Introduction

The latest routine international evaluation for longevity trait took place as scheduled at the Interbull Centre. Data from twenty two (22) populations were included in this evaluation.

International genetic evaluations for direct longevity trait of bulls from Australia, Belgium, Canada, Switzerland, Germany, Denmark-Finland-Sweden Spain, France, The United Kingdom, Ireland, Israel, Italy, New Zealand, The Netherlands, The United States of America Hungary, Norway, Slovenia, Czech Republic and Japan were computed. Brown Swiss, Guernsey, Holstein, Jersey, Red Dairy Cattle and Simmental breed data were included in this evaluation.

Changes in national procedures

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

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.
NOR (RDC)	Inclusion of heterozigoty in the model
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
ZAF (JER)	Decrease in reliability due to wrongly submitting GEBVs' reliability in previous evaluation (Sept test run). The correct value of reliability has now been provided
FRA (BSW,HOL)	Base change
POL (HOL)	Small decrease in information due to data edits
ITA (BSW)	Base change, updated the data and pedigree editing procedures and fixed effects.
SVN (ALL)	Base change
DEA (BSW)	New model with a switch from Survival Kit to a linear BLUP-AM using MiX99. This is also related with different data edits (e.g. calvings from 1995 instead of 1990), which lead to the loss of several bulls. Testing a new way of assigning ToP.
CHE (BSW)	Switched from SurvivalKit version 5 to version 6.12 and estimated new variance components. Base change
ITA (HOL)	Cut-off of one year of data causing decrease in information. Base change
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
NZL (ALL)	Drops in information due to continuous DNA parentage testing
CAN (ALL)	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

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 Longevity (April Routine Evaluation 2021).
Number of records for direct longevity by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		135	8081	1742	721	
BEL			1726			
CAN	248	103	12624	776	872	
CHE	3051		3550			
CZE			4864			
DEA	4950					
DEU			22587		277	
DFS			13911	2557	9316	
ESP			3922			
EST						
FRA	413		17234			
FRM						4716
GBR	124	313	7980	832	565	82
HUN			3559			
IRL			3001	198	65	
ISR			1570			
ITA	2190		9342			
JPN			6490			
KOR						
LTU						
LVA						
NLD	191		15547	178	75	364
NOR					3855	
NZL	59	58	7868	4840	1286	
POL			10913			
PRT						
SVK						
SVN	416		627			641
URY						
USA	1136	797	39529	4858	737	71
ZAF			1256	701	135	
HRV						
CAM					40	
No.Records	12778	1406	196181	16682	17944	5874
Pub. Proofs	10242	1122	151309	13580	16155	5170

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

BSW dlo

	CAN	CHE	DEA	NLD	NZL	USA	ITA	FRA	GBR	SVN
CAN	8.69									
CHE	0.73	10.86								
DEA	0.88	0.86	12.29							
NLD	0.65	0.78	0.74	319.95						
NZL	0.57	0.56	0.44	0.51	332.03					
USA	0.91	0.66	0.83	0.71	0.59	2.71				
ITA	0.78	0.69	0.87	0.62	0.45	0.68	16.06			
FRA	0.66	0.76	0.72	0.66	0.50	0.68	0.53	0.93		
GBR	0.85	0.58	0.61	0.59	0.64	0.83	0.63	0.55	0.31	
SVN	0.71	0.67	0.83	0.72	0.47	0.70	0.76	0.65	0.52	23.53

GUE dlo

	AUS	CAN	NZL	USA	GBR
AUS	0.05				
CAN	0.61	8.10			
NZL	0.69	0.67	280.16		
USA	0.64	0.90	0.65	2.85	
GBR	0.63	0.91	0.69	0.87	0.38

HOL dlo

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	IRL	ISR	ITA	NLD	NZL	USA	HUN	CZE	SVN	ZAF	POL	JPN
AUS	0.04																				
BEL	0.65	0.38																			
CAN	0.63	0.87	6.32																		
CHE	0.73	0.77	0.83	12.25																	
DEU	0.68	0.85	0.88	0.87	12.59																
DFS	0.70	0.85	0.86	0.82	0.93	12.33															
ESP	0.55	0.79	0.87	0.77	0.84	0.76	11.66														
FRA	0.60	0.60	0.60	0.75	0.63	0.70	0.57	0.98													
GBR	0.68	0.89	0.91	0.79	0.87	0.83	0.88	0.56	0.31												
IRL	0.57	0.84	0.79	0.65	0.75	0.70	0.76	0.44	0.80	2.08											
ISR	0.60	0.57	0.55	0.66	0.67	0.71	0.55	0.65	0.55	0.54	104.91										
ITA	0.50	0.65	0.76	0.73	0.74	0.68	0.88	0.62	0.76	0.62	0.54	5.92									
NLD	0.55	0.63	0.64	0.73	0.72	0.75	0.60	0.66	0.62	0.46	0.66	0.52	267.04								
NZL	0.65	0.74	0.64	0.72	0.77	0.73	0.53	0.54	0.67	0.68	0.48	0.47	0.53	248.87							
USA	0.64	0.86	0.89	0.79	0.88	0.88	0.88	0.65	0.85	0.73	0.69	0.75	0.73	0.64	2.24						
HUN	0.45	0.59	0.69	0.57	0.59	0.54	0.76	0.52	0.66	0.50	0.44	0.70	0.46	0.44	0.72	1.21					
CZE	0.45	0.50	0.59	0.59	0.58	0.49	0.70	0.44	0.59	0.56	0.44	0.67	0.45	0.44	0.58	0.52	13.51				
SVN	0.45	0.77	0.72	0.60	0.74	0.68	0.69	0.51	0.70	0.66	0.57	0.54	0.64	0.64	0.79	0.46	0.44	24.78			
ZAF	0.62	0.82	0.88	0.64	0.79	0.73	0.85	0.48	0.85	0.86	0.44	0.67	0.45	0.63	0.84	0.68	0.55	0.69	30.56		
POL	0.45	0.45	0.46	0.57	0.58	0.49	0.60	0.45	0.48	0.45	0.44	0.62	0.45	0.44	0.50	0.45	0.52	0.45	0.45	12.54	
JPN	0.60	0.89	0.94	0.72	0.85	0.85	0.85	0.51	0.89	0.83	0.47	0.67	0.60	0.70	0.87	0.68	0.54	0.76	0.90	0.45	1.74

JER dlo

	AUS	CAN	DFS	NLD	NZL	USA	GBR	ZAF	IRL
AUS	0.04								
CAN	0.50	7.39							
DFS	0.67	0.69	12.11						
NLD	0.60	0.61	0.79	331.21					
NZL	0.59	0.53	0.73	0.51	227.22				
USA	0.61	0.82	0.79	0.74	0.61	2.39			
GBR	0.56	0.86	0.75	0.64	0.53	0.81	0.29		
ZAF	0.47	0.62	0.52	0.46	0.46	0.68	0.64	27.66	
IRL	0.54	0.70	0.59	0.46	0.51	0.67	0.71	0.72	1.60

RDC dlo

	AUS	CAN	DEU	DFS	NZL	USA	GBR	NLD	ZAF	IRL	NOR	CAM
AUS	0.05											
CAN	0.56	6.99										
DEU	0.65	0.86	12.51									
DFS	0.66	0.74	0.91	12.98								
NZL	0.62	0.52	0.68	0.52	279.16							
USA	0.58	0.86	0.88	0.85	0.52	2.52						
GBR	0.64	0.90	0.84	0.75	0.54	0.81	0.31					
NLD	0.54	0.65	0.73	0.75	0.50	0.76	0.62	330.58				
ZAF	0.52	0.86	0.78	0.58	0.50	0.83	0.80	0.51	32.62			
IRL	0.54	0.76	0.72	0.63	0.62	0.66	0.72	0.48	0.79	1.53		
NOR	0.55	0.76	0.74	0.81	0.44	0.81	0.64	0.79	0.61	0.67	41.54	
CAM	0.51	0.66	0.78	0.76	0.44	0.75	0.66	0.72	0.54	0.44	0.58	8.99

SIM dlo

	FRM	NLD	SVN	GBR	USA
FRM	0.98				
NLD	0.59	288.75			
SVN	0.51	0.73	22.58		
GBR	0.61	0.60	0.70	0.26	
USA	0.73	0.75	0.78	0.82	2.19

^LAPPENDIX II. Number of common bulls

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEA	NLD	NZL	USA	ITA	FRA	GBR	SVN
CAN	0	130	140	43	26	173	130	87	59	37
CHE	112	0	581	94	26	318	469	168	69	91
DEA	121	482	0	141	36	317	681	218	68	119
NLD	37	89	132	0	24	72	124	74	34	53
NZL	26	20	30	16	0	30	31	23	18	13
USA	168	295	280	61	25	0	245	122	83	45
ITA	118	404	589	102	27	175	0	197	72	111
FRA	78	125	159	59	19	83	156	0	53	64
GBR	57	51	46	25	14	73	49	44	0	23
SVN	34	84	111	53	11	37	110	62	18	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	NZL	USA	GBR
AUS	0	47	26	61	37
CAN	46	0	13	68	30
NZL	26	11	0	29	16
USA	57	58	26	0	89
GBR	32	24	14	90	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	IRL	ISR	ITA	NLD	NZL	USA	HUN	CZE	SVN	ZAF	POL	JPN
AUS	0	667	1306	584	1536	1276	856	1211	1434	716	110	1138	1396	1132	1808	721	882	184	467	1008	896
BEL	576	0	705	539	1044	809	616	823	862	483	85	753	1065	462	863	516	632	177	303	728	523
CAN	1263	670	0	859	2258	1406	1249	1387	1678	537	134	1662	1460	680	3298	1030	1115	213	473	1370	1340
CHE	501	531	695	0	1126	716	555	637	775	396	70	723	890	382	1006	444	558	149	260	673	486
DEU	1123	1057	1618	995	0	2614	1473	2270	2221	867	179	2527	3186	907	3426	1275	1911	336	541	2457	1424

DFS	918	759	1165	627	1936	0	1022	1619	1774	771	164	1640	2188	823	2143	950	1377	274	510	1677	1014
ESP	603	588	737	437	932	761	0	1106	1129	504	115	1248	1080	516	1530	777	897	201	441	1052	913
FRA	765	773	827	539	1111	805	754	0	1603	733	129	1628	1883	755	2441	952	1304	210	464	1616	1208
GBR	1292	878	1906	733	1879	1481	950	1018	0	1061	167	1688	1977	996	2415	968	1286	254	537	1541	1147
IRL	618	475	485	398	758	642	483	561	1129	0	105	665	900	722	797	460	579	133	331	625	465
ISR	70	48	81	40	137	121	63	61	127	82	0	163	175	110	210	129	139	53	70	162	119
ITA	844	719	1303	640	1733	1302	905	863	1452	585	115	0	1728	702	2579	1074	1313	253	480	1671	1205
NLD	1180	1175	1312	851	2904	1946	928	1096	1893	839	127	1429	0	991	2467	1008	1586	287	500	1868	1070
NZL	1113	375	667	316	681	579	385	422	915	624	88	536	892	0	1037	496	646	133	352	642	555
USA	1756	753	3515	892	2433	1652	981	1215	2333	715	196	1875	2035	979	0	1404	1762	257	628	2118	2017
HUN	545	433	903	357	1015	768	615	611	917	409	87	950	847	384	1365	0	985	177	395	1017	764
CZE	587	504	772	410	1501	945	657	807	1046	463	102	975	1423	474	1402	914	0	237	429	1397	912
SVN	126	141	150	108	326	222	151	138	203	103	38	220	245	92	196	133	178	0	102	276	182
ZAF	405	257	397	211	422	385	382	308	490	291	44	380	408	284	604	315	299	72	0	416	433
POL	743	655	1110	539	2190	1372	724	991	1433	524	119	1317	1722	484	2006	902	1163	246	311	0	1034
JPN	525	341	690	330	663	582	454	432	671	318	52	608	601	313	974	454	443	106	311	573	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	NLD	NZL	USA	GBR	ZAF	IRL
AUS	0	243	155	66	422	472	229	228	54
CAN	249	0	109	34	165	431	175	155	10
DFS	127	102	0	109	152	207	189	152	49
NLD	59	28	109	0	67	81	84	69	32
NZL	459	174	132	60	0	343	233	200	118
USA	511	442	190	87	411	0	259	304	46
GBR	239	176	190	82	246	303	0	181	82
ZAF	223	151	135	65	207	319	189	0	38
IRL	52	9	45	31	131	47	89	38	0

RDC

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	NZL	USA	GBR	NLD	ZAF	IRL	NOR	CAM
AUS	0	95	36	195	128	122	88	26	37	17	64	10
CAN	97	0	13	160	80	216	97	6	71	5	7	0
DEU	36	12	0	51	15	20	14	15	3	6	13	0
DFS	174	163	42	0	159	186	120	47	50	19	139	0
NZL	129	79	15	153	0	109	83	19	36	12	36	9
USA	122	198	20	181	109	0	120	39	62	28	73	21
GBR	86	95	14	116	78	113	0	32	51	23	55	0
NLD	25	6	14	45	19	38	31	0	2	13	41	0
ZAF	38	73	3	49	32	56	44	2	0	2	0	0
IRL	16	5	6	15	12	28	22	13	2	0	54	0
NOR	54	6	12	111	34	74	58	40	0	52	0	0
CAM	10	0	0	0	9	21	0	0	0	0	0	0

SIM

common bulls below diagonal
common three quarter sib group above diagonal

	FRM	NLD	SVN	GBR	USA
FRM	0	111	0	64	52
NLD	132	0	57	43	24
SVN	0	56	0	0	1
GBR	81	41	0	0	19
USA	67	26	1	26	0