

## Introduction

The latest routine international evaluation for udder traits took place as scheduled at the Interbull Centre. Data from thirty-three (33) countries were included in this evaluation.

International genetic evaluations for udder health traits of bulls from Australia, Austria-Germany, Belgium, Canada, Croatia, Czech Republic, Denmark-Finland-Sweden, Estonia, France, Hungary, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, South Africa, Slovak Republic, Spain, Switzerland, the United Kingdom, the United States of America, Poland, Lithuania, Latvia, Croatia, Slovenia, Portugal and Uruguay were computed. Brown Swiss, Holstein, Red Dairy Cattle, Guernsey, Jersey and Simmental breed data were included in this evaluation.

Countries sending real MAS data (other countries participate to the MAS evaluation using SCS data as predictor):

HOL : DFS, NLD, FRA, CAN, ITA, CHE, USA, DEU, GBR, AUS  
RDC : DFS, NLD, CAN, GBR, AUS  
BSW : NLD, FRA, CHE, GBR  
JER : DFS, NLD, CAN, GBR, AUS, USA  
SIM : NLD, CHE, GBR  
GUE : No evaluation for MAS yet

## Changes in national procedures

Changes in the national genetic evaluation of conformation traits are as follows:

ITA (JER)	First time with scs and mas using scs as predictor. Change in direction of scale compared to test run due to the correction of a bug.
DEU (RDC)	No longer participating in the mas evaluation with scs as predictor.
NLD (HOL)	Send Clinical mastitis instead of Udder health index for mas.
HRV (HOL,SIM)	Data now provided by the new organization HAPIH
ITA (BSW)	Base change. Updated data and pedigree editing procedures and fixed effects.
BEL (HOL)	Few bulls missing due to no longer having enough daughters. Some bulls changed in ToP due to the new program assigning such values.
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.
DFS (JER)	Few bulls missing due to update in pedigree
JPN (HOL)	Small decrease in information due to pedigree's update
FRA (BSW,HOL)	Base change
ITA (SIM)	Base change
SVN (ALL)	Base change
GBR (ALL)	Base change
EST (HOL,RDC)	Small changes in information due to pedigree updates
DEA (ALL)	Change of base to cow base group instead of the former defined bull base group.
CHE (ALL)	Base change. EDC calculated following the multi-trait approach as implemented in Pete Sullivan's MT-EDC software.
USA (HOL,JER)	MAS: very large submission of new / corrected data from one of data suppliers (over 1mln new records, over +25k corrections of existing cow health events records)
ITA (HOL)	Cut-off of one year of data causing decrease in information. Base change
NLD (HOL)	Sent in Clinical mastitis instead of Udder health index
IRL (ALL)	Changes in number of daughters, edc and herd numbers due to pedigree changes
DEU (ALL)	Base change, few bulls lost daughters/herds/EDC due to data editing. MAS RDC no longer providing scs data as predictor
NZL (ALL)	Drops in information due to continuous DNA parentage testing
CAN (ALL)	Base change
LTU (HOL)	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](https://interbull.org/ib/rg_procedure)

#### DATA AND METHOD OF ANALYSIS

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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

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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

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Dates for the next routine evaluation can be found on  
<http://www.interbull.org/ib/servicecalendar>.

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NEXT TEST INTERNATIONAL EVALUATION  
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Dates for the next test run can be found on  
<http://www.interbull.org/ib/servicecalendar>.

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PUBLICATION OF INTERBULL ROUTINE RUN  
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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.

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PUBLICATION OF INTERBULL TEST RUN  
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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 udder health (April Routine Evaluation 2021).  
Number of records for milk somatic cells by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		140	8437	1687	767	
BEL			2152			
CAN	265	102	13145	807	844	
CHE	3075		3602	95		3417
CZE			4469			
DEA	5818					23550
DEU			22994		280	
DFS			13734	2247	7987	
ESP			4143			
EST			1235		459	
FRA	414		17578			482
FRM						4539
GBR	140	294	7149	723	544	83
HUN			3081			190
IRL			2715			
ISR			1557			
ITA	2026		9535	76		1684
JPN			6493			
KOR			1457			
LTU			1278		435	
LVA			527		564	
NLD	207		16344	197	93	453
NOR					4223	
NZL	59	57	8280	4802	1371	
POL			11448			
PRT			2459			
SVK			1141			
SVN	400		633			681
URY			1884			
USA	1120	714	40149	4892	716	77







FRA	0.89	1.00																		
ITA	0.91	0.83	12.79																	
NLD	0.86	0.86	0.80	4.12																
CHE	0.86	0.91	0.88	9.64																
DEA	0.91	0.92	0.85	0.87	0.79	12.23														
HUN	0.89	0.84	0.89	0.87	0.87	0.92	16.36													
SVN	0.88	0.84	0.83	0.80	0.84	0.84	0.85	9.04												
GBR	0.82	0.88	0.80	0.84	0.89	0.83	0.83	0.82	2.70											
HRV	0.86	0.81	0.82	0.75	0.80	0.81	0.84	0.82	0.78	9.95										
USA	0.82	0.87	0.77	0.85	0.83	0.82	0.76	0.73	0.80	0.75	0.20									

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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 FRA NLD USA CHE DEA NZL ITA GBR SVN

CAN	0	87	54	182	142	151	26	134	62	37
FRA	78	0	84	120	162	217	23	191	53	62
NLD	50	69	0	81	98	154	28	134	41	52
USA	179	81	72	0	321	325	30	232	84	45
CHE	122	119	92	298	0	601	28	467	69	89
DEA	136	160	148	289	499	0	40	659	70	117
NZL	26	18	21	27	22	35	0	32	18	14
ITA	119	150	112	162	406	556	25	0	72	109
GBR	59	42	30	73	50	46	15	48	0	23
SVN	34	60	53	37	85	109	13	108	17	0

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BSW

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common bulls below diagonal

common three quarter sib group above diagonal

CAN FRA NLD USA CHE DEA NZL ITA GBR SVN

CAN	0	80	52	182	67	151	26	134	29	37
FRA	73	0	71	106	66	204	20	180	25	62
NLD	46	60	0	75	44	140	28	122	19	49
USA	179	73	65	0	87	324	30	232	36	45
CHE	62	50	44	64	0	212	12	178	15	54
DEA	136	151	132	289	182	0	40	659	32	117
NZL	26	16	21	27	12	35	0	32	11	14
ITA	119	145	102	162	148	556	25	0	34	109
GBR	27	20	14	33	11	22	8	24	0	13
SVN	34	60	50	37	51	109	13	108	10	0

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GUE

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common bulls below diagonal

common three quarter sib group above diagonal

CAN GBR USA AUS NZL

CAN	0	30	72	48	14
GBR	25	0	87	37	13
USA	63	89	0	65	29
AUS	46	31	62	0	26
NZL	11	11	29	26	0

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GUE

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HOL

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common bulls below diagonal

common three quarter sib group above diagonal

CAN CHE DEU DFS EST FRA GBR NLD USA ISR ITA AUS HUN BEL JPN ESP ZAF NZL IRL CZE SVK POL LTU LVA PRT KOR SVN HRV URY

CAN	0	925	2395	1532	270	1527	1655	1628	3572	140	1811	1479	1087	850	1393	1338	507	766	509	1174	440	1526	327	207	1040	703	226	323	803
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	CAN	DFS	GBR	NLD	USA	AUS	ZAF	NZL	CHE	ITA
CAN	0	109	160	40	449	264	150	180	39	37
DFS	100	0	170	129	195	155	149	150	59	40
GBR	160	161	0	88	235	219	165	218	71	48
NLD	36	130	80	0	89	74	75	75	40	29
USA	474	173	255	96	0	499	283	369	69	48
AUS	271	123	222	66	544	0	229	438	56	46
ZAF	146	131	164	71	299	220	0	198	56	44
NZL	186	126	218	68	439	485	206	0	53	39
CHE	32	56	67	34	69	45	48	43	0	33
ITA	32	39	48	24	47	40	39	36	32	0

JER

common bulls below diagonal										
common three quarter sib group above diagonal										
	CAN	DFS	GBR	NLD	USA	AUS	ZAF	NZL	CHE	ITA
CAN	0	42	71	17	80	117	67	82	24	24
DFS	37	0	108	103	51	126	128	126	56	38
GBR	67	99	0	62	76	152	124	150	64	43
NLD	12	98	57	0	29	69	71	68	37	29
USA	73	42	75	26	0	149	109	107	35	26
AUS	106	91	155	63	158	0	220	432	52	45
ZAF	61	106	124	68	120	217	0	194	53	44
NZL	74	98	150	61	107	478	204	0	49	39
CHE	21	52	59	32	28	44	47	42	0	32
ITA	20	36	42	24	24	39	39	36	32	0

RDC

common bulls below diagonal														
common three quarter sib group above diagonal														
	CAN	DFS	GBR	NOR	USA	DEU	AUS	EST	ZAF	NZL	LTU	LVA	NLD	CAM
CAN	0	174	80	7	205	14	103	2	69	90	17	7	7	0
DFS	179	0	105	130	199	52	194	111	50	167	103	91	57	0
GBR	81	99	0	54	111	14	85	8	38	83	26	11	38	0
NOR	6	104	57	0	77	14	69	22	0	41	25	17	44	0
USA	191	195	105	77	0	23	135	22	58	122	34	14	44	24
DEU	13	43	14	13	22	0	37	23	1	17	29	28	15	0
AUS	104	167	82	59	136	37	0	32	33	145	43	28	33	12
EST	2	100	7	22	21	23	30	0	0	10	25	36	17	0
ZAF	71	47	34	0	52	1	32	0	0	33	5	1	3	0
NZL	88	165	78	41	123	17	145	9	29	0	27	13	21	12
LTU	16	98	24	22	29	28	42	25	5	25	0	36	15	0
LVA	7	59	11	15	10	22	25	28	1	10	32	0	9	0
NLD	7	55	37	43	43	14	31	16	3	21	14	8	0	0
CAM	0	0	0	0	24	0	12	0	0	12	0	0	0	0

RDC

common bulls below diagonal													
common three quarter sib group above diagonal													
	CAN	DFS	GBR	NOR	USA	AUS	EST	ZAF	NZL	LTU	LVA	NLD	CAM
CAN	0	74	28	3	73	33	0	35	34	13	4	3	0
DFS	73	0	73	132	190	208	111	45	165	102	92	54	0
GBR	27	68	0	49	77	54	5	25	58	21	9	29	0
NOR	3	105	52	0	77	69	22	0	41	25	17	40	0
USA	73	185	75	77	0	124	22	53	120	34	14	41	24
AUS	33	185	52	59	127	0	32	30	138	40	27	30	10
EST	0	100	5	22	21	30	0	0	10	25	36	17	0
ZAF	36	45	24	0	51	32	0	0	31	5	1	2	0
NZL	34	161	56	41	123	139	9	29	0	27	13	19	12
LTU	12	97	19	22	29	40	25	5	25	0	36	14	0
LVA	4	59	9	15	10	25	28	1	10	32	0	8	0
NLD	3	52	29	39	41	28	16	2	19	13	7	0	0

CAM 0 0 0 0 24 10 0 0 12 0 0 0 0

SIM

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common bulls below diagonal  
common three quarter sib group above diagonal

	FRM	FRA	ITA	NLD	CHE	DEA	HUN	SVN	GBR	HRV	USA
FRM	0	3	172	124	213	270	2	17	65	2	58
FRA	1	0	152	74	12	272	6	58	0	105	2
ITA	206	137	0	227	94	932	18	131	44	296	31
NLD	149	71	223	0	91	341	8	66	48	142	24
CHE	265	9	97	95	0	343	2	5	51	2	29
DEA	315	230	848	361	311	0	37	223	48	641	33
HUN	0	5	15	8	1	24	0	12	0	19	0
SVN	17	55	126	63	5	206	11	0	0	108	1
GBR	82	0	48	48	58	51	0	0	0	0	19
HRV	1	95	285	139	2	672	17	96	0	0	3
USA	73	2	36	26	28	39	0	1	26	3	0

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SIM

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common bulls below diagonal  
common three quarter sib group above diagonal

	FRM	FRA	ITA	NLD	CHE	DEA	HUN	SVN	GBR	HRV	USA
FRM	0	2	158	104	4	228	2	17	25	2	36
FRA	1	0	85	31	1	161	3	34	0	58	1
ITA	192	75	0	216	4	932	18	131	18	296	31
NLD	127	30	211	0	4	314	8	63	18	136	23
CHE	4	1	4	4	0	73	0	0	1	0	2
DEA	276	124	848	333	64	0	37	223	20	641	33
HUN	0	2	15	8	0	24	0	12	0	19	0
SVN	17	29	126	60	0	206	11	0	0	108	1
GBR	34	0	23	20	1	25	0	0	0	0	16
HRV	1	51	285	134	0	672	17	96	0	0	3
USA	51	1	36	25	2	39	0	1	22	3	0

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