

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, USA
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:

AUS (ALL)	Decrease in information due to the data clean-up, pedigree changes, bulls' statue changes and rounding effect
FRA (ALL)	All proofs sent to MACE are now "genomic-free" single-step proofs, issued from a BLUP evaluation running on single-step preadjusted performances, as suggested as one of the methods of choice to provide unbiased "genomic-free" proofs to Interbull by the Interbull working group on this topic. In addition to these changes, unknown parent groups have been modified for all traits.
ISR (HOL)	Decrease in information due to the data edits, paternity correction and updated UPG grouping and number of iterations.
EST (HOL)	Decrease in information due to the updated definition of fixed lactation curve in the model , additional criteria for exclusion of test-day info (status of cow, ill status of test day information -suspicious)
PRT (HOL)	EDC affected by changes in pedigree.
ESP (HOL)	Drop in information due to the update of national database.
DEU (HOL)	Drop in information (Especially for MAS) due to the data changing, some bulls don't meet the requirements to be included in the evaluation (daughters in less than 10 herd)
GBR(RDC,JER)	Decrease in information due to the update in data input.
NLD (HOL)	Decrease in information due to pedigree changes /correction.
CHE(HOL,SIM)	Decrease in information (scs) due to the edits in database, and change in hys assignment.
IRL(HOL)	Drop in information due to pedigree correction (cow genotyping)
ITA (SIM)	Drop in information due to pedigree editing.
DEA (BSW,SIM)	Base change, decrease in info due to the pedigree correction based on genotyping, type of proof changes for some bulls

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 udder health (December Routine Evaluation 2023).
 Number of records for milk somatic cells by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		150	8882	1769	842	
BEL			2320			
CAN	281	109	14003	893	884	
CHE	3225		3388	101		3650
CZE			4840			
DEA	6080					25023
DEU			24355		304	
DFS			14534	2353	8176	
ESP			4654			
EST			1404		490	
FRA	496		18648			485
FRM						4815
GBR	156	313	7629	789	602	110
HUN			3164			190
IRL			3070			
ISR			1736			
ITA	2192		9795	66		1837
JPN			7050			
KOR			1695			
LTU			898		362	
LVA			1373		674	
NLD	235		17216	272	107	528
NOR					4357	
NZL	77	57	9128	5240	1471	
POL			12799			
PRT			2964			
SVK			1194			
SVN	341		695			684
URY			2144			
USA	1199	747	42390	5297	773	114
ZAF			1205	616	125	
HRV			971			1057
CAM					49	
No. Records	14282	1376	224144	17396	19216	38493

AUS	0.65	0.65	0.65	0.71	0.64	0.11								
ZAF	0.73	0.71	0.72	0.82	0.70	0.71	20.92							
NZL	0.63	0.63	0.63	0.66	0.63	0.69	0.76	0.38						
CHE	0.82	0.81	0.75	0.78	0.75	0.70	0.80	0.73	13.37					
ITA	0.76	0.73	0.74	0.84	0.67	0.68	0.82	0.70	0.82	7.02				

RDC scs

	CAN	DFS	GBR	NOR	USA	DEU	AUS	EST	ZAF	NZL	LTU	LVA	NLD	CAM
CAN	5.99													
DFS	0.93	12.93												
GBR	0.94	0.91	11.56											
NOR	0.85	0.91	0.80	13.60										
USA	0.92	0.85	0.88	0.79	0.23									
DEU	0.94	0.96	0.95	0.90	0.89	14.28								
AUS	0.81	0.84	0.86	0.82	0.72	0.83	0.26							
EST	0.89	0.89	0.89	0.84	0.85	0.93	0.81	19.06						
ZAF	0.83	0.85	0.85	0.87	0.86	0.91	0.75	0.87	25.31					
NZL	0.76	0.77	0.81	0.76	0.71	0.79	0.89	0.76	0.77	0.43				
LTU	0.82	0.88	0.83	0.90	0.79	0.89	0.80	0.88	0.86	0.75	0.37			
LVA	0.86	0.88	0.90	0.84	0.83	0.92	0.82	0.93	0.87	0.78	0.89	436.10		
NLD	0.91	0.95	0.94	0.87	0.86	0.96	0.84	0.88	0.88	0.80	0.85	0.87	3.96	
CAM	0.88	0.88	0.88	0.88	0.83	0.88	0.85	0.88	0.88	0.83	0.87	0.87	0.89	6.15

RDC mas

	CAN	DFS	GBR	NOR	USA	AUS	EST	ZAF	NZL	LTU	LVA	NLD	CAM
CAN	7.80												
DFS	0.89	13.48											
GBR	0.87	0.83	2.18										
NOR	0.81	0.70	0.73	13.60									
USA	0.79	0.73	0.78	0.79	0.23								
AUS	0.66	0.65	0.65	0.78	0.68	0.12							
EST	0.81	0.73	0.79	0.83	0.80	0.73	19.06						
ZAF	0.84	0.81	0.83	0.87	0.79	0.73	0.84	25.38					
NZL	0.64	0.63	0.65	0.75	0.70	0.76	0.81	0.77	0.43				
LTU	0.75	0.73	0.76	0.85	0.77	0.73	0.90	0.85	0.79	0.36			
LVA	0.78	0.72	0.79	0.86	0.75	0.72	0.94	0.86	0.82	0.91	435.86		
NLD	0.83	0.79	0.84	0.86	0.83	0.72	0.85	0.84	0.71	0.82	0.84	4.74	
CAM	0.83	0.83	0.83	0.88	0.81	0.87	0.88	0.87	0.88	0.87	0.88	0.85	6.15

SIM scs

	FRM	FRA	ITA	NLD	CHE	DEA	HUN	SVN	GBR	HRV	USA
FRM	1.06										
FRA	0.88	1.06									
ITA	0.87	0.88	12.43								
NLD	0.91	0.93	0.84	3.97							
CHE	0.93	0.93	0.87	0.93	10.41						
DEA	0.92	0.96	0.85	0.92	0.89	12.28					
HUN	0.88	0.91	0.92	0.88	0.88	0.89	16.37				
SVN	0.82	0.82	0.81	0.81	0.84	0.80	0.82	9.25			
GBR	0.91	0.96	0.87	0.95	0.90	0.93	0.89	0.83	10.81		
HRV	0.86	0.78	0.79	0.78	0.79	0.78	0.83	0.78	0.79	9.67	
USA	0.83	0.90	0.87	0.87	0.84	0.80	0.91	0.78	0.90	0.79	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	12.40								
NLD	0.87	0.87	0.78	4.13							
CHE	0.82	0.89	0.86	0.82	9.99						
DEA	0.92	0.91	0.85	0.89	0.73	12.28					

GBR	2093	727	1750	1367	196	1178	0	1990	2480	174	1670	1558	932	961	1155	1191	507	1005	956	1186	400	1634	321	478	1081	558	219	379	777
NLD	1842	1004	3628	2281	346	1665	1772	0	2921	191	1989	1643	1061	1439	1232	1323	512	1209	888	1744	584	2357	367	576	1267	572	299	521	798
USA	4674	1019	2972	2071	323	1640	2280	2652	0	259	2953	2204	1429	1092	2186	1768	633	1229	813	1904	588	2723	403	768	1591	978	268	443	1321
ISR	118	42	149	133	37	91	125	149	249	0	171	137	124	95	135	124	66	132	109	157	57	189	56	86	124	75	51	77	108
ITA	1809	735	2127	1518	223	1170	1360	1769	2418	121	0	1269	1071	878	1252	1429	418	729	571	1405	423	2111	343	591	1163	663	287	440	768
AUS	1689	616	1417	1097	141	1036	1364	1452	2273	86	1004	0	801	832	1013	998	481	1319	731	962	333	1262	264	435	943	518	180	331	776
HUN	1066	383	1079	833	139	778	815	916	1418	86	946	612	0	599	792	858	395	548	431	1015	335	1096	250	394	833	511	165	296	565
BEL	929	682	1414	942	149	1144	944	1658	982	61	890	737	522	0	618	766	337	573	508	742	319	960	187	315	760	345	176	306	395
JPN	879	366	767	664	94	560	634	717	1108	63	675	599	466	414	0	1012	428	628	440	963	340	1178	230	410	831	633	175	265	657
ESP	1041	518	1165	966	123	1182	954	1204	1225	76	1085	732	700	753	525	0	448	607	499	992	349	1337	244	425	982	556	212	330	600
ZAF	465	216	428	389	56	399	444	435	618	42	336	419	320	287	299	399	0	367	294	408	180	418	106	165	443	267	72	158	326
NZL	853	383	842	688	87	590	871	1104	1184	106	563	1326	425	465	352	467	298	0	743	700	270	787	191	280	655	343	133	250	615
IRL	515	389	695	591	74	567	910	787	695	82	474	603	347	470	275	449	246	610	0	524	212	644	146	213	480	229	105	192	378
CZE	1015	431	1652	1044	213	988	869	1594	1574	122	1076	660	942	600	487	746	287	524	384	0	536	1621	297	466	927	545	233	421	645
SVK	332	129	541	238	57	270	230	416	399	24	263	166	235	194	130	180	97	164	98	459	0	501	106	170	349	219	80	158	256
POL	1669	679	2921	1768	330	1579	1445	2266	2768	149	1828	1006	1010	895	680	1018	316	614	505	1395	358	0	418	696	1253	673	311	558	802
LTU	171	59	513	216	46	121	171	227	283	25	187	121	152	91	77	100	40	91	69	193	48	324	0	207	245	158	72	165	182
LVA	358	140	657	343	110	259	275	390	671	55	387	221	283	184	184	233	96	157	117	310	79	563	134	0	452	275	123	275	300
PRT	1324	516	1357	1050	164	1047	1004	1281	1703	81	1125	794	835	772	531	957	396	532	401	780	234	1290	153	352	0	544	178	360	640
KOR	792	218	502	433	71	388	412	423	1117	40	558	381	411	260	404	402	198	253	151	393	132	572	71	166	467	0	114	168	439
SVN	181	105	371	227	59	173	157	261	219	36	248	123	124	137	97	155	51	90	79	170	36	277	31	71	141	72	0	126	105
HRV	213	147	747	393	108	281	271	479	341	53	341	210	218	248	126	253	108	150	131	319	79	509	113	213	297	81	101	0	209
URY	875	273	669	544	97	468	646	655	1620	64	576	615	460	310	396	482	292	513	291	472	153	673	101	170	551	350	58	124	0

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	286	777	949	215	991	1042	411	1422	110	1350	963	736	608	935	977	251	486	343	831	261	1234	217	368	809	570	188	243	537
CHE	252	0	272	269	78	273	266	177	266	28	288	255	132	230	194	224	64	164	134	174	72	293	62	87	184	124	77	69	110
DEU	611	240	0	1041	263	911	820	608	758	94	1035	685	561	597	571	724	199	418	328	752	233	1393	257	424	595	315	275	424	355
DFS	974	245	916	0	361	1454	1451	835	1152	167	1364	1327	922	887	1044	1128	488	882	693	1339	366	1813	325	468	1038	522	258	443	629
EST	145	42	190	246	0	274	295	199	273	63	309	257	223	225	238	243	110	161	134	321	119	426	97	183	230	141	98	146	160
FRA	794	244	675	925	152	0	1309	590	974	125	1353	1152	914	946	1068	1195	414	719	591	1239	356	1819	242	404	970	520	210	328	531
GBR	1067	245	671	1165	187	951	0	620	1254	173	1390	1412	889	891	1054	1126	465	914	852	1135	348	1538	286	417	1003	518	213	353	672
NLD	394	167	548	847	141	489	610	0	429	98	580	537	403	583	400	486	208	512	366	721	180	954	166	249	506	215	155	297	290
USA	1639	232	636	1179	213	783	1366	389	0	191	1570	1123	882	613	1108	973	351	619	441	1040	292	1626	245	502	967	693	202	245	782
ISR	73	13	65	119	37	76	124	76	189	0	147	133	121	95	133	124	64	131	97	157	55	186	52	77	124	75	50	74	102
ITA	1158	253	795	1163	197	903	1169	530	1607	100	0	1077	960	760	1109	1264	346	604	471	1218	349	1812	291	471	1025	606	251	358	627
AUS	1041	225	546	967	142	858	1256	465	1245	85	898	0	784	805	1011	996	464	1290	698	955	306	1232	243	395	917	497	178	315	709
HUN	712	103	438	768	139	669	796	340	940	84	866	607	0	580	783	847	383	543	413	1011	312	1073	235	373	811	493	163	283	508
BEL	639	225	603	837	147	955	902	605	588	61	783	732	518	0	597	750	330	559	488	727	290	924	173	296	737	336	175	295	367
JPN	656	145	355	604	94	494	618	296	871	63	632	599	466	414	0	1012	425	621	432	963	314	1164	215	388	806	608	173	252	586
ESP	689	175	509	884	123	979	930	462	800	76	937	729	699	753	525	0	442	606	479	991	319	1319	227	400	965	544	207	318	548
ZAF	236	51	153	373	56	326	429	184	393	42	288	413	319	287	299	399	0	363	283	402	169	409	99	162	431	254	72	148	305
NZL	439	141	336	626	86	492	769	464	591	106	499	1290	424	462	352	467	296	0	713	699	257	767	181	265	640	333	133	241	570
IRL	341	132	292	526	72	481	830	345	425	70	406	575	339	461	271	437	234	585	0	506	190	609	141	200	457	225	100	181	350
CZE	647	124	577	916	213	805	852	697	981	122	950	654	942	600	487	746	287	524	365	0	505	1599	278	440	907	527	232	405	588
SVK	186	28	138	205	56	215	221	101	206	24	232	163	231	188	130	180	96	161	96	459	0	448	93	157	326	205	74	146	230
POL	1183	245	1411	1538	325	1360	1398	954	1839	148	1624	998	1000	881	680	1017	315	609	484	1395	340	0	391	625	1200	645	304	532	725
LTU	136	22	208	204	45	110	167	104	179	25	161	122	150	90	77	100	40	89	66	193	46	314	0	189	226	140	69	154	163
LVA	227	33	333	282	104	202	250	154	421	49	291	196	272	175	175	221	94	147	107	292	78	501	127	0	423	257	117	264	271
PRT	847	160	522	960	163	891	973	509	1074	81	1030	787	827	770	531	957	395	529	392	780	227	1259	151	332	0	526	176	339	587
KOR	561	98	229	398	71	345	397	157	762	40	525	375	407	260	404	402	197	249	157	393	130	559	68	157	464	0	113	155	395
SVN	146	55	265	207	59	162	155	125	165	35	221	123	124	137	9														

NLD	47	181	102	0	120	90	82	105	43	27
USA	538	218	293	125	0	535	300	422	74	42
AUS	295	151	253	80	584	0	243	482	60	41
ZAF	157	146	178	78	316	233	0	212	58	38
NZL	216	164	263	99	495	536	220	0	58	35
CHE	36	61	73	36	75	50	51	49	0	28
ITA	28	35	41	22	41	35	33	33	28	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	54	89	22	102	140	75	100	26	22
DFS	49	0	128	148	74	144	141	157	60	33
GBR	87	122	0	78	96	183	138	185	67	38
NLD	15	143	74	0	45	82	78	95	39	27
USA	93	63	97	44	0	179	127	141	41	26
AUS	128	110	187	75	190	0	238	477	57	40
ZAF	68	120	140	75	138	232	0	207	55	38
NZL	92	131	188	90	141	529	217	0	54	35
CHE	24	57	64	34	35	50	50	48	0	27
ITA	18	31	36	22	25	34	33	33	28	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	193	94	8	224	14	108	3	70	97	22	10	8	0
DFS	199	0	129	141	221	66	219	140	51	199	103	132	65	0
GBR	95	124	0	73	134	16	103	15	40	97	26	16	46	0
NOR	7	116	77	0	86	16	79	30	0	53	19	20	53	0
USA	211	219	129	87	0	26	152	28	59	139	37	25	51	31
DEU	13	57	16	15	24	0	48	33	1	23	28	36	19	0
AUS	109	192	98	68	155	47	0	46	34	172	44	40	45	13
EST	2	128	13	30	27	33	42	0	0	22	22	53	23	0
ZAF	72	48	35	0	53	1	34	0	0	35	5	2	3	0
NZL	95	195	92	53	140	23	172	20	30	0	22	19	27	13
LTU	21	89	24	18	33	27	41	22	5	22	0	44	15	0
LVA	10	91	16	18	22	30	36	45	2	16	40	0	18	0
NLD	8	63	45	52	50	18	43	22	3	27	14	17	0	0
CAM	0	0	0	0	31	0	13	0	0	13	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	88	33	3	83	35	0	35	38	18	7	3	0
DFS	87	0	91	143	212	232	140	46	197	102	126	64	0
GBR	32	87	0	62	94	66	9	27	66	20	14	35	0
NOR	3	117	66	0	86	79	30	0	53	19	19	47	0
USA	83	210	93	87	0	141	28	54	136	37	25	48	31
AUS	35	209	65	68	145	0	46	31	163	41	38	43	12
EST	0	128	9	30	27	42	0	0	22	22	49	22	0
ZAF	36	46	26	0	52	33	0	0	33	5	2	2	0
NZL	38	191	66	53	140	164	20	30	0	22	18	25	13
LTU	17	88	18	18	33	39	22	5	22	0	44	14	0
LVA	7	84	14	17	22	35	41	2	15	40	0	14	0
NLD	3	62	35	46	48	41	21	2	25	13	13	0	0
CAM	0	0	0	0	31	12	0	0	13	0	0	0	0

SIM

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	191	134	243	277	2	11	67	2	92
FRA	1	0	142	81	15	260	4	51	0	103	3
ITA	216	126	0	266	102	1027	18	153	46	334	38
NLD	159	77	260	0	94	405	8	86	49	169	32
CHE	295	12	104	98	0	367	2	2	53	2	34
DEA	315	217	938	425	335	0	37	268	49	727	40
HUN	0	3	15	8	1	24	0	10	0	19	1
SVN	10	49	145	80	2	252	9	0	0	132	2
GBR	84	0	50	49	60	52	0	0	0	0	20
HRV	1	93	318	165	2	761	17	122	0	0	5
USA	107	3	45	33	33	43	1	2	27	5	0

SIM

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	105	5	228	2	11	25	2	37
FRA	1	0	83	31	2	161	3	25	0	58	1
ITA	183	71	0	250	10	1027	18	153	18	334	38
NLD	128	30	245	0	9	371	8	81	18	159	32
CHE	5	2	10	9	0	97	0	0	1	0	5
DEA	276	124	938	390	92	0	37	268	20	727	40
HUN	0	2	15	8	0	24	0	10	0	19	1
SVN	10	22	145	76	0	252	9	0	0	132	2
GBR	34	0	23	20	1	25	0	0	0	0	17
HRV	1	51	318	156	0	761	17	122	0	0	5
USA	52	1	45	33	5	43	1	2	23	5	0