Introduction

The latest routine international evaluation for workability traits took place as scheduled at the Interbull Centre. Data from fourtheen (14) 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 and Switzerland 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:

ITA (BSW)	Base change
NLD (ALL)	minor change in the calculation of the reliability for the workability traits what is causing a drop in reliability of about 2% for a small group of bulls.
FRA (ALL)	Base change
CAN (ALL)	Base change
SVN (HOL,BSW)	Base change
CHE (HOL)	Base change. Some old bulls (without data) with decrease in reliability for tem compared to the previous run. This is possibly due to a problem to approximate the reliability of bulls far away from data (software used accf90).
AUS (ALL)	New database and procedures for data extraction. Mix99 software will be used for all traits. EBV expression is on the observable scale for a trait into consideration, (kg, days, log(scc), type scores, etc). Drop in reliabilities. The genetic parameters for all traits remain the same.
NOR (RDC)	The rolling definition of hys is causing the daughters to distribute somewhat differently over hys-classes at each evaluation. Therefore some bulls occasionally may loose EDC although the number of daughters stay the same. For TEM, some bulls have changed from official to unofficial. This is due to reverting the criterion of reliability>0.5 back to the old criterion of at least 70 daughters. For MSP a new extraction pipeline is applied: Holstein bulls are not extracted causing loss of daughters due to more stringent criteria for extraction. Genetic groups have been removed from the model.
NZL (ALL)	NZL has continuous DNA parentage testing so daughters, herds, EDC will always change. Small decrease in Reliability as consequence.

INTERBULL CHANGES COMPARED TO THE DECEMBER ROUTINE RUN

Subsetting:

As decided by the ITC in Orlando, new subsetting was introduced in the september test run. Sub-setting is necessary for operational purposes and restrictions of time scales. To minimize the effect of subsetting, larger subsets with 10-12 countries and with 4 link providing countries have been applied.

Window:

According to the decision taken by ITC in Orlando, the following changes have been introduced in regards to the windows used for post processing:

The upper bounds have been set to 0.99 as these were judged to have very little effect on evaluations. The lower values have been set to about the 25% percentile value. The largest changes are for the lower values for conformation traits, with the lowest window being 40% for OFL otherwise it is about 50% for all other confirmation traits. It is anticipated that these low values may not have large impact on evaluations since there were very few countries combinations whose estimated correlations fell between the old limit of 0.30 and these new limits.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 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 2019).
Number of records for milking speed by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS			6304	1258	510	
BEL						
CAN	180		11965	660	801	
CHE	2631		3023	51		
CZE						
DEA	4066					
DEU			18338		256	
DFS			11623	1933	6496	
ESP						
EST						
FRA	339		16566			
FRM						
GBR			5511			
HUN						
IRL						
ISR						
ITA	1947		6676			
JPN						
KOR						
LTU						
LVA						
NLD	108		13215	26		
NOR					3852	
NZL			5920	3775	574	
POL						
PRT						
SVK						
SVN	283		469			
URY						
USA						
ZAF						
HRV						
MEX						
CAM					31	
No.Records	9554		99610	7703	12520	
Pub. Proofs	8098	0	86948	7172	11961	0

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

BSW msp

	CAN	CHE	DEA	ITA	NLD	SVN	FRA
CAN	7.61						
CHE	0.94	15.69					
DEA	0.89	0.96	11.70				
ITA	0.91	0.95	0.93	17.75			
NLD	0.93	0.95	0.94	0.93	6.42		
SVN	0.87	0.90	0.91	0.94	0.87	24.19	
FRA	0.94	0.93	0.86	0.90	0.95	0.86	0.86

HOL msp

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	SVN	NZL	ITA
CAN	7.61										
CHE	0.91	12.54									
DEU	0.91	0.97	11.53								
DFS	0.94	0.95	0.97	14.51							
FRA	0.94	0.97	0.96	0.96	1.08						
NLD	0.95	0.97	0.97	0.97	0.98	5.59					
AUS	0.88	0.90	0.86	0.87	0.90	0.90	0.27				
GBR	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.14			
SVN	0.86	0.87	0.87	0.85	0.85	0.87	0.86	0.85	23.50		
NZL	0.91	0.92	0.88	0.87	0.93	0.92	0.94	0.85	0.86	0.36	
ITA	0.94	0.94	0.93	0.95	0.96	0.95	0.88	0.85	0.85	0.91	7.10

HOL tem

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	NZL	ITA
CAN	6.97									
CHE	0.70	10.85								
DEU	0.84	0.78	12.00							
DFS	0.78	0.83	0.87	13.21						
FRA	0.71	0.90	0.81	0.92	0.98					
NLD	0.86	0.74	0.88	0.87	0.82	5.04				
AUS	0.70	0.70	0.70	0.72	0.71	0.74	0.25			
GBR	0.70	0.79	0.71	0.80	0.85	0.71	0.70	0.14		
NZL	0.70	0.70	0.71	0.70	0.70	0.70	0.71	0.70	0.34	
ITA	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	7.26

JER msp

	CAN	DFS	NLD	AUS	NZL	CHE
CAN	8.05					
DFS	0.91	13.68				
NLD	0.95	0.96	4.72			
AUS	0.86	0.86	0.91	0.26		
NZL	0.87	0.86	0.91	0.87	0.32	
CHE	0.92	0.95	0.96	0.88	0.89	12.11

RDC msp

	CAN	DEU	DFS	NOR	AUS	NZL	CAM
CAN	6.87						
DEU	0.91	9.17					
DFS	0.94	0.93	13.43				
NOR	0.90	0.88	0.98	14.77			
AUS	0.87	0.86	0.86	0.86	0.30		
NZL	0.90	0.88	0.88	0.91	0.90	0.41	
CAM	0.90	0.90	0.90	0.90	0.88	0.90	7.94

RDC tem

	CAN	DEU	DFS	NOR	AUS	NZL	CAM
CAN	6.47						
DEU	0.82	9.80					
DFS	0.74	0.80	11.11				
NOR	0.77	0.72	0.92	17.71			
AUS	0.70	0.71	0.71	0.71	0.27		
NZL	0.71	0.71	0.72	0.72	0.78	0.40	
CAM	0.74	0.74	0.74	0.74	0.72	0.74	7.09

^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	97	105	99	36	21	65
CHE	80	0	523	406	58	46	147
DEA	89	440	0	559	82	67	179
ITA	83	347	460	0	74	62	159
NLD	30	55	73	58	0	25	51
SVN	18	45	62	61	24	0	35
FRA	57	110	133	126	41	33	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
CAN	0	753	1782	1081	1269	1175	951	1381	151	365	1358
CHE	628	0	868	529	522	696	437	603	102	229	559
DEU	979	673	0	1794	1821	2144	969	1519	234	394	1692
DFS	753	445	908	0	1315	1485	845	1199	178	421	1046
FRA	686	435	705	520	0	1601	910	1295	140	455	1212
NLD	1040	661	1384	1054	792	0	997	1405	186	551	1175
AUS	821	358	552	461	504	770	0	942	108	586	680
GBR	1420	582	933	775	693	1126	705	0	165	441	1187
SVN	117	77	219	140	97	166	77	126	0	53	176
NZL	332	192	265	258	221	493	461	343	39	0	292
ITA	1061	493	903	724	580	883	491	947	145	243	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
CAN	0	665	1531	895	1139	1126	920	1351	355	1247
CHE	545	0	651	415	469	565	383	551	204	493
DEU	779	475	0	1370	1564	1850	860	1339	345	1438
DFS	548	329	587	0	1164	1230	775	1065	400	926
FRA	678	392	615	448	0	1495	856	1244	421	1215
NLD	989	530	1113	729	759	0	990	1393	544	1140
AUS	801	323	462	379	501	763	0	946	585	702
GBR	1398	516	783	605	689	1120	708	0	440	1148
NZL	325	173	228	228	219	486	462	344	0	317
ITA	893	421	720	575	559	801	471	869	253	0

JER

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common bulls below diagonal
common three quarter sib group above diagonal

	CAN	DFS	NLD	AUS	NZL	CHE
CAN	0	59	9	161	66	22
DFS	44	0	12	75	75	39
NLD	7	8	0	14	13	7
AUS	162	48	15	0	192	25

NZL	68	52	12	184	0	22
CHE	20	38	4	24	20	0

JER

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	DEU	DFS	NOR	AUS	NZL	CAM
CAN	0	9	119	5	37	33	0
DEU	9	0	41	10	23	5	0
DFS	119	31	0	103	115	56	0
NOR	5	10	79	0	53	11	0
AUS	33	23	87	44	0	38	8
NZL	30	5	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	105	5	37	32	0
DEU	8	0	34	10	22	5	0
DFS	105	28	0	96	115	56	0
NOR	5	10	72	0	50	10	0
AUS	33	22	87	41	0	38	8
NZL	30	5	53	9	35	0	2
CAM	0	0	0	0	8	2	0

SIM

SIM