1194  386  836  209  102 1082  155  535  334    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  743 1625  964 1410 1321 1029 1624  306 1672  406 1205
  CHE  674    0  719  420  604  639  414  637  169  628  144  464
  DEU  926  590    0 1384 1805 1968  876 1448  275 1829  338 1547
  DFS  621  357  677    0 1320 1317  818 1124  365 1059  177  839
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FRA	1046	555	972	649	0	1793	981	1476	409	1574	328	1398
NLD	1208	628	1315	812	1180	0	1054	1572	508	1452	270	1322
AUS	899	358	501	411	636	814	0	1032	537	827	188	552
GBR	1697	624	904	662	1018	1306	784	0	399	1456	287	1025
NZL	276	148	185	206	240	453	419	305	0	271	60	142
ITA	1446	577	1103	713	978	1182	598	1229	222	0	395	1310
JPN	160	83	123	86	122	128	114	125	44	147	0	354
POL	1145	371	1147	551	985	1172	386	837	102	1069	155	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	DFS	NLD	AUS	NZL	CHE
CAN	0	64	10	186	67	28
DFS	49	0	15	85	76	42
NLD	7	11	0	17	14	8
AUS	186	57	17	0	187	29
NZL	67	55	12	171	0	24
CHE	27	42	5	29	23	0

JER

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	DEU	DFS	NOR	AUS	NZL	CAM
CAN	0	6	158	6	36	28	0
DEU	6	0	23	7	18	2	0
DFS	161	15	0	114	128	47	0
NOR	6	6	91	0	58	10	0
AUS	33	17	100	49	0	36	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	129	6	36	27	0
DEU	8	0	42	11	23	4	0
DFS	131	36	0	109	128	47	0
NOR	6	11	86	0	55	9	0
AUS	33	23	100	46	0	36	8
NZL	25	4	46	9	33	0	1
CAM	0	0	0	0	8	1	0

SIM

SIM