

## 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:

ISR (HOL)	Drops in information due to pedigree corrections and edits.
AUS (HOL,JER,RDC)	Decreasing in information due to pedigree changes, changes in status of bull which leads to a good number of bulls no longer being qualified. MAS: This is a new trait for which the are still collecting historic data from various sources.
JPN (HOL)	Some changes in proofs caused by additional records and in EDCs caused by modification of pedigree.
ITA (HOL)	Drops in information for some bulls due to data edits.
USA (ALL)	Drops in information for most traits are due to pedigree corrections and herd-year minimum edits.
NZL (BSW,GUE,HOL,JER,RDC)	Continuous DNA parentage testing affected daughter counts, herd count, EDCs, and reliabilities.
DEU (HOL)	Changes in data caused decrease in number of daughters.
SVN (BSW,HOL,SIM)	Some bulls losing information (herds/daughters/EDC), due to changes in data base, related to the pedigree completeness as well as phenotypic data improvement.
HRV (SIM)	Decrease in information due to changes related to the pedigree completeness and additional pedigree changes.
ESP (HOL)	Change in base definition. Some Bulls lost some EDC, due to some daughters that were assigned as culled but did contribute more information now.
ITA (BSW)	For some traits, new information cause low correlation with previous evaluation for some years.
IRL (BSW)	MAS: Bull change publish status due to the lost of herd record. High number of bulls with lacking of pedigree. Majority of them old bulls and the rest non-pedigree stock bulls.
FRA (HOL,SIM,MON)	The reliability from the singlestep is now used as a factor for the publication rule. As the single step reliability showed differences between traits, even belonging to the same trait group, there are a different amount of bulls no more qualifying for publication across all traits due to the fact that such bulls do not meet anymore the new threshold set by the organisation.

## 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>.

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 udder health (August Routine Evaluation 2022).  
Number of records for milk somatic cells by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		146	8675	1730	806	
BEL			2240			
CAN	270	105	13590	852	864	
CHE	3145		3296	98		3526
CZE			4645			
DEA	5957					24255
DEU			23750		293	
DFS			14183	2306	8104	
ESP			4432			
EST			1318		472	
FRA	432		18336			470
FRM						4669
GBR	147	305	7403	756	573	85
HUN			3163			190
IRL			2927			
ISR			1644			
ITA	2109		9521	73		1761
JPN			6810			
KOR			1600			
LTU			1341		436	
LVA			1275		596	
NLD	221		16827	240	98	494
NOR					4293	
NZL	71	57	8618	4949	1410	
POL			12160			
PRT			2468			
SVK			1166			
SVN	411		694			742
URY			2018			
USA	1162	733	41352	5120	754	92
ZAF			1204	609	125	
HRV			931			1036





GBR	0.81	0.85	1.89											
NLD	0.84	0.82	0.77	4.40										
USA	0.77	0.77	0.74	0.75	2.47									
AUS	0.68	0.68	0.68	0.68	0.68	0.11								
ZAF	0.73	0.72	0.72	0.80	0.71	0.70	21.08							
NZL	0.63	0.63	0.63	0.64	0.63	0.63	0.77	0.39						
CHE	0.84	0.82	0.74	0.77	0.75	0.71	0.80	0.73	12.83					
ITA	0.76	0.73	0.73	0.80	0.67	0.67	0.80	0.70	0.81	7.23				

RDC scs

	CAN	DFS	GBR	NOR	USA	DEU	AUS	EST	ZAF	NZL	LTU	LVA	NLD	CAM
CAN	5.96													
DFS	0.94	12.91												
GBR	0.93	0.92	11.59											
NOR	0.87	0.90	0.82	13.68										
USA	0.92	0.86	0.88	0.81	0.23									
DEU	0.94	0.96	0.95	0.89	0.89	14.21								
AUS	0.81	0.84	0.87	0.82	0.74	0.84	0.27							
EST	0.88	0.89	0.90	0.85	0.86	0.94	0.81	19.35						
ZAF	0.84	0.86	0.86	0.89	0.86	0.92	0.76	0.88	25.38					
NZL	0.78	0.79	0.82	0.80	0.73	0.81	0.90	0.80	0.79	0.44				
LTU	0.85	0.90	0.87	0.89	0.82	0.90	0.78	0.90	0.87	0.77	0.34			
LVA	0.87	0.89	0.91	0.85	0.83	0.93	0.83	0.95	0.88	0.81	0.90	428.45		
NLD	0.91	0.95	0.95	0.89	0.87	0.96	0.85	0.90	0.88	0.83	0.87	0.89	4.13	
CAM	0.89	0.90	0.90	0.89	0.83	0.90	0.88	0.90	0.89	0.86	0.89	0.88	0.90	6.29

RDC mas

	CAN	DFS	GBR	NOR	USA	AUS	EST	ZAF	NZL	LTU	LVA	NLD	CAM
CAN	7.72												
DFS	0.90	13.56											
GBR	0.86	0.85	2.09										
NOR	0.82	0.73	0.74	13.68									
USA	0.79	0.74	0.74	0.78	0.80	0.23							
AUS	0.70	0.69	0.69	0.74	0.70	0.12							
EST	0.82	0.75	0.80	0.83	0.81	0.72	19.35						
ZAF	0.84	0.83	0.82	0.88	0.79	0.72	0.85	25.40					
NZL	0.65	0.63	0.67	0.77	0.70	0.69	0.82	0.77	0.44				
LTU	0.79	0.75	0.81	0.88	0.80	0.74	0.91	0.86	0.79	0.34			
LVA	0.78	0.72	0.81	0.87	0.75	0.71	0.94	0.87	0.84	0.91	435.86		
NLD	0.85	0.79	0.84	0.86	0.84	0.71	0.87	0.85	0.72	0.83	0.86	4.60	
CAM	0.85	0.85	0.85	0.88	0.82	0.84	0.89	0.88	0.88	0.89	0.88	0.86	6.29

SIM scs

	FRM	FRA	ITA	NLD	CHE	DEA	HUN	SVN	GBR	HRV	USA
FRM	1.09										
FRA	0.89	1.01									
ITA	0.88	0.87	12.58								
NLD	0.91	0.93	0.85	4.31							
CHE	0.93	0.93	0.88	0.93	10.40						
DEA	0.92	0.93	0.85	0.91	0.89	12.25					
HUN	0.89	0.90	0.92	0.88	0.89	0.90	16.37				
SVN	0.88	0.83	0.83	0.83	0.85	0.82	0.85	9.17			
GBR	0.91	0.95	0.88	0.95	0.90	0.93	0.89	0.84	11.64		
HRV	0.87	0.80	0.80	0.80	0.81	0.80	0.84	0.80	0.81	9.74	
USA	0.84	0.90	0.87	0.87	0.86	0.82	0.91	0.81	0.90	0.81	0.20

SIM mas

	FRM	FRA	ITA	NLD	CHE	DEA	HUN	SVN	GBR	HRV	USA
FRM	1.08										
FRA	0.87	1.00									
ITA	0.90	0.82	12.54								

NLD	0.87	0.86	0.79	4.03								
CHE	0.84	0.89	0.87	0.85	9.66							
DEA	0.92	0.92	0.85	0.87	0.76	12.25						
HUN	0.87	0.83	0.89	0.86	0.85	0.89	16.37					
SVN	0.87	0.81	0.81	0.79	0.82	0.81	0.84	9.17				
GBR	0.77	0.88	0.77	0.81	0.89	0.79	0.83	0.79	2.76			
HRV	0.84	0.78	0.79	0.72	0.78	0.79	0.83	0.80	0.75	9.74		
USA	0.81	0.86	0.72	0.84	0.81	0.80	0.75	0.71	0.80	0.73	0.20	

^LAPPENDIX II. Number of common bulls

BSW

common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	FRA	NLD	USA	CHE	DEA	NZL	ITA	GBR	SVN
CAN	0	88	56	185	145	155	31	140	68	39
FRA	78	0	85	120	166	220	27	197	58	63
NLD	52	69	0	88	105	161	30	137	43	53
USA	182	82	79	0	328	338	35	235	95	49
CHE	124	125	97	305	0	623	34	490	78	93
DEA	140	167	153	302	519	0	47	694	82	121
NZL	31	21	23	32	27	42	0	39	23	14
ITA	124	158	114	165	432	596	32	0	83	113
GBR	69	50	37	94	62	58	21	63	0	25
SVN	36	61	54	39	89	113	13	112	22	0

BSW

common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	FRA	NLD	USA	CHE	DEA	NZL	ITA	GBR	SVN
CAN	0	82	53	185	71	155	31	140	31	39
FRA	73	0	71	105	73	207	23	186	30	63
NLD	47	59	0	79	48	144	30	127	21	50
USA	182	73	69	0	95	337	35	235	41	49
CHE	65	56	47	73	0	233	17	200	19	58
DEA	140	158	134	302	201	0	47	694	39	121
NZL	31	19	23	32	15	42	0	39	10	14
ITA	124	152	104	165	171	596	32	0	42	113
GBR	30	26	18	41	16	28	8	33	0	15
SVN	36	61	51	39	55	113	13	112	13	0

GUE

common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	GBR	USA	AUS	NZL
CAN	0	30	74	51	14
GBR	25	0	88	40	13
USA	66	91	0	69	29
AUS	49	34	67	0	26
NZL	11	11	29	26	0

GUE

HOL

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	916	2561	1668	299	1674	1766	1764	3863	150	1903	1577	1119	887	1471	1416	504	815	556	1243	456	1686	350	535	1062	759	247	337	858
CHE	840	0	1170	759	183	765	725	969	1043	69	768	666	450	639	497	599	258	431	388	548	246	749	195	258	499	290	160	214	337
DEU	1996	1105	0	2862	472	2674	2143	3597	3713	176	2682	1758	1320	1304	1508	1646	548	1032	822	1966	704	2888	685	749	1228	677	376	694	857





CAN	0	127	172	47	479	277	157	194	42	36
DFS	120	0	185	163	216	170	159	164	61	40
GBR	176	180	0	101	253	236	171	236	75	46
NLD	42	165	94	0	104	81	79	87	41	29
USA	506	197	277	111	0	523	295	392	72	46
AUS	284	140	240	72	569	0	239	451	59	44
ZAF	153	142	172	75	311	229	0	204	58	43
NZL	201	141	241	82	464	499	214	0	56	37
CHE	36	60	72	35	73	50	51	48	0	32
ITA	31	40	47	24	45	38	38	35	32	0

JER

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common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	DFS	GBR	NLD	USA	AUS	ZAF	NZL	CHE	ITA
CAN	0	48	84	20	91	130	70	92	25	23
DFS	43	0	119	127	67	138	136	139	59	37
GBR	80	112	0	70	89	171	130	166	66	42
NLD	13	122	66	0	38	76	74	79	37	29
USA	83	56	88	37	0	165	121	124	38	26
AUS	118	104	174	69	175	0	232	445	55	43
ZAF	64	115	131	71	132	228	0	200	55	43
NZL	83	113	168	74	126	492	211	0	52	37
CHE	23	56	63	32	32	49	50	47	0	31
ITA	19	35	41	24	25	37	38	35	32	0

RDC

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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	186	86	7	219	14	105	3	70	92	17	9	7	0
DFS	191	0	116	137	214	62	204	123	51	178	110	74	60	0
GBR	87	111	0	63	120	15	93	12	39	90	27	10	42	0
NOR	6	111	66	0	82	15	74	26	0	47	25	12	48	0
USA	205	211	115	83	0	24	144	24	59	129	34	12	48	25
DEU	13	53	15	14	22	0	42	25	1	19	29	26	15	0
AUS	106	178	89	63	146	41	0	38	34	156	45	21	39	11
EST	2	112	10	26	23	25	35	0	0	14	26	23	19	0
ZAF	72	48	35	0	53	1	34	0	0	35	5	2	3	0
NZL	90	175	86	47	131	19	156	13	30	0	28	13	23	12
LTU	16	98	25	22	29	28	42	25	5	25	0	31	15	0
LVA	9	30	10	10	9	20	17	15	2	10	26	0	6	0
NLD	7	58	41	47	47	14	37	18	3	23	14	5	0	0
CAM	0	0	0	0	25	0	11	0	0	12	0	0	0	0

RDC

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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	80	30	3	77	34	0	35	36	13	7	3	0
DFS	79	0	80	139	206	219	123	46	176	109	126	58	0
GBR	29	76	0	54	83	58	7	26	61	21	14	31	0
NOR	3	112	57	0	82	74	26	0	47	25	19	43	0
USA	77	203	82	83	0	134	24	54	126	34	25	46	25
AUS	34	196	56	63	137	0	38	31	148	42	38	36	10
EST	0	112	7	26	23	35	0	0	14	26	49	18	0
ZAF	36	46	25	0	52	33	0	0	33	5	2	2	0
NZL	36	171	60	47	131	149	13	30	0	28	17	21	12
LTU	12	97	19	22	29	40	25	5	25	0	53	14	0
LVA	7	84	14	17	22	35	42	2	14	47	0	14	0
NLD	3	56	31	42	46	34	17	2	21	13	13	0	0
CAM	0	0	0	0	25	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	2	177	129	232	270	2	17	67	2	72
FRA	1	0	141	77	10	255	4	59	0	100	3
ITA	203	126	0	245	96	980	18	156	46	324	33
NLD	154	74	241	0	91	376	8	72	49	158	28
CHE	284	8	99	95	0	356	2	5	53	2	32
DEA	315	212	897	397	322	0	37	265	49	706	36
HUN	0	3	15	8	1	24	0	12	0	19	0
SVN	17	54	147	67	5	243	11	0	0	129	1
GBR	84	0	50	49	60	52	0	0	0	0	19
HRV	1	90	311	155	2	740	17	117	0	0	4
USA	87	3	40	30	31	42	0	1	26	4	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	157	104	5	228	2	17	25	2	36
FRA	1	0	85	31	1	161	3	34	0	59	1
ITA	183	74	0	228	7	979	18	156	18	324	33
NLD	127	30	225	0	6	334	8	68	18	150	26
CHE	5	1	7	6	0	86	0	0	1	0	4
DEA	276	124	897	354	77	0	37	265	20	706	36
HUN	0	2	15	8	0	24	0	12	0	19	0
SVN	17	29	147	65	0	243	11	0	0	129	1
GBR	34	0	23	20	1	25	0	0	0	0	16
HRV	1	51	311	148	0	740	17	117	0	0	4
USA	51	1	40	28	4	42	0	1	22	4	0

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