Introduction

The latest routine international evaluation for workability traits took place as scheduled at the Interbull Centre. Data from fourtheen (15) 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, Spain 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:

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 lose EDC although the number of daughters stay the same.
DEU (ALL)	Base change, Performance data: phenotypic data from 2000 onwards, Pedigree: sire and maternal grandsire of animals having own performance must be known, Breed: breed of animal having own performance must be consistent with the breeds of parents
JPN (HOL)	First time with msp, small decrease in information due to additional records and modification of pedigree.
GBR (HOL)	Base change from 2004/2005 to 2014/2015 affecting means and standard deviation
NZL (ALL)	Results based on brand new models which are based on the most recent version of LICâ s genetic evaluation software based on a multiple trait models. The new multiple traits have caused a general drop in reliability. It contains a number of enhancements which result in more accurate genetic evaluations and reduces the time taken to compute genetic evaluations. Implementation of Parent Average Adjustment (PAA), changes to the daugher count for all traits. When the single trait models are combined into a multi trait BV the single trait daughter count that was the greatest (which is always the 2 year old daughter count)was taken into account. The old routine for Fertility and longevity were based on having a record for that trait or a production record, this is now change so that it is a count of that particular trait.
NLD (ALL)	Base change, now the cows born in 2015 are the base (it was 2010)
AUS (ALL)	Changed the method for calculation of reliabilities, Pedigree corrections based on genotype information has caused drops in information
SVN (ALL)	Until now the EBV were limited to the interval(52, 148). We used to reduce all EBV greater than 147 to not exceed 148. We reduced all EBv smaller than 53 to be no less than 52. From now on, we no longer apply such restriction to EBVs.
ITA (HOL)	Base change plus cut off of 1 year of data causing decreases in information.
ITA (BSW)	Base change applied a rolling base including a cow born between 15 an 12 year before the evaluation date.
CHE (ALL)	Base change. HOL: MiX99 is now used solution of the equation system and ApaX for the approximation of the reliabilities. Slight changes in number of daughters, number of herds and EDC are due to manual data edits in the database. The change of herd-year-season assignment of certain data records might also explain small changes in EDC and reliabilities for certain bulls. BSW: few bulls missing in this evaluation due to change in status of bulls.
NLD (ALL)	Base change
DEA (BSW)	Substantial number of bulls whose EDC decreased. In the data preparation there was an update with respect to the definition of herd-year-season classes for the trait milking speed subjectively scored. The checking on the definition has been overlooked for some time. Mainly bulls with considerable numbers of daughters for this trait are affected.
CAN (ALL)	Base change
FRA (ALL)	Base change
GBR (ALL)	Drops in daughters due to minor data editings. For RDC some daughters of these bulls were duplicated with some of them having eartag numbers and herd book numbers. Data providers have now correctly eliminated the eartag numbers of these cows, so that only the herd-book numbers are now included. Base change

INTERBULL CHANGES COMPARED TO THE PREVIOUS 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.

The window so far applied for MAS evaluation have been found too high compared to the
within-country genetic correlation between mastitis and SCS available from the literature.
It has been an ITC recommendation to adjust the windows for MAS in this test run to make them more in line with the
values available from the literature. The recommendation has been approved by the Steering committee.
Also, according to the decision taken by ITC in Orlando (2015) to review all windows every five (5) years, an overall
review of the windows for all traits will take place during the first half of 2020 with the aim of implementation set for the September 2020 test run.

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 2020).
Number of records for milking speed by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS			6320	1241	512	
BEL						
CAN	191		12294	695	823	
CHE	2713		3145	52		
CZE						
DEA	4175					
DEU			17139		244	
DFS			11821	1969	6589	
ESP			2916			
EST						
FRA	348		16814			
FRM						
GBR			5725			
HUN						
IRL						
ISR						
ITA	1997		6694			
JPN			1644			

KOR						
LTU						
LVA						
NLD	109	13482	29			
NOR				3879		
NZL		6177	3883	588		
POL						
PRT						
SVK						
SVN	297	503				
URY						
USA						
ZAF						
HRV						
MEX						
CAM				31		
No.Records	9830	101758	7869	12666		
Pub. Proofs	8308 0	88026	7330	12149	0	

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

BSW msp

	CAN	CHE	DEA	ITA	NLD	SVN	FRA
CAN	8.62						
CHE	0.94	15.66					
DEA	0.91	0.96	11.72				
ITA	0.92	0.95	0.93	17.69			
NLD	0.94	0.96	0.94	0.93	5.77		
SVN	0.87	0.91	0.91	0.94	0.88	25.25	
FRA	0.94	0.93	0.86	0.90	0.96	0.86	0.85

HOL msp

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	SVN	NZL	ITA	JPN
CAN	7.64											
CHE	0.92	12.62										
DEU	0.91	0.98	11.80									
DFS	0.94	0.95	0.97	14.50								
FRA	0.94	0.98	0.96	0.96	1.08							
NLD	0.96	0.98	0.97	0.97	0.98	5.09						
AUS	0.86	0.87	0.85	0.85	0.88	0.87	0.26					
GBR	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.20				
SVN	0.85	0.86	0.87	0.85	0.85	0.86	0.86	0.85	23.64			
NZL	0.90	0.91	0.87	0.86	0.92	0.91	0.93	0.85	0.86	0.36		
ITA	0.94	0.94	0.93	0.94	0.96	0.95	0.85	0.85	0.85	0.88	6.99	
JPN	0.97	0.94	0.92	0.95	0.97	0.97	0.89	0.85	0.86	0.91	0.95	2.16

HOL tem

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	NZL	ITA	JPN
CAN	7.11										
CHE	0.70	10.85									
DEU	0.84	0.77	11.90								
DFS	0.78	0.83	0.87	13.17							
FRA	0.71	0.91	0.80	0.92	0.98						
NLD	0.86	0.76	0.89	0.86	0.81	5.49					
AUS	0.70	0.70	0.70	0.70	0.70	0.72	0.24				
GBR	0.70	0.80	0.70	0.78	0.85	0.70	0.70	0.16			
NZL	0.70	0.70	0.74	0.70	0.70	0.71	0.75	0.70	0.37		

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ITA       0.70    0.70    0.70    0.70    0.70    0.70    0.70    0.70    0.70    6.99
JPN       0.92    0.81    0.90    0.87    0.85    0.94    0.70    0.71    0.70    0.70    2.36

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JER     msp
--------------------------------------------------------------------------------
           CAN     DFS     NLD     AUS     NZL     CHE
CAN       8.00
DFS       0.91   13.70
NLD       0.95    0.96    4.22
AUS       0.85    0.86    0.89    0.25
NZL       0.87    0.86    0.90    0.86    0.32
CHE       0.93    0.95    0.97    0.87    0.88   11.97

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RDC     msp
--------------------------------------------------------------------------------
           CAN     DEU     DFS     NOR     AUS     NZL     CAM
CAN       7.03
DEU       0.91    9.60
DFS       0.93    0.93   13.36
NOR       0.90    0.88    0.98   14.92
AUS       0.86    0.86    0.85    0.86    0.28
NZL       0.90    0.88    0.88    0.91    0.89    0.40
CAM       0.90    0.90    0.90    0.90    0.88    0.90    7.86

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RDC     tem
--------------------------------------------------------------------------------
           CAN     DEU     DFS     NOR     AUS     NZL     CAM
CAN       6.43
DEU       0.82   10.03
DFS       0.73    0.80   11.11
NOR       0.76    0.72    0.92   17.08
AUS       0.70    0.71    0.70    0.71    0.26
NZL       0.71    0.73    0.72    0.72    0.80    0.44
CAM       0.74    0.74    0.74    0.74    0.72    0.73    7.01

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^LAPPENDIX II. Number of common bulls
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BSW
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 common bulls below diagonal
 common three quarter sib group above diagonal
       CAN  CHE  DEA  ITA  NLD  SVN  FRA
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  CAN    0  103  111  105   36   26   69
  CHE   87    0  541  424   58   53  150
  DEA   96  457    0  584   83   74  184
  ITA   90  364  484    0   76   70  165
  NLD   30   55   74   60    0   27   51
  SVN   23   52   69   69   26    0   40
  FRA   59  111  135  127   41   38    0
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BSW
--------
GUE
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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
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CAN	0	797	1766	1122	1310	1239	967	1457	166	377	1415	328
CHE	663	0	882	551	547	727	440	639	109	236	581	117
DEU	1031	693	0	1768	1783	2095	923	1518	247	382	1705	326
DFS	800	465	954	0	1349	1538	850	1229	188	433	1053	187
FRA	730	455	712	549	0	1641	925	1325	152	465	1209	279
NLD	1111	692	1420	1120	833	0	1004	1455	203	562	1195	223
AUS	828	356	549	466	505	770	0	956	116	591	672	147
GBR	1510	612	966	812	724	1178	711	0	179	456	1213	233
SVN	127	80	233	145	105	179	79	136	0	56	188	63
NZL	343	198	267	267	231	504	464	357	42	0	291	73
ITA	1153	509	936	757	616	940	491	1003	157	242	0	323
JPN	119	66	100	88	84	98	90	98	27	48	101	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEU	DFS	FRA	NLD	AUS	GBR	NZL	ITA	JPN
CAN	0	709	1494	909	1179	1184	935	1426	366	1412	328
CHE	580	0	675	419	494	596	387	587	211	540	116
DEU	816	509	0	1297	1520	1800	806	1311	325	1508	294
DFS	568	331	598	0	1184	1247	781	1073	405	899	140
FRA	721	412	619	467	0	1535	871	1271	431	1207	279
NLD	1060	562	1139	751	802	0	996	1440	556	1184	223
AUS	805	322	450	381	502	762	0	958	590	672	147
GBR	1484	546	789	620	720	1169	710	0	453	1213	233
NZL	335	179	225	230	229	497	463	356	0	291	73
ITA	1145	470	801	603	615	924	491	1004	242	0	322
JPN	119	66	93	63	84	98	90	98	48	101	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	DFS	NLD	AUS	NZL	CHE
CAN	0	59	9	162	68	22
DFS	45	0	13	76	77	40
NLD	7	9	0	15	13	7
AUS	163	49	16	0	191	25
NZL	69	55	12	176	0	24
CHE	20	39	4	24	22	0

JER

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	DEU	DFS	NOR	AUS	NZL	CAM
CAN	0	9	129	6	36	33	0
DEU	9	0	39	10	22	5	0
DFS	130	31	0	106	112	56	0
NOR	6	10	82	0	51	11	0
AUS	33	22	86	42	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	111	5	35	32	0
DEU	8	0	35	10	21	5	0
DFS	111	29	0	100	112	56	0
NOR	5	10	76	0	48	10	0
AUS	32	21	86	39	0	38	8
NZL	30	5	53	9	35	0	2
CAM	0	0	0	0	8	2	0

SIM

SIM