

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:

DEU (ALL)	Base change. MSP - change in trait definition: The current milk speed, defined as a weighted function of measured milk flow rate and subjective score of milking speed, is replaced with the milk flow rate. heritability $h^2=0,25$ An additional fixed effect of calving month is added to the evaluation model. A phenotypic pre-adjustment of heterogeneous variances within region*calving_year*milking_frequencies is applied to the milk flow rate. Bulls missing: these are bulls which have only the trait "subjective score of milking speed". Bulls having herds/edc decreased: this information was based on a combination of "measured milk flow rate and subjective score of milking speed" and is now only "measured milk flow rate". TEM: An additional fixed effect of calving month is added to the evaluation model. Drop in information is due to an updated data preparation.
NLD (ALL)	Added age at scoring for temperament and month of calving for milking speed.
NOR (RDC)	High quality reliability meant for IB test 4 are now used.
ITA (BSW)	Base change. Updated data and pedigree editing procedures and fixed effects.
AUS (ALL)	Change in information due to data clean up: pedigree changes or changes in status of a bull causing a good number of bulls to be no longer qualified.
JPN (HOL)	Small decrease in information due to pedigree's update
FRA (BSW,HOL)	Base change
POL (HOL)	Small decrease in information due to data edits
SVN (BSW,HOL)	Base change
DEA (BSW)	Change of base to cow base group instead of the former defined bull base group.
CHE (ALL)	Slight changes in number of daughters, number of herds and EDC are due to manual edits in the database.
NZL (ALL)	Drops in information due to continuous DNA parentage testing
CAN (ALL)	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 2021).
Number of records for milking speed by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS			6437	1281	528	
BEL						
CAN	206		12613	725	839	
CHE	2776		3251	55		
CZE			1723			
DEA	4287					
DEU			12617		202	
DFS			11979	1993	6663	
ESP			3107			
EST						
FRA	369		17026			
FRM						
GBR			5899			
HUN						
IRL						
ISR						
ITA	2039		6751			
JPN			1808			
KOR						
LTU						
LVA						
NLD	113		13697	33		
NOR					3917	
NZL			6415	3983	595	
POL			7955			
PRT						
SVK						
SVN	319		565			
URY						
USA						
ZAF						
HRV						
CAM					34	
No. Records	10109		111843	8070	12778	
Pub. Proofs	8516	0	97830	7506	12290	0

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

 BSW msp

	CAN	CHE	DEA	ITA	NLD	SVN	FRA
CAN	8.86						
CHE	0.94	15.67					
DEA	0.91	0.96	11.69				
ITA	0.92	0.95	0.92	17.64			
NLD	0.94	0.96	0.94	0.93	5.82		
SVN	0.86	0.90	0.90	0.94	0.87	25.07	
FRA	0.93	0.93	0.85	0.90	0.95	0.84	0.83

 HOL msp

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	SVN	NZL	ITA	JPN	ESP	CZE	POL
CAN	7.57														
CHE	0.92	12.63													
DEU	0.89	0.97	12.51												
DFS	0.94	0.95	0.95	14.40											
FRA	0.94	0.98	0.94	0.96	1.07										
NLD	0.95	0.98	0.95	0.97	0.98	5.10									
AUS	0.84	0.86	0.82	0.84	0.86	0.86	0.25								
GBR	0.81	0.82	0.80	0.82	0.83	0.83	0.81	0.19							
SVN	0.81	0.85	0.86	0.84	0.84	0.85	0.81	0.82	23.75						
NZL	0.89	0.90	0.86	0.86	0.91	0.90	0.92	0.80	0.80	0.36					
ITA	0.94	0.94	0.91	0.94	0.96	0.95	0.84	0.83	0.83	0.87	6.90				
JPN	0.97	0.94	0.89	0.94	0.97	0.96	0.88	0.83	0.82	0.90	0.95	2.16			
ESP	0.95	0.94	0.91	0.94	0.96	0.96	0.84	0.81	0.81	0.88	0.94	0.95	13.68		
CZE	0.87	0.92	0.92	0.90	0.90	0.91	0.83	0.78	0.82	0.83	0.84	0.85	0.89	18.89	
POL	0.73	0.73	0.67	0.73	0.73	0.73	0.73	0.73	0.73	0.69	0.73	0.73	0.74	0.73	15.09

 HOL tem

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	NZL	ITA	JPN	POL
CAN	7.25											
CHE	0.69	10.70										
DEU	0.84	0.76	11.86									
DFS	0.77	0.83	0.87	13.13								
FRA	0.70	0.91	0.80	0.92	0.97							
NLD	0.86	0.76	0.89	0.86	0.81	5.49						
AUS	0.65	0.67	0.67	0.69	0.69	0.71	0.23					
GBR	0.66	0.80	0.69	0.78	0.85	0.70	0.67	0.16				
NZL	0.62	0.56	0.74	0.64	0.60	0.72	0.72	0.50	0.36			
ITA	0.44	0.39	0.43	0.42	0.39	0.44	0.40	0.42	0.10	6.90		
JPN	0.91	0.80	0.91	0.87	0.85	0.93	0.66	0.70	0.63	0.40	2.67	
POL	0.54	0.50	0.53	0.51	0.50	0.53	0.51	0.50	0.19	0.39	0.52	20.53

 JER msp

	CAN	DFS	NLD	AUS	NZL	CHE
CAN	8.09					
DFS	0.91	13.66				
NLD	0.94	0.96	4.77			
AUS	0.82	0.82	0.87	0.24		
NZL	0.76	0.80	0.87	0.82	0.32	
CHE	0.92	0.95	0.96	0.84	0.81	11.59

 RDC msp

	CAN	DEU	DFS	NOR	AUS	NZL	CAM
CAN	7.01						
DEU	0.87	11.34					

DFS	0.92	0.90	13.36				
NOR	0.83	0.74	0.96	14.96			
AUS	0.81	0.72	0.79	0.78	0.27		
NZL	0.88	0.81	0.86	0.81	0.86	0.40	
CAM	0.77	0.69	0.78	0.77	0.72	0.76	7.93

RDC tem

	CAN	DEU	DFS	NOR	AUS	NZL	CAM
CAN	6.39						
DEU	0.80	10.01					
DFS	0.71	0.79	11.07				
NOR	0.72	0.62	0.91	17.10			
AUS	0.65	0.58	0.67	0.64	0.25		
NZL	0.62	0.70	0.70	0.63	0.79	0.44	
CAM	0.63	0.61	0.61	0.61	0.53	0.60	7.31

^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	110	120	110	37	27	72
CHE	97	0	559	437	59	61	153
DEA	109	473	0	600	85	84	191
ITA	98	376	501	0	79	78	170
NLD	30	58	77	64	0	28	51
SVN	24	59	79	77	27	0	45
FRA	64	114	139	131	42	43	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	1625	1180	1355	1295	1012	1519	187	386	1483	361	1032	456	1044
CHE	709	0	842	580	569	761	468	670	121	242	613	136	455	210	416
DEU	1038	695	0	1637	1601	1951	857	1442	274	364	1577	336	987	634	1431
DFS	873	492	983	0	1372	1595	880	1262	206	438	1055	212	692	523	968
FRA	768	472	685	577	0	1668	950	1352	163	468	1196	297	836	541	1121
NLD	1173	723	1434	1180	860	0	1033	1500	227	578	1202	249	774	645	1112
AUS	873	380	529	493	518	796	0	990	126	603	672	164	517	324	488
GBR	1586	641	965	856	757	1230	739	0	197	464	1230	258	793	472	888
SVN	148	90	258	160	113	200	83	155	0	59	207	76	158	96	207
NZL	350	203	260	274	233	519	477	360	45	0	281	78	230	162	179
ITA	1255	538	929	801	637	976	503	1047	179	237	0	360	953	462	1099
JPN	135	74	110	100	95	110	100	110	35	53	120	0	293	133	317
ESP	596	323	521	464	530	590	332	550	115	167	606	96	0	342	705
CZE	199	96	283	186	194	430	106	168	59	64	219	50	153	0	413
POL	950	316	1155	710	633	924	323	681	183	130	844	131	424	219	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
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CAN	0	751	1562	935	1222	1244	980	1485	374	1475	361	1025
CHE	626	0	720	439	517	630	415	618	217	575	135	393
DEU	872	548	0	1343	1558	1876	841	1366	337	1528	316	1314
DFS	593	344	639	0	1205	1283	799	1090	410	873	161	773
FRA	760	429	654	484	0	1563	895	1297	434	1193	297	1106
NLD	1120	594	1215	782	828	0	1027	1487	571	1192	249	1085
AUS	851	346	470	399	515	789	0	992	602	671	164	484
GBR	1553	575	834	637	753	1224	738	0	461	1227	258	876
NZL	342	184	233	234	231	511	476	359	0	280	78	178
ITA	1246	503	853	606	636	964	503	1047	237	0	359	1077
JPN	135	74	108	75	95	109	100	110	53	120	0	312
POL	944	299	906	498	633	914	323	682	130	839	131	0

JER

common bulls below diagonal
common three quarter sib group above diagonal
CAN DFS NLD AUS NZL CHE

CAN	0	62	10	176	71	25
DFS	47	0	14	84	78	41
NLD	7	10	0	16	14	8
AUS	176	55	16	0	193	27
NZL	73	56	12	179	0	25
CHE	23	40	5	25	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	137	6	36	33	0
DEU	6	0	22	7	18	2	0
DFS	139	14	0	110	117	56	0
NOR	6	6	87	0	52	11	0
AUS	33	17	89	43	0	38	8
NZL	30	2	53	10	35	0	2
CAM	0	0	0	0	8	2	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal
CAN DEU DFS NOR AUS NZL CAM

CAN	0	8	120	6	36	32	0
DEU	8	0	36	10	22	5	0
DFS	121	30	0	107	117	56	0
NOR	6	10	83	0	50	10	0
AUS	33	22	89	41	0	38	8
NZL	30	5	53	9	35	0	2
CAM	0	0	0	0	8	2	0

SIM

SIM