

Introduction

The latest routine international evaluation for conformation traits took place as scheduled at the Interbull Centre. Data from twenty five (26) countries were included in this evaluation.

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

The WHFF trait definitions are available on this link http://www.interbull.org/ib/conf_trait_hol_jer

The following is a list of substitute traits as applied by countries:

COU	BRD	TRT_Code	TRT_NAME	Subs_Trt
USA	BSW	ofr	overall frame	sta
USA	BSW	oru	overall rump	rwi
USA	BSW	rle	rump length	rwi
USA	BSW	thp	thurl position	rwi

Changes in national procedures

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

USA (RDC,BSW,JER,GUE)	Separate groups for unknown foreign parents were removed because most such animals are now from countries with no domestic U.S. descendants.
USA (HOL)	Decrease in information due to the ongoing parentage checks an correction.
AUS (ALL)	Some decrease in information due to pedigree, data updates and change in bulls' status which made bulls no longer qualifying for inclusion.
NLD (ALL)	Base change
POL (HOL)	Drop in information due to the data edits.
FRA (ALL)	Base change
ITA (HOL)	Base change. Drop in information due to the yearly data cut-off for phenotypes
DEA (ALL)	Base change
CHE (ALL)	Drop of information due to changes in the groups of fixed effects regions and level (geographical) and edits in database. Base change.
CAN (ALL)	Base change
BEL (HOL)	Drop in information due to few pedigree correction
NZL (HOL,JER,RDC)	Drop in information due to changes in pedigree due to DNA parentage testing
ITA (BSW)	Base change

INTERBULL CHANGES COMPARED TO THE PREVIOUS ROUTINE RUN

In 2020 new post-processing windows correlations for all breeds and traits have been applied: 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. The previously lower value adopted (based on the 25th percentile) had been found too high causing estimated and post-processed correlations to differ significantly from each other. It is a recommendation from the Interbull Technical Committee to review such windows every 5 years. 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. More information can be read on https://interbull.org/ib/rg_procedure

Since 2021 a new trait group has been added to the MACE evaluation, called stcm (SNP Training for clinical mastitis) evaluating the trait cma (pure clinical mastitis). New trait group codes have been issued as follows: 041 for international ebv files (.itb), 071 for parent average (ipr).

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 conformation traits (April Routine Evaluation 2024). Number of records for stature by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		50	4019	769	264	
BEL			1727			
CAN	251	104	12822	848	910	
CHE	2964		3150	51		
CZE			4505			
DEA	3792					
DEU			21618		278	
DFS			12426	2126	6484	
ESP			4459			
EST			918			
FRA	444		18165			
FRM						
GBR	24	231	6551	467	351	
HUN			2817			
IRL			1936			
ISR						
ITA	2275		8393	74		
JPN			6322			
KOR			1641			
LTU						
LVA			1343		613	
NLD	141		15608	51	58	
NOR					2546	
NZL			7087	4292	603	
POL			9420			
PRT			2587			
SVK						
SVN	258		616			
URY						
USA	943	733	34363	4555	277	
ZAF			853	558		
HRV						
CAM					40	
No. Records	11092	1118	183346	13791	12424	
Pub. Proofs	8815	948	140795	11971	13017	0

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

BSW	sta								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.25								
CHE	0.95	12.49							
FRA	0.98	0.97	0.94						
ITA	0.96	0.96	0.95	13.80					

NLD	0.95	0.95	0.97	0.91	4.31				
USA	0.98	0.95	0.97	0.95	0.94	1.62			
DEA	0.96	0.97	0.98	0.95	0.96	0.96	11.21		
SVN	0.93	0.91	0.91	0.93	0.90	0.90	0.91	17.06	
GBR	0.96	0.92	0.96	0.93	0.93	0.96	0.90	0.90	0.86

BSW cwi

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.76								
CHE	0.91	10.22							
FRA	0.87	0.91	0.83						
ITA	0.80	0.85	0.85	21.21					
NLD	0.92	0.85	0.88	0.71	4.81				
USA	0.89	0.90	0.91	0.86	0.83	0.89			
DEA	0.86	0.82	0.87	0.73	0.77	0.80	11.38		
SVN	0.89	0.91	0.91	0.81	0.86	0.85	0.90	24.88	
GBR	0.91	0.84	0.81	0.70	0.90	0.80	0.83	0.81	1.47

BSW bde

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA
CAN	7.14								
CHE	0.84	10.34							
FRA	0.73	0.87	0.91						
ITA	0.79	0.92	0.90	17.81					
NLD	0.82	0.85	0.84	0.85	4.66				
DEA	0.79	0.89	0.91	0.87	0.80	11.07			
SVN	0.78	0.73	0.79	0.80	0.78	0.71	25.19		
GBR	0.87	0.88	0.78	0.83	0.89	0.86	0.83	1.69	
USA	0.73	0.75	0.84	0.78	0.86	0.80	0.77	0.86	0.82

BSW ang

	CAN	CHE	FRA	NLD	USA	GBR			
CAN	8.69								
CHE	0.69	11.02							
FRA	0.87	0.67	0.84						
NLD	0.79	0.68	0.66	3.81					
USA	0.85	0.67	0.74	0.77	1.08				
GBR	0.89	0.77	0.79	0.82	0.90	0.78			

BSW ran

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.90								
CHE	0.94	10.68							
FRA	0.97	0.96	0.91						
ITA	0.94	0.93	0.93	23.19					
NLD	0.95	0.92	0.96	0.92	4.62				
USA	0.97	0.94	0.96	0.91	0.94	1.36			
DEA	0.97	0.94	0.96	0.94	0.92	0.97	11.78		
SVN	0.91	0.88	0.89	0.89	0.90	0.90	0.88	22.79	
GBR	0.96	0.93	0.97	0.93	0.96	0.96	0.91	0.92	1.90

BSW rwi

	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN	ITA
CAN	7.06								
CHE	0.89	10.32							
FRA	0.95	0.87	0.97						
NLD	0.94	0.85	0.93	4.10					
USA	0.91	0.86	0.86	0.80	0.97				
DEA	0.90	0.88	0.92	0.78	0.89	13.24			

GBR	0.92	0.84	0.90	0.88	0.92	0.81	1.24		
SVN	0.89	0.79	0.93	0.86	0.81	0.89	0.86	25.76	
ITA	0.87	0.79	0.90	0.79	0.86	0.87	0.87	0.90	19.22

BSW rls

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.70								
CHE	0.92	13.09							
FRA	0.91	0.93	0.97						
ITA	0.91	0.86	0.92	23.68					
NLD	0.88	0.85	0.88	0.83	5.13				
USA	0.95	0.93	0.90	0.87	0.85	0.80			
DEA	0.91	0.91	0.93	0.89	0.80	0.89	12.13		
SVN	0.85	0.77	0.86	0.82	0.80	0.82	0.86	22.68	
GBR	0.85	0.86	0.90	0.83	0.86	0.83	0.87	0.80	1.50

BSW fan

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.57								
CHE	0.68	14.20							
FRA	0.74	0.73	1.04						
ITA	0.69	0.84	0.80	21.38					
NLD	0.72	0.66	0.80	0.68	5.14				
USA	0.81	0.72	0.80	0.85	0.80	0.85			
DEA	0.61	0.89	0.67	0.89	0.62	0.65	11.51		
SVN	0.70	0.75	0.71	0.78	0.67	0.70	0.81	24.93	
GBR	0.80	0.72	0.84	0.72	0.87	0.82	0.67	0.76	1.26

BSW hde

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	8.22							
CHE	0.86	12.68						
FRA	0.79	0.82	1.07					
ITA	0.79	0.83	0.82	21.00				
NLD	0.74	0.73	0.80	0.72	5.14			
DEA	0.75	0.87	0.85	0.93	0.77	11.94		
SVN	0.80	0.84	0.85	0.88	0.74	0.90	31.91	
USA	0.84	0.73	0.80	0.89	0.80	0.80	0.82	0.85

BSW fua

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.75								
CHE	0.86	12.37							
FRA	0.89	0.88	0.83						
ITA	0.88	0.85	0.85	19.72					
NLD	0.89	0.85	0.86	0.85	4.78				
USA	0.94	0.86	0.86	0.93	0.87	1.27			
DEA	0.82	0.85	0.90	0.82	0.77	0.83	11.09		
SVN	0.72	0.73	0.78	0.81	0.77	0.72	0.89	22.16	
GBR	0.91	0.83	0.87	0.87	0.90	0.91	0.71	0.60	1.46

BSW ruh

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.62								
CHE	0.91	12.21							
FRA	0.85	0.82	0.89						
ITA	0.75	0.84	0.86	12.88					
NLD	0.76	0.81	0.87	0.83	4.30				
USA	0.82	0.79	0.88	0.84	0.88	1.07			

DEA	0.83	0.84	0.91	0.92	0.84	0.81	11.67		
SVN	0.80	0.80	0.81	0.86	0.88	0.83	0.87	21.10	
GBR	0.73	0.79	0.86	0.81	0.87	0.91	0.75	0.79	1.81

BSW ruw

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	
CAN	8.64								
CHE	0.92	12.04							
FRA	0.84	0.88	0.83						
ITA	0.78	0.88	0.80	13.27					
NLD	0.69	0.66	0.80	0.68	4.30				
USA	0.86	0.90	0.87	0.89	0.79	1.02			
DEA	0.85	0.91	0.78	0.95	0.55	0.90	12.10		
SVN	0.84	0.85	0.80	0.81	0.67	0.83	0.82	21.08	

BSW usu

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.30								
CHE	0.91	12.06							
FRA	0.83	0.91	0.88						
ITA	0.88	0.91	0.88	19.03					
NLD	0.81	0.83	0.89	0.81	4.23				
USA	0.83	0.89	0.86	0.86	0.90	0.99			
DEA	0.92	0.93	0.90	0.93	0.78	0.84	11.37		
SVN	0.81	0.81	0.69	0.75	0.66	0.71	0.81	20.73	
GBR	0.79	0.79	0.85	0.84	0.91	0.92	0.72	0.62	2.78

BSW ude

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.85								
CHE	0.96	12.23							
FRA	0.96	0.96	0.97						
ITA	0.95	0.96	0.97	19.88					
NLD	0.95	0.94	0.95	0.93	4.33				
USA	0.96	0.95	0.96	0.95	0.94	1.23			
DEA	0.93	0.97	0.94	0.97	0.94	0.92	12.15		
SVN	0.92	0.95	0.92	0.96	0.95	0.92	0.96	23.12	
GBR	0.96	0.94	0.96	0.94	0.96	0.96	0.90	0.94	2.19

BSW ftp

	CAN	CHE	FRA	NLD	USA	DEA	SVN	GBR	ITA
CAN	7.42								
CHE	0.97	13.99							
FRA	0.97	0.96	0.91						
NLD	0.97	0.95	0.96	5.07					
USA	0.92	0.91	0.88	0.91	1.31				
DEA	0.95	0.98	0.95	0.96	0.90	11.00			
SVN	0.93	0.93	0.93	0.96	0.91	0.95	18.34		
GBR	0.95	0.93	0.89	0.93	0.94	0.93	0.93	1.42	
ITA	0.87	0.86	0.86	0.86	0.87	0.86	0.87	0.87	21.00

BSW ftl

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.53								
CHE	0.90	14.70							
FRA	0.95	0.95	0.97						
ITA	0.93	0.94	0.95	18.14					
NLD	0.92	0.96	0.92	0.92	5.05				
USA	0.93	0.96	0.95	0.93	0.95	1.75			

DEA	0.90	0.98	0.97	0.96	0.94	0.96	11.05		
SVN	0.90	0.91	0.90	0.90	0.92	0.90	0.91	18.56	
GBR	0.95	0.94	0.93	0.94	0.97	0.96	0.92	0.92	1.51

BSW rtp

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA	
CAN	6.73								
CHE	0.98	14.54							
FRA	0.97	0.98	0.89						
ITA	0.92	0.95	0.94	20.01					
NLD	0.96	0.95	0.96	0.92	4.59				
DEA	0.97	0.99	0.98	0.96	0.94	11.94			
SVN	0.94	0.93	0.94	0.93	0.95	0.93	18.36		
USA	0.91	0.87	0.90	0.89	0.94	0.87	0.89	1.31	

BSW ocs

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.76								
CHE	0.80	9.43							
FRA	0.74	0.83	0.98						
ITA	0.77	0.81	0.87	8.98					
NLD	0.72	0.69	0.77	0.69	3.93				
USA	0.79	0.73	0.81	0.81	0.82	0.52			
DEA	0.81	0.90	0.87	0.88	0.59	0.71	10.44		
SVN	0.59	0.64	0.65	0.63	0.61	0.62	0.73	20.00	
GBR	0.74	0.82	0.84	0.78	0.86	0.85	0.68	0.68	1.71

BSW ous

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.03								
CHE	0.85	14.01							
FRA	0.89	0.87	0.97						
ITA	0.81	0.88	0.85	10.17					
NLD	0.88	0.84	0.89	0.78	5.06				
USA	0.89	0.81	0.83	0.79	0.86	0.79			
DEA	0.85	0.94	0.84	0.91	0.78	0.79	12.39		
SVN	0.75	0.83	0.71	0.80	0.77	0.72	0.90	19.96	
GBR	0.76	0.82	0.74	0.80	0.77	0.86	0.74	0.72	1.66

BSW ofl

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.26								
CHE	0.82	11.80							
FRA	0.63	0.63	1.69						
ITA	0.60	0.71	0.84	17.55					
NLD	0.65	0.65	0.74	0.63	4.58				
USA	0.59	0.62	0.66	0.67	0.66	0.83			
DEA	0.68	0.84	0.64	0.81	0.58	0.57	11.04		
SVN	0.73	0.85	0.62	0.71	0.63	0.65	0.88	26.64	
GBR	0.66	0.75	0.81	0.66	0.73	0.72	0.65	0.62	1.47

BSW ofr

	CAN	CHE	DEA	ITA	SVN	USA	FRA		
CAN	7.25								
CHE	0.80	11.99							
DEA	0.81	0.90	11.40						
ITA	0.77	0.91	0.93	16.97					
SVN	0.73	0.78	0.79	0.81	23.18				
USA	0.75	0.83	0.90	0.86	0.74	1.62			

FRA 0.73 0.90 0.91 0.90 0.78 0.87 0.86

BSW tpl

	CAN	CHE	DEA	ITA	SVN	FRA
CAN	7.38					
CHE	0.88	12.23				
DEA	0.89	0.90	11.79			
ITA	0.91	0.91	0.91	23.65		
SVN	0.88	0.86	0.86	0.84	24.77	
FRA	0.96	0.92	0.92	0.90	0.86	1.26

BSW oru

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	7.35						
CHE	0.76	16.60					
DEA	0.72	0.87	12.46				
ITA	0.92	0.76	0.77	17.51			
SVN	0.83	0.58	0.70	0.78	27.10		
USA	0.88	0.58	0.49	0.82	0.67	0.97	
FRA	0.83	0.87	0.80	0.78	0.67	0.83	1.23

BSW rle

	CHE	DEA	ITA	SVN	USA	FRA
CHE	11.79					
DEA	0.94	12.25				
ITA	0.81	0.85	19.22			
SVN	0.77	0.76	0.82	24.72		
USA	0.55	0.51	0.76	0.68	0.97	
FRA	0.93	0.94	0.86	0.77	0.73	1.03

BSW thp

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	7.15						
CHE	0.83	11.38					
DEA	0.78	0.83	12.03				
ITA	0.88	0.91	0.85	28.98			
SVN	0.77	0.84	0.85	0.87	35.63		
USA	0.88	0.87	0.71	0.82	0.73	1.36	
FRA	0.88	0.81	0.85	0.84	0.76	0.78	0.97

BSW hoq

	CAN	CHE	DEA	ITA	SVN	FRA
CAN	6.96					
CHE	0.91	12.17				
DEA	0.92	0.89	12.48			
ITA	0.91	0.84	0.85	19.52		
SVN	0.94	0.88	0.91	0.91	21.70	
FRA	0.91	0.85	0.87	0.87	0.89	1.01

BSW ful

	CHE	DEA	ITA	SVN	FRA
CHE	11.90				
DEA	0.91	12.13			
ITA	0.92	0.95	12.78		
SVN	0.82	0.90	0.84	21.40	
FRA	0.75	0.85	0.78	0.76	0.88

BSW udb					
	CHE	DEA	ITA	SVN	FRA
CHE	12.40				
DEA	0.96	13.25			
ITA	0.93	0.95	26.23		
SVN	0.84	0.86	0.86	24.61	
FRA	0.91	0.88	0.86	0.81	0.91

BSW tdi					
	CHE	DEA	ITA	SVN	FRA
CHE	15.84				
DEA	0.96	11.26			
ITA	0.94	0.95	20.49		
SVN	0.90	0.93	0.91	18.92	
FRA	0.97	0.98	0.91	0.91	0.87

BSW tth					
	CHE	DEA	ITA	SVN	FRA
CHE	14.46				
DEA	0.98	12.91			
ITA	0.94	0.95	23.25		
SVN	0.88	0.87	0.88	20.81	
FRA	0.93	0.95	0.95	0.87	0.88

GUE sta					
	CAN	GBR	USA	AUS	
CAN	6.52				
GBR	0.97	1.24			
USA	0.98	0.96	2.76		
AUS	0.90	0.92	0.91	0.87	

GUE cwi					
	CAN	GBR	USA	AUS	
CAN	6.87				
GBR	0.92	1.85			
USA	0.85	0.85	1.51		
AUS	0.72	0.80	0.65	0.33	

GUE bde					
	CAN	GBR	USA	AUS	
CAN	6.46				
GBR	0.87	1.58			
USA	0.75	0.88	1.75		
AUS	0.80	0.77	0.69	0.44	

GUE ang					
	CAN	GBR	USA	AUS	
CAN	7.96				
GBR	0.89	1.69			
USA	0.87	0.91	1.86		
AUS	0.66	0.76	0.67	0.38	

GUE ran					
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	CAN	GBR	USA	AUS
CAN	6.50			
GBR	0.97	1.66		
USA	0.97	0.97	1.99	
AUS	0.90	0.93	0.89	0.73

GUE rwi

	CAN	GBR	USA	AUS
CAN	7.15			
GBR	0.93	1.62		
USA	0.92	0.92	1.70	
AUS	0.84	0.83	0.77	0.65

GUE rls

	CAN	GBR	USA	AUS
CAN	8.61			
GBR	0.82	1.91		
USA	0.93	0.81	0.89	
AUS	0.70	0.78	0.70	0.31

GUE rlr

	CAN	USA	AUS
CAN	7.15		
USA	0.84	0.91	
AUS	0.59	0.54	0.19

GUE fan

	CAN	GBR	USA	AUS
CAN	8.86			
GBR	0.79	1.77		
USA	0.84	0.75	0.86	
AUS	0.62	0.76	0.64	0.26

GUE fua

	CAN	GBR	USA	AUS
CAN	7.38			
GBR	0.94	1.42		
USA	0.92	0.92	1.81	
AUS	0.78	0.78	0.76	0.37

GUE ruh

	CAN	GBR	USA	AUS
CAN	6.81			
GBR	0.72	1.99		
USA	0.80	0.91	1.44	
AUS	0.75	0.76	0.75	0.37

GUE usu

	CAN	GBR	USA	AUS
CAN	6.87			
GBR	0.79	1.60		
USA	0.79	0.87	1.35	
AUS	0.74	0.78	0.74	0.30

GUE ude				
	CAN	GBR	USA	AUS
CAN	6.33			
GBR	0.97	1.40		
USA	0.95	0.95	1.83	
AUS	0.89	0.89	0.88	0.51

GUE ftp				
	CAN	GBR	USA	AUS
CAN	6.02			
GBR	0.95	1.31		
USA	0.92	0.92	1.60	
AUS	0.92	0.91	0.86	0.39

GUE ftl				
	CAN	GBR	USA	AUS
CAN	4.69			
GBR	0.94	1.96		
USA	0.94	0.97	2.00	
AUS	0.93	0.94	0.93	0.91

GUE rtp			
	CAN	AUS	USA
CAN	5.39		
AUS	0.88	0.35	
USA	0.93	0.88	1.60

GUE ocs				
	CAN	GBR	USA	AUS
CAN	7.98			
GBR	0.76	2.19		
USA	0.73	0.86	0.86	
AUS	0.59	0.64	0.57	0.79

GUE ous				
	CAN	GBR	USA	AUS
CAN	8.12			
GBR	0.77	1.56		
USA	0.87	0.83	0.82	
AUS	0.69	0.82	0.73	1.05

GUE ofl				
	CAN	GBR	USA	AUS
CAN	7.58			
GBR	0.66	1.64		
USA	0.64	0.68	0.83	
AUS	0.41	0.55	0.52	0.60

HOL sta										
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA
AUS	0.64									
BEL	0.88	1.05								
CAN	0.89	0.94	5.02							
CHE	0.89	0.91	0.96	10.71						

NLD USA HUN POL NZL ZAF JPN CZE EST IRL KOR SVN PRT LVA

POL 0.54 0.64 0.53 0.70 0.57 0.60 0.68 0.59 0.70 0.54 0.76 0.77 0.54 0.51 0.77 0.55 0.53 0.71 15.84

HOL bcs

	BEL	CHE	DEU	DFS	FRA	GBR	ITA	NLD	USA	CZE	JPN	IRL	KOR	CAN	PRT	ESP	SVN	EST	HUN	NZL	POL	
BEL	0.97																					
CHE	0.71	11.74																				
DEU	0.71	0.90	14.12																			
DFS	0.74	0.89	0.95	12.18																		
FRA	0.71	0.93	0.95	0.95	0.95																	
GBR	0.75	0.91	0.90	0.90	0.92	1.61																
ITA	0.71	0.91	0.95	0.95	0.96	0.90	6.60															
NLD	0.71	0.94	0.96	0.95	0.95	0.91	0.93	5.03														
USA	0.76	0.71	0.81	0.80	0.81	0.75	0.78	0.76	1.35													
CZE	0.72	0.87	0.96	0.95	0.92	0.89	0.94	0.93	0.77	13.81												
JPN	0.79	0.93	0.97	0.97	0.97	0.92	0.96	0.95	0.84	0.95	1.69											
IRL	0.72	0.86	0.79	0.85	0.87	0.93	0.83	0.85	0.71	0.77	0.86	0.98										
KOR	0.72	0.75	0.85	0.85	0.86	0.81	0.85	0.80	0.75	0.85	0.88	0.72	2.38									
CAN	0.73	0.93	0.96	0.94	0.95	0.94	0.94	0.95	0.82	0.94	0.98	0.87	0.85	5.87								
PRT	0.71	0.85	0.87	0.86	0.89	0.87	0.85	0.86	0.71	0.84	0.87	0.79	0.83	0.89	1.76							
ESP	0.73	0.87	0.92	0.92	0.94	0.93	0.92	0.91	0.75	0.91	0.93	0.82	0.85	0.94	0.88	1.02						
SVN	0.72	0.88	0.92	0.91	0.88	0.81	0.89	0.91	0.72	0.91	0.89	0.73	0.79	0.85	0.75	0.84	20.76					
EST	0.72	0.83	0.91	0.87	0.88	0.78	0.88	0.91	0.81	0.88	0.89	0.72	0.76	0.88	0.76	0.79	0.86	16.53				
HUN	0.72	0.87	0.94	0.92	0.92	0.87	0.94	0.90	0.75	0.95	0.93	0.76	0.85	0.93	0.85	0.91	0.87	0.83	0.99			
NZL	0.71	0.90	0.91	0.91	0.92	0.91	0.91	0.88	0.72	0.88	0.92	0.87	0.81	0.91	0.85	0.86	0.84	0.82	0.89	0.16		
POL	0.72	0.86	0.91	0.89	0.89	0.89	0.90	0.87	0.75	0.91	0.92	0.79	0.80	0.91	0.85	0.87	0.83	0.80	0.91	0.85	11.17	

JER sta

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.54									
CAN	0.89	6.70								
DFS	0.90	0.97	11.73							
GBR	0.91	0.96	0.94	1.18						
ITA	0.87	0.95	0.93	0.95	1.65					
NZL	0.87	0.84	0.85	0.90	0.87	0.36				
USA	0.90	0.97	0.95	0.96	0.94	0.89	1.65			
ZAF	0.87	0.85	0.84	0.92	0.87	0.89	0.86	8.72		
NLD	0.88	0.96	0.97	0.94	0.92	0.85	0.94	0.86	5.06	
CHE	0.89	0.96	0.96	0.95	0.93	0.85	0.94	0.87	0.97	11.55

JER cwi

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.30									
CAN	0.74	6.60								
DFS	0.71	0.80	15.58							
GBR	0.81	0.91	0.84	1.84						
ITA	0.65	0.77	0.69	0.73	1.63					
NZL	0.81	0.73	0.66	0.75	0.66	0.37				
USA	0.74	0.89	0.80	0.85	0.90	0.67	1.01			
ZAF	0.68	0.77	0.73	0.80	0.73	0.75	0.76	8.50		
NLD	0.73	0.91	0.89	0.90	0.72	0.69	0.84	0.80	4.43	
CHE	0.67	0.85	0.86	0.82	0.81	0.68	0.84	0.71	0.87	12.34

JER bde

	AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD	USA	CHE
AUS	0.33									
CAN	0.78	5.63								
DFS	0.76	0.85	13.74							
GBR	0.75	0.86	0.85	1.53						
ITA	0.70	0.74	0.78	0.85	1.59					
NZL	0.78	0.69	0.70	0.69	0.70	0.37				
ZAF	0.79	0.72	0.82	0.80	0.71	0.74	8.70			

NLD	0.70	0.83	0.83	0.89	0.87	0.70	0.78	4.58		
USA	0.69	0.70	0.73	0.76	0.91	0.69	0.71	0.86	1.01	
CHE	0.74	0.87	0.92	0.89	0.83	0.71	0.79	0.89	0.82	13.42

 JER ang

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0.33									
CAN	0.67	7.54								
DFS	0.71	0.82	13.19							
GBR	0.80	0.84	0.86	1.36						
ITA	0.73	0.85	0.81	0.85	1.55					
USA	0.70	0.83	0.84	0.83	0.79	1.00				
ZAF	0.62	0.63	0.65	0.80	0.82	0.67	8.61			
NLD	0.72	0.82	0.74	0.82	0.80	0.73	0.65	6.02		
CHE	0.63	0.78	0.71	0.71	0.74	0.72	0.65	0.74	9.72	

 JER ran

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.36									
CAN	0.88	5.75								
DFS	0.89	0.96	11.52							
GBR	0.94	0.95	0.96	1.27						
ITA	0.88	0.95	0.94	0.95	1.68					
NZL	0.90	0.88	0.88	0.92	0.89	0.30				
USA	0.89	0.95	0.96	0.97	0.94	0.91	1.23			
ZAF	0.88	0.88	0.88	0.89	0.88	0.88	0.88	8.93		
NLD	0.90	0.96	0.95	0.96	0.94	0.89	0.95	0.91	4.82	
CHE	0.91	0.96	0.95	0.95	0.94	0.90	0.94	0.89	0.94	13.08

 JER rwi

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.32									
CAN	0.80	6.27								
DFS	0.81	0.91	12.06							
GBR	0.80	0.92	0.86	1.37						
ITA	0.77	0.85	0.81	0.85	1.51					
NZL	0.88	0.82	0.82	0.80	0.80	0.30				
USA	0.77	0.81	0.81	0.84	0.87	0.78	0.98			
ZAF	0.77	0.78	0.79	0.80	0.78	0.77	0.78	9.07		
NLD	0.84	0.94	0.91	0.87	0.79	0.84	0.80	0.79	5.08	
CHE	0.82	0.92	0.83	0.86	0.79	0.80	0.79	0.78	0.91	13.03

 JER rls

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.18									
CAN	0.67	6.22								
DFS	0.67	0.90	12.56							
GBR	0.71	0.84	0.75	1.70						
ITA	0.67	0.86	0.81	0.80	1.94					
NZL	0.66	0.66	0.67	0.68	0.68	0.12				
USA	0.66	0.94	0.87	0.87	0.85	0.66	0.87			
ZAF	0.71	0.68	0.67	0.74	0.68	0.83	0.70	11.86		
NLD	0.71	0.91	0.90	0.85	0.85	0.67	0.86	0.73	3.72	
CHE	0.74	0.92	0.86	0.81	0.80	0.68	0.85	0.71	0.90	9.35

 JER rlr

	AUS	CAN	DFS	ITA	ZAF	NLD	USA	CHE		
AUS	0.22									
CAN	0.52	6.43								

DFS	0.53	0.79	13.82						
ITA	0.56	0.82	0.71	1.45					
ZAF	0.51	0.52	0.52	0.55	12.24				
NLD	0.58	0.86	0.89	0.74	0.61	5.16			
USA	0.50	0.71	0.63	0.84	0.52	0.74	0.87		
CHE	0.63	0.67	0.62	0.61	0.55	0.70	0.57	12.17	

JER fan

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.22								
CAN	0.61	6.56							
DFS	0.62	0.87	12.81						
GBR	0.70	0.79	0.77	1.55					
ITA	0.62	0.74	0.68	0.70	1.49				
USA	0.62	0.88	0.82	0.85	0.79	0.86			
ZAF	0.65	0.65	0.66	0.81	0.65	0.74	9.54		
NLD	0.67	0.73	0.77	0.85	0.70	0.76	0.70	4.07	
CHE	0.65	0.82	0.82	0.71	0.69	0.75	0.66	0.71	11.89

JER fua

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.37									
CAN	0.72	5.80								
DFS	0.69	0.85	12.78							
GBR	0.74	0.94	0.86	1.69						
ITA	0.67	0.86	0.74	0.87	1.57					
NZL	0.80	0.71	0.73	0.80	0.69	0.42				
USA	0.73	0.94	0.86	0.92	0.90	0.71	1.47			
ZAF	0.69	0.90	0.87	0.92	0.78	0.74	0.89	11.84		
NLD	0.73	0.90	0.87	0.92	0.85	0.80	0.88	0.84	4.96	
CHE	0.77	0.92	0.85	0.87	0.80	0.71	0.87	0.88	0.89	12.09

JER ruh

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.35									
CAN	0.72	6.79								
DFS	0.73	0.83	10.73							
GBR	0.79	0.79	0.83	1.40						
ITA	0.72	0.72	0.79	0.83	1.40					
NZL	0.71	0.71	0.76	0.76	0.81	0.41				
USA	0.77	0.83	0.90	0.90	0.83	0.74	1.24			
ZAF	0.82	0.70	0.77	0.86	0.84	0.77	0.83	9.17		
NLD	0.74	0.75	0.91	0.87	0.81	0.81	0.87	0.76	4.14	
CHE	0.78	0.91	0.84	0.82	0.71	0.76	0.84	0.74	0.82	12.76

JER usu

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.38									
CAN	0.73	6.38								
DFS	0.71	0.84	13.50							
GBR	0.78	0.85	0.85	1.75						
ITA	0.65	0.76	0.75	0.83	1.68					
NZL	0.58	0.59	0.59	0.62	0.63	0.40				
USA	0.74	0.81	0.89	0.84	0.82	0.60	0.97			
ZAF	0.75	0.76	0.71	0.79	0.65	0.59	0.75	9.97		
NLD	0.81	0.81	0.87	0.91	0.79	0.61	0.88	0.78	4.65	
CHE	0.76	0.90	0.86	0.81	0.79	0.61	0.83	0.77	0.85	10.97

JER ude

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.35								
CAN	0.91	5.56							
DFS	0.88	0.93	12.15						
GBR	0.89	0.97	0.93	1.44					
ITA	0.91	0.95	0.94	0.94	1.73				
USA	0.88	0.95	0.95	0.94	0.96	1.76			
ZAF	0.87	0.89	0.89	0.89	0.88	0.88	10.35		
NLD	0.89	0.96	0.96	0.96	0.95	0.95	0.91	4.96	
CHE	0.93	0.95	0.93	0.92	0.95	0.95	0.89	0.96	9.95

 JER ftp

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.46									
CAN	0.89	6.24								
DFS	0.88	0.91	12.73							
GBR	0.90	0.94	0.88	1.36						
ITA	0.87	0.87	0.86	0.87	1.66					
NZL	0.87	0.92	0.87	0.88	0.87	0.31				
USA	0.86	0.95	0.91	0.94	0.86	0.88	1.31			
ZAF	0.87	0.93	0.87	0.92	0.87	0.90	0.90	10.07		
NLD	0.92	0.97	0.94	0.93	0.86	0.90	0.90	0.90	5.62	
CHE	0.92	0.95	0.93	0.91	0.87	0.89	0.90	0.88	0.96	9.91

 JER ftl

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	NZL
AUS	0.33									
CAN	0.91	5.58								
DFS	0.92	0.91	13.91							
GBR	0.91	0.93	0.94	1.46						
ITA	0.90	0.92	0.91	0.93	1.82					
USA	0.90	0.91	0.94	0.97	0.92	1.08				
ZAF	0.91	0.90	0.93	0.95	0.90	0.96	10.82			
NLD	0.92	0.93	0.96	0.97	0.91	0.95	0.93	4.39		
CHE	0.91	0.92	0.94	0.96	0.90	0.94	0.92	0.96	11.44	
NZL	0.92	0.95	0.92	0.94	0.91	0.93	0.93	0.93	0.93	0.52

 JER rtp

	AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE
AUS	0.32							
CAN	0.87	6.33						
DFS	0.87	0.94	13.07					
NZL	0.87	0.95	0.90	0.42				
ZAF	0.87	0.90	0.87	0.87	9.26			
NLD	0.89	0.96	0.95	0.92	0.87	5.22		
USA	0.87	0.93	0.95	0.87	0.86	0.94	1.33	
CHE	0.89	0.97	0.94	0.93	0.92	0.96	0.92	11.15

 JER ocs

	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE
AUS	0.77								
CAN	0.54	5.20							
DFS	0.50	0.62	12.59						
GBR	0.63	0.75	0.81	2.95					
ITA	0.48	0.70	0.72	0.79	1.32				
NZL	0.62	0.58	0.47	0.56	0.55	0.30			
USA	0.62	0.79	0.67	0.84	0.78	0.58	0.87		
NLD	0.56	0.71	0.86	0.87	0.80	0.63	0.81	3.46	
CHE	0.56	0.83	0.73	0.88	0.79	0.54	0.74	0.82	8.24

JER ous									
	AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE	ITA
AUS	0.78								
CAN	0.67	6.32							
DFS	0.67	0.82	12.85						
GBR	0.73	0.81	0.71	1.46					
NZL	0.81	0.72	0.68	0.75	0.44				
USA	0.68	0.89	0.82	0.85	0.71	0.98			
NLD	0.70	0.88	0.87	0.78	0.80	0.86	5.21		
CHE	0.76	0.87	0.79	0.84	0.77	0.85	0.92	10.75	
ITA	0.69	0.83	0.88	0.78	0.71	0.85	0.84	0.86	1.72

JER ofl								
	AUS	CAN	DFS	GBR	ITA	USA	NLD	CHE
AUS	6.32							
CAN	0.47	5.00						
DFS	0.37	0.72	13.64					
GBR	0.63	0.62	0.63	1.32				
ITA	0.46	0.59	0.67	0.65	1.77			
USA	0.61	0.64	0.62	0.64	0.73	1.39		
NLD	0.45	0.66	0.64	0.72	0.68	0.66	5.14	
CHE	0.55	0.83	0.70	0.70	0.70	0.79	0.72	11.25

RDC sta											
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.67										
CAN	0.88	6.31									
DEU	0.88	0.97	13.29								
DFS	0.86	0.96	0.97	8.65							
GBR	0.92	0.96	0.96	0.93	1.32						
NOR	0.87	0.93	0.94	0.97	0.92	13.61					
NZL	0.90	0.89	0.86	0.89	0.92	0.92	0.50				
USA	0.89	0.97	0.96	0.94	0.97	0.91	0.89	2.32			
NLD	0.87	0.96	0.97	0.97	0.94	0.96	0.84	0.93	4.83		
CAM	0.92	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	6.07	
LVA	0.85	0.85	0.86	0.91	0.84	0.89	0.86	0.84	0.86	0.90	0.65

RDC cwi											
	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR	LVA
AUS	0.41										
CAN	0.72	6.82									
DEU	0.72	0.88	11.58								
DFS	0.76	0.82	0.89	13.68							
GBR	0.83	0.87	0.90	0.88	1.61						
NZL	0.78	0.68	0.70	0.68	0.80	0.35					
USA	0.66	0.84	0.81	0.83	0.83	0.71	1.27				
NLD	0.72	0.92	0.92	0.89	0.91	0.69	0.82	5.20			
CAM	0.76	0.79	0.79	0.79	0.79	0.78	0.79	0.79	6.85		
NOR	0.83	0.79	0.81	0.89	0.82	0.82	0.82	0.87	0.79	14.43	
LVA	0.68	0.69	0.67	0.66	0.66	0.70	0.65	0.69	0.79	0.79	0.30

RDC bde											
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.51										
CAN	0.80	6.02									
DEU	0.76	0.87	10.07								
DFS	0.79	0.83	0.92	11.87							
GBR	0.78	0.86	0.92	0.90	1.60						
NOR	0.76	0.80	0.82	0.89	0.83	15.31					
NZL	0.77	0.70	0.73	0.73	0.75	0.82	0.35				

USA	0.70	0.76	0.89	0.84	0.89	0.82	0.73	1.28			
NLD	0.70	0.83	0.90	0.85	0.91	0.90	0.69	0.90	4.57		
CAM	0.85	0.82	0.84	0.83	0.83	0.83	0.84	0.83	0.83	5.88	
LVA	0.73	0.77	0.80	0.82	0.79	0.84	0.75	0.69	0.75	0.82	0.34

RDC ang

	AUS	CAN	DEU	DFS	GBR	USA	NLD	CAM	NOR	LVA	
AUS	0.45										
CAN	0.66	6.86									
DEU	0.64	0.61	6.82								
DFS	0.71	0.73	0.68	9.06							
GBR	0.77	0.81	0.62	0.83	1.36						
USA	0.69	0.86	0.61	0.80	0.86	1.19					
NLD	0.73	0.82	0.61	0.74	0.82	0.74	5.22				
CAM	0.83	0.77	0.79	0.79	0.79	0.79	0.79	7.29			
NOR	0.71	0.75	0.79	0.63	0.77	0.78	0.77	0.77	16.15		
LVA	0.66	0.63	0.63	0.62	0.63	0.62	0.64	0.77	0.77	0.30	

RDC ran

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.45										
CAN	0.90	5.69									
DEU	0.91	0.97	8.99								
DFS	0.90	0.95	0.95	10.02							
GBR	0.92	0.97	0.97	0.95	1.58						
NOR	0.90	0.94	0.90	0.91	0.93	12.10					
NZL	0.92	0.90	0.89	0.88	0.92	0.93	0.28				
USA	0.89	0.98	0.96	0.94	0.97	0.93	0.90	1.62			
NLD	0.90	0.97	0.98	0.96	0.97	0.94	0.89	0.96	5.67		
CAM	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	5.74	
LVA	0.89	0.92	0.92	0.90	0.91	0.89	0.89	0.90	0.91	0.92	0.41

RDC rwi

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR	LVA
AUS	0.48										
CAN	0.84	6.45									
DEU	0.79	0.94	9.83								
DFS	0.80	0.93	0.92	10.48							
GBR	0.84	0.92	0.89	0.88	1.46						
NZL	0.82	0.89	0.81	0.87	0.90	0.33					
USA	0.77	0.90	0.85	0.89	0.93	0.87	1.40				
NLD	0.83	0.94	0.96	0.92	0.88	0.82	0.81	6.32			
CAM	0.86	0.87	0.86	0.88	0.87	0.88	0.87	0.87	6.67		
NOR	0.82	0.87	0.85	0.94	0.87	0.88	0.87	0.89	0.87	13.87	
LVA	0.79	0.82	0.82	0.85	0.78	0.80	0.77	0.82	0.86	0.86	0.41

RDC rls

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.23										
CAN	0.70	6.49									
DEU	0.71	0.94	9.11								
DFS	0.68	0.97	0.94	9.28							
GBR	0.78	0.77	0.85	0.77	1.54						
NOR	0.71	0.87	0.85	0.93	0.79	11.80					
NZL	0.67	0.67	0.68	0.67	0.69	0.73	0.12				
USA	0.68	0.92	0.93	0.93	0.82	0.83	0.67	0.89			
NLD	0.71	0.92	0.93	0.88	0.86	0.80	0.66	0.90	5.41		
CAM	0.82	0.80	0.80	0.79	0.80	0.80	0.78	0.81	0.80	6.82	
LVA	0.70	0.77	0.81	0.72	0.75	0.71	0.71	0.76	0.80	0.80	0.28

RDC	rlr	AUS	CAN	DEU	DFS	NOR	NLD	USA	CAM	LVA
AUS	0.21									
CAN	0.58	6.32								
DEU	0.61	0.88	10.47							
DFS	0.55	0.82	0.90	10.90						
NOR	0.58	0.77	0.82	0.84	13.30					
NLD	0.58	0.87	0.90	0.88	0.85	5.08				
USA	0.56	0.72	0.77	0.66	0.71	0.80	0.89			
CAM	0.75	0.72	0.72	0.73	0.71	0.71	0.71	6.93		
LVA	0.62	0.72	0.76	0.78	0.66	0.70	0.69	0.73	0.24	

RDC	fan	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA
AUS	0.29										
CAN	0.64	6.64									
DEU	0.68	0.81	13.75								
DFS	0.62	0.69	0.79	9.32							
GBR	0.73	0.78	0.90	0.74	1.60						
NOR	0.67	0.74	0.86	0.62	0.77	12.83					
USA	0.67	0.84	0.83	0.71	0.83	0.77	1.05				
NLD	0.67	0.74	0.88	0.78	0.88	0.73	0.80	5.08			
CAM	0.74	0.77	0.77	0.77	0.77	0.77	0.77	0.77	7.77		
LVA	0.70	0.64	0.65	0.64	0.65	0.68	0.67	0.66	0.77	0.27	

RDC	fua	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.39											
CAN	0.77	5.43										
DEU	0.74	0.91	12.49									
DFS	0.73	0.79	0.84	11.67								
GBR	0.76	0.88	0.94	0.85	1.52							
NOR	0.76	0.82	0.76	0.86	0.80	12.05						
NZL	0.76	0.82	0.80	0.69	0.79	0.72	0.36					
USA	0.75	0.93	0.89	0.85	0.92	0.80	0.84	1.46				
NLD	0.75	0.91	0.93	0.85	0.93	0.79	0.83	0.89	3.98			
CAM	0.84	0.81	0.79	0.80	0.79	0.80	0.79	0.81	0.81	6.70		
LVA	0.68	0.75	0.76	0.80	0.76	0.75	0.74	0.71	0.75	0.78	0.36	

RDC	ruh	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.47											
CAN	0.79	5.67										
DEU	0.79	0.87	14.45									
DFS	0.78	0.87	0.89	10.72								
GBR	0.78	0.75	0.84	0.85	1.45							
NOR	0.75	0.84	0.88	0.87	0.82	12.27						
NZL	0.82	0.73	0.81	0.77	0.92	0.77	0.33					
USA	0.77	0.84	0.90	0.93	0.90	0.83	0.85	1.32				
NLD	0.74	0.75	0.91	0.91	0.87	0.90	0.82	0.86	4.01			
CAM	0.81	0.82	0.82	0.83	0.82	0.82	0.82	0.82	0.82	6.14		
LVA	0.75	0.73	0.75	0.83	0.72	0.74	0.73	0.72	0.74	0.82	0.39	

RDC	usu	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.34											
CAN	0.75	5.79										
DEU	0.72	0.90	12.35									
DFS	0.66	0.75	0.79	13.04								
GBR	0.80	0.79	0.75	0.79	1.86							

NOR	0.65	0.71	0.66	0.72	0.76	12.17						
NZL	0.64	0.71	0.61	0.59	0.66	0.68	0.32					
USA	0.77	0.82	0.75	0.85	0.88	0.78	0.69	1.18				
NLD	0.78	0.81	0.79	0.89	0.92	0.75	0.58	0.91	4.50			
CAM	0.83	0.77	0.76	0.76	0.78	0.76	0.76	0.77	0.78	5.89		
LVA	0.63	0.64	0.62	0.60	0.73	0.67	0.67	0.67	0.67	0.76	0.32	

RDC ude

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA		
AUS	0.56											
CAN	0.88	5.66										
DEU	0.89	0.97	12.70									
DFS	0.88	0.96	0.94	10.66								
GBR	0.89	0.96	0.96	0.93	1.78							
NOR	0.89	0.91	0.90	0.88	0.92	14.21						
USA	0.87	0.96	0.95	0.95	0.96	0.92	1.29					
NLD	0.88	0.97	0.97	0.95	0.97	0.89	0.96	4.24				
CAM	0.91	0.92	0.93	0.92	0.92	0.92	0.92	0.92	4.47			
LVA	0.89	0.89	0.88	0.91	0.88	0.89	0.88	0.88	0.92	0.42		

RDC ftp

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA	
AUS	0.54											
CAN	0.92	6.07										
DEU	0.93	0.97	12.83									
DFS	0.89	0.95	0.93	11.92								
GBR	0.91	0.93	0.94	0.89	1.49							
NOR	0.88	0.91	0.89	0.93	0.91	14.18						
NZL	0.91	0.90	0.90	0.87	0.89	0.89	0.26					
USA	0.86	0.92	0.91	0.92	0.93	0.91	0.87	1.42				
NLD	0.92	0.98	0.97	0.95	0.94	0.89	0.91	0.90	4.61			
CAM	0.90	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.62		
LVA	0.88	0.87	0.87	0.87	0.87	0.89	0.88	0.86	0.87	0.91	0.38	

RDC ftl

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA	NZL	
AUS	0.58											
CAN	0.93	5.06										
DEU	0.93	0.94	13.91									
DFS	0.92	0.90	0.97	10.59								
GBR	0.94	0.93	0.97	0.93	1.44							
NOR	0.91	0.92	0.92	0.94	0.93	12.54						
USA	0.94	0.93	0.95	0.93	0.97	0.93	1.63					
NLD	0.92	0.93	0.98	0.97	0.97	0.95	0.95	5.24				
CAM	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	7.29			
LVA	0.90	0.91	0.90	0.90	0.90	0.94	0.89	0.90	0.93	0.48		
NZL	0.94	0.94	0.93	0.92	0.93	0.93	0.93	0.93	0.93	0.90	0.41	

RDC rtp

	AUS	CAN	DEU	DFS	NOR	NZL	NLD	USA	CAM	LVA		
AUS	0.39											
CAN	0.88	5.96										
DEU	0.89	0.96	13.83									
DFS	0.87	0.93	0.96	12.29								
NOR	0.88	0.90	0.89	0.87	13.12							
NZL	0.91	0.95	0.92	0.88	0.89	0.35						
NLD	0.90	0.97	0.98	0.96	0.88	0.93	5.41					
USA	0.88	0.91	0.95	0.91	0.91	0.89	0.96	1.42				
CAM	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.12			
LVA	0.89	0.89	0.89	0.88	0.88	0.89	0.91	0.87	0.91	0.38		

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RDC      ocs
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AUS      AUS      CAN      DEU      DFS      GBR      NOR      NZL      USA      NLD      CAM
AUS      1.08
CAN      0.64      4.75
DEU      0.53      0.74      20.68
DFS      0.59      0.60      0.71      10.50
GBR      0.65      0.73      0.87      0.74      1.62
NOR      0.52      0.69      0.69      0.74      0.75      16.34
NZL      0.72      0.56      0.62      0.52      0.65      0.63      0.27
USA      0.62      0.76      0.82      0.72      0.87      0.75      0.71      0.56
NLD      0.59      0.71      0.86      0.82      0.88      0.74      0.65      0.86      3.31
CAM      0.73      0.75      0.75      0.76      0.76      0.75      0.73      0.78      0.78      6.27
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RDC      ous
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AUS      AUS      CAN      DEU      DFS      GBR      NOR      NZL      USA      NLD      CAM
AUS      1.48
CAN      0.71      5.35
DEU      0.75      0.87      17.10
DFS      0.68      0.78      0.81      10.78
GBR      0.83      0.79      0.82      0.71      1.60
NOR      0.72      0.80      0.80      0.79      0.82      13.06
NZL      0.83      0.82      0.78      0.73      0.81      0.75      0.36
USA      0.75      0.88      0.84      0.85      0.86      0.82      0.87      0.97
NLD      0.71      0.88      0.90      0.85      0.77      0.80      0.82      0.85      4.26
CAM      0.85      0.83      0.83      0.82      0.83      0.82      0.85      0.84      0.84      6.72
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RDC      ofl
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AUS      AUS      CAN      DEU      DFS      GBR      NOR      USA      NLD      CAM
AUS      0.65
CAN      0.37      4.40
DEU      0.42      0.73      16.44
DFS      0.38      0.80      0.82      13.83
GBR      0.54      0.67      0.73      0.66      1.44
NOR      0.46      0.70      0.70      0.58      0.76      12.98
USA      0.58      0.60      0.74      0.64      0.69      0.75      1.31
NLD      0.47      0.67      0.76      0.65      0.73      0.76      0.68      7.16
CAM      0.56      0.75      0.75      0.75      0.75      0.75      0.75      0.75      6.80
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^LAPPENDIX II. Number of common bulls

BSW

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-----
common bulls below diagonal
common three quarter sib group above diagonal
      CAN  CHE  FRA  ITA  NLD  USA  DEA  SVN  GBR
-----
CAN   0  140  86  138  42  157  121  25  20
CHE  122   0  183  504  72  281  549  59  18
FRA   79  145   0  211  63  101  208  40  14
ITA  119  447  176   0  94  220  616  74  19
NLD   34   69  52   74   0   62   86  28  12
USA  147  250  79  161  49   0  234  25  20
DEA  102  453  166  531  75  188   0  69  15
SVN   23   56  41   69  28  22   65   0   6
GBR   17   16  13   17  10  18  13   4   0
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BSW

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-----
common bulls below diagonal
common three quarter sib group above diagonal
      CAN  CHE  FRA  ITA  NLD  USA  DEA  SVN  GBR
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CAN	0	132	52	138	35	157	119	25	20
CHE	115	0	115	449	67	252	486	59	18
FRA	47	86	0	126	44	62	137	40	10
ITA	119	393	105	0	86	220	580	74	19
NLD	30	66	40	70	0	48	80	28	12
USA	147	217	46	161	40	0	216	25	20
DEA	101	394	107	494	73	163	0	69	14
SVN	23	56	41	69	28	22	65	0	6
GBR	17	16	9	17	10	18	13	4	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA
CAN	0	140	86	138	35	121	23	20	157
CHE	122	0	183	504	71	549	48	18	281
FRA	79	145	0	211	57	208	37	14	101
ITA	119	447	176	0	86	616	67	19	220
NLD	30	69	49	70	0	81	27	12	48
DEA	102	453	166	531	74	0	60	15	234
SVN	21	46	38	61	27	56	0	6	22
GBR	17	16	13	17	10	13	4	0	20
USA	147	250	79	161	40	188	20	18	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	NLD	USA	GBR
CAN	0	139	85	24	156	20
CHE	122	0	177	49	279	18
FRA	78	141	0	40	100	14
NLD	21	50	36	0	33	9
USA	146	250	78	29	0	20
GBR	17	16	13	7	18	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	140	86	138	42	157	121	25	20
CHE	122	0	183	504	72	281	549	59	18
FRA	79	145	0	211	63	101	208	40	14
ITA	119	447	176	0	94	220	616	74	19
NLD	34	69	52	74	0	62	86	28	12
USA	147	250	79	161	49	0	234	25	20
DEA	102	453	166	531	75	188	0	69	15
SVN	23	56	41	69	28	22	65	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN	ITA
CAN	0	140	52	42	157	121	20	23	134
CHE	122	0	115	72	281	549	18	48	497
FRA	47	86	0	44	62	137	10	37	126
NLD	34	69	40	0	62	86	12	27	92
USA	147	250	46	49	0	234	20	22	206
DEA	102	453	108	75	188	0	15	60	610
GBR	17	16	9	10	18	13	0	6	19
SVN	21	46	38	27	20	56	4	0	67

ITA 116 441 105 73 147 523 17 61 0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	140	86	138	42	157	121	25	20
CHE	122	0	183	504	72	281	549	59	18
FRA	79	145	0	211	63	101	208	40	14
ITA	119	447	176	0	94	220	616	74	19
NLD	34	69	52	74	0	62	86	28	12
USA	147	250	79	161	49	0	234	25	20
DEA	102	453	166	531	75	188	0	69	15
SVN	23	56	41	69	28	22	65	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	140	86	138	34	157	121	25	20
CHE	122	0	183	504	70	281	549	59	18
FRA	79	145	0	211	57	101	208	40	14
ITA	119	447	176	0	85	220	616	74	19
NLD	29	68	49	69	0	47	80	28	12
USA	147	250	79	161	38	0	234	25	20
DEA	102	453	166	531	73	188	0	69	15
SVN	23	56	41	69	28	22	65	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	0	140	86	134	34	121	25	157
CHE	122	0	183	498	70	549	59	281
FRA	79	145	0	210	57	208	40	101
ITA	116	442	176	0	84	610	74	206
NLD	29	68	49	68	0	80	28	47
DEA	102	453	166	523	73	0	69	234
SVN	23	56	41	69	28	65	0	25
USA	147	250	79	147	38	188	22	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	140	52	95	34	157	89	25	20
CHE	122	0	115	333	71	280	356	59	18
FRA	47	86	0	118	43	62	127	40	10
ITA	84	286	98	0	65	122	334	68	16
NLD	29	69	39	58	0	47	69	28	12
USA	147	250	46	88	39	0	138	25	20
DEA	76	287	100	297	63	99	0	68	12
SVN	23	56	41	64	28	22	64	0	6
GBR	17	16	9	14	10	18	11	4	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	140	86	138	35	157	121	25	20
CHE	122	0	183	504	71	281	549	59	18
FRA	79	145	0	211	57	101	208	40	14
ITA	119	447	176	0	86	220	616	74	19
NLD	30	69	49	70	0	48	81	28	12
USA	147	250	79	161	40	0	234	25	20
DEA	102	453	166	531	74	188	0	69	15
SVN	23	56	41	69	28	22	65	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN
CAN	0	140	86	138	35	157	121	25
CHE	122	0	183	504	71	281	549	59
FRA	79	145	0	211	57	101	208	40
ITA	119	447	176	0	86	220	616	74
NLD	30	69	49	70	0	48	81	28
USA	147	250	79	161	40	0	234	25
DEA	102	453	166	531	74	188	0	69
SVN	23	56	41	69	28	22	65	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	140	86	138	42	157	121	25	20
CHE	122	0	183	504	72	281	549	59	18
FRA	79	145	0	211	63	101	208	40	14
ITA	119	447	176	0	94	220	616	74	19
NLD	34	69	52	74	0	62	86	28	12
USA	147	250	79	161	49	0	234	25	20
DEA	102	453	166	531	75	188	0	69	15
SVN	23	56	41	69	28	22	65	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	140	86	138	42	155	121	25	20
CHE	122	0	183	504	73	281	549	59	18
FRA	79	145	0	211	64	101	208	40	14
ITA	119	447	176	0	98	220	616	74	19
NLD	34	70	53	78	0	62	89	28	12
USA	146	250	79	161	49	0	234	25	20
DEA	102	453	166	531	78	188	0	69	15
SVN	23	56	41	69	28	22	65	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	NLD	USA	DEA	SVN	GBR	ITA
CAN	0	140	86	42	157	110	25	20	126
CHE	122	0	183	73	281	517	59	18	462
FRA	79	145	0	64	101	195	40	14	194
NLD	34	70	53	0	62	83	28	12	88

USA	147	250	79	49	0	209	25	20	176
DEA	94	422	156	76	160	0	69	14	522
SVN	23	56	41	28	22	65	0	6	73
GBR	17	16	13	10	18	13	4	0	19
ITA	109	410	162	73	128	458	68	17	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	140	86	138	42	157	121	25	20
CHE	122	0	183	504	72	281	549	59	18
FRA	79	145	0	211	63	101	208	40	14
ITA	119	447	176	0	94	218	616	74	19
NLD	34	69	52	74	0	62	86	28	12
USA	147	250	79	160	49	0	234	25	20
DEA	102	453	166	531	75	188	0	69	15
SVN	23	56	41	69	28	22	65	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	0	140	86	95	30	89	25	157
CHE	122	0	180	333	68	356	59	280
FRA	79	142	0	142	55	148	40	101
ITA	84	286	118	0	68	334	68	122
NLD	26	68	48	62	0	71	28	42
DEA	76	287	113	297	66	0	68	138
SVN	23	56	41	64	28	64	0	25
USA	147	250	79	88	35	99	22	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	132	75	138	42	157	89	25	20
CHE	115	0	145	448	67	252	351	58	18
FRA	70	113	0	171	54	84	139	39	14
ITA	119	391	145	0	92	217	370	72	19
NLD	34	66	48	74	0	62	69	28	12
USA	147	217	66	161	49	0	138	25	20
DEA	76	283	110	332	63	99	0	67	12
SVN	23	55	40	67	28	22	63	0	6
GBR	17	16	13	17	10	18	11	4	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	132	75	138	42	156	121	25	20
CHE	115	0	145	449	67	252	494	58	18
FRA	70	113	0	172	54	84	174	40	14
ITA	119	393	145	0	94	220	609	73	19
NLD	34	66	48	74	0	62	86	28	12
USA	146	217	66	161	49	0	232	25	20
DEA	101	404	139	527	75	184	0	69	15
SVN	23	55	41	68	28	22	65	0	6
GBR	17	16	13	17	10	18	13	4	0


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BSW
-----
common bulls below diagonal
common three quarter sib group above diagonal
      CAN  CHE  FRA  ITA  NLD  USA  DEA  SVN  GBR
-----
CAN   0  132  75  134  42  157  121  25  20
CHE  115   0  145  448  67  252  494  59  18
FRA   70  113   0  171  54  84  174  40  14
ITA  116  392  145   0  92  206  604  74  19
NLD   34   66  48   73   0  62  86  28  12
USA  147  217  66  147  49   0  232  25  20
DEA  101  404  139  520  75  184   0  69  15
SVN   23   56  41  69  28  22  65   0   6
GBR   17   16  13  17  10  18  13   4   0
-----

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BSW
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BSW
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BSW
-----
common bulls below diagonal
common three quarter sib group above diagonal
      CAN  CHE  DEA  ITA  SVN  USA  FRA
-----
CAN   0  131  120  96  24  158  53
CHE  114   0  488  333  59  251  115
DEA  102  401   0  374  68  228  137
ITA   85  285  322   0  67  122  118
SVN   23   56  64  63   0  25  39
USA  147  217  183  88  22   0  62
FRA   48   86  108  98  40  46   0
-----

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BSW
-----
common bulls below diagonal
common three quarter sib group above diagonal
      CAN  CHE  DEA  ITA  SVN  USA  FRA
-----
CAN   0  138  122  139  25  87
CHE  121   0  549  504  58  183
DEA  102  453   0  614  69  207
ITA  120  447  530   0  73  209
SVN   23   56  65  69   0  40
FRA   80  145  166  175  41   0
-----

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BSW
-----
common bulls below diagonal
common three quarter sib group above diagonal
      CAN  CHE  DEA  ITA  SVN  USA  FRA
-----
CAN   0  131  99  96  24  158  53
CHE  114   0  386  333  59  251  115
DEA   86  314   0  341  67  166  129
ITA   85  285  304   0  67  122  118
SVN   23   56  63  63   0  25  39
USA  147  217  123  88  22   0  62
FRA   48   86  102  98  40  46   0
-----

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BSW
-----
common bulls below diagonal
common three quarter sib group above diagonal
      CHE  DEA  ITA  SVN  USA  FRA
-----
CHE   0  531  333  48  280  181
DEA  438   0  373  59  219  202
-----

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ITA	286	321	0	60	122	142
SVN	46	55	55	0	22	36
USA	250	172	88	20	0	100
FRA	144	163	118	37	79	0

BSW

 common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	0	88	72	77	23	90	41
CHE	75	0	386	333	53	251	115
DEA	60	314	0	341	63	166	129
ITA	68	285	304	0	60	122	118
SVN	22	50	59	56	0	23	38
USA	80	217	123	88	20	0	62
FRA	36	86	102	98	39	46	0

BSW

 common bulls below diagonal
 common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	FRA
CAN	0	138	122	135	25	87
CHE	121	0	549	498	58	183
DEA	102	453	0	608	69	207
ITA	117	442	522	0	73	208
SVN	23	56	65	69	0	40
FRA	80	145	166	175	41	0

BSW

 common bulls below diagonal
 common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	548	501	58	179
DEA	452	0	614	69	205
ITA	444	530	0	73	206
SVN	56	65	69	0	40
FRA	142	165	174	41	0

BSW

 common bulls below diagonal
 common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	322	308	58	128
DEA	272	0	332	68	147
ITA	270	297	0	68	139
SVN	56	64	64	0	40
FRA	101	112	116	41	0

BSW

 common bulls below diagonal
 common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	548	495	57	179
DEA	452	0	608	69	205
ITA	439	522	0	72	205
SVN	55	65	68	0	40
FRA	142	165	174	41	0

BSW

```

-----
common bulls below diagonal
common three quarter sib group above diagonal
  CHE  DEA  ITA  SVN  FRA
-----
CHE    0  355  331  58  110
DEA  286    0  333  68  125
ITA  284  297    0  68  116
SVN   56   64   64    0   40
FRA   84   99   96   41    0
-----

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GUE
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  GBR  USA  AUS
-----
CAN    0  25  66  20
GBR   22    0  79  12
USA   56   77    0  24
AUS   21   10  22    0
-----

```

```

GUE
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  GBR  USA  AUS
-----
CAN    0  25  66  20
GBR   22    0  79  12
USA   56   77    0  24
AUS   21   10  22    0
-----

```

```

GUE
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  GBR  USA  AUS
-----
CAN    0  25  66  20
GBR   22    0  79  12
USA   56   77    0  24
AUS   21   10  22    0
-----

```

```

GUE
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  GBR  USA  AUS
-----
CAN    0  25  66  20
GBR   22    0  79  12
USA   56   77    0  24
AUS   21   10  22    0
-----

```

```

GUE
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  GBR  USA  AUS
-----
CAN    0  25  66  20
GBR   22    0  79  12
USA   56   77    0  24
AUS   21   10  22    0
-----

```

```

GUE
-----
common bulls below diagonal

```

common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	25	66	20
GBR	22	0	79	12
USA	56	77	0	24
AUS	21	10	22	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	25	66	20
GBR	22	0	79	12
USA	56	77	0	24
AUS	21	10	22	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN USA AUS

CAN	0	39	20
USA	37	0	8
AUS	21	7	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	25	66	20
GBR	22	0	79	12
USA	56	77	0	24
AUS	21	10	22	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	25	66	20
GBR	22	0	79	12
USA	56	77	0	24
AUS	21	10	22	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	25	66	20
GBR	22	0	79	12
USA	56	77	0	24
AUS	21	10	22	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	25	66	20
-----	---	----	----	----

GBR	22	0	79	12
USA	56	77	0	24
AUS	21	10	22	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	25	64	19
GBR	22	0	79	12
USA	55	77	0	24
AUS	20	10	22	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	25	66	20
GBR	22	0	79	12
USA	56	77	0	24
AUS	21	10	22	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	25	66	20
GBR	22	0	79	12
USA	56	77	0	24
AUS	21	10	22	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN AUS USA

CAN	0	20	66
AUS	21	0	24
USA	56	22	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	12	66	20
GBR	9	0	33	9
USA	56	31	0	23
AUS	21	8	21	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA AUS

CAN	0	23	64	19
GBR	20	0	77	11
USA	55	75	0	24
AUS	20	9	22	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

Table with 5 columns: CAN, GBR, USA, AUS. Values range from 0 to 77.

GUE

GUE

HOL

common bulls below diagonal
common three quarter sib group above diagonal

Large table with 22 columns (AUS to LVA) and 22 rows. Values range from 0 to 636.

HOL

common bulls below diagonal
common three quarter sib group above diagonal

Large table with 22 columns (AUS to LVA) and 22 rows. Values range from 0 to 948.

CZE	365	408	813	362	1131	632	651	795	776	937	1202	1264	715	815	226	214	247	0	163	419	512	200	805	425
EST	53	61	101	45	157	129	70	81	101	125	153	165	68	123	24	23	31	89	0	74	87	56	135	113
IRL	402	398	439	369	493	446	431	493	819	431	621	561	282	315	285	195	201	314	39	0	220	87	404	170
KOR	246	204	696	207	370	314	382	330	412	527	350	1039	350	388	134	161	254	360	35	153	0	104	491	261
SVN	76	103	151	85	303	162	123	147	145	226	197	175	92	175	46	38	54	142	29	70	65	0	149	107
PRT	437	581	1088	446	932	743	859	822	893	1012	1011	1390	622	846	246	297	309	662	79	344	418	115	0	411
LVA	103	129	290	117	532	232	198	208	244	357	285	582	216	342	64	74	90	265	57	94	160	62	321	0

HOL

common bulls below diagonal																								
common three quarter															sib group above diagonal									
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN	LVA
AUS	0	517	935	479	902	789	657	885	931	644	903	1132	478	602	513	308	585	560	103	439	351	566	109	253
BEL	450	0	697	546	933	693	621	880	772	654	1045	810	422	608	292	247	441	550	103	416	289	581	134	250
CAN	868	666	0	876	2134	1203	1366	1494	1685	1825	1394	3403	899	1237	389	376	1201	1163	188	469	750	1071	198	513
CHE	434	543	778	0	1016	599	580	707	741	726	846	933	376	563	257	218	405	498	93	373	292	496	119	249
DEU	623	875	1324	862	0	2127	1492	2369	1906	2261	2648	2911	1026	1836	464	372	1210	1693	266	610	604	1141	322	731
DFS	532	606	895	543	1248	0	982	1597	1372	1206	1650	1698	735	1168	467	384	819	1090	207	560	472	854	205	435
ESP	509	597	888	480	848	709	0	1278	1123	1273	1128	1596	723	972	336	368	867	908	151	432	527	870	172	402
FRA	623	866	1026	654	1265	887	978	0	1584	1477	1909	2438	856	1556	524	390	1156	1271	173	583	564	947	195	448
GBR	804	771	1712	736	1292	957	913	1071	0	1492	1705	2210	791	1214	499	396	924	1083	187	764	544	976	196	461
ITA	550	663	1623	657	1511	976	946	1007	1299	0	1486	2392	841	1394	296	299	939	1213	212	467	620	1018	254	556
NLD	776	1146	1278	833	1959	1251	975	1284	1456	1305	0	2147	798	1404	632	373	907	1425	234	689	512	1026	227	491
USA	963	700	3456	866	1643	1063	1068	1348	2035	2033	1805	0	1164	1689	561	467	1743	1651	242	608	920	1342	219	708
HUN	345	343	795	316	689	529	559	574	639	712	613	1053	0	747	280	300	612	842	122	339	452	658	128	334
POL	397	484	945	410	1215	765	635	983	936	1097	1092	1424	577	0	325	291	777	1161	211	429	538	908	225	524
NZL	416	226	334	214	322	301	274	307	393	250	573	475	208	203	0	204	332	344	52	350	193	314	63	143
ZAF	286	212	350	192	293	302	341	319	369	262	344	496	257	217	186	0	308	303	54	237	232	322	55	137
JPN	311	246	440	236	360	326	331	339	375	387	367	504	251	270	162	196	0	765	117	347	533	629	126	327
CZE	365	408	813	362	1131	632	631	826	776	937	1218	1264	715	815	226	226	247	0	163	419	513	806	199	440
EST	53	61	101	45	157	129	67	82	101	125	154	165	68	123	24	23	31	89	0	74	87	135	56	119
IRL	402	398	439	369	493	446	413	512	819	431	632	561	282	315	285	226	201	314	39	0	221	404	87	184
KOR	246	204	697	207	370	314	378	338	413	528	358	1041	352	389	134	177	256	360	35	153	0	492	104	271
PRT	437	580	1088	446	932	743	840	836	892	1012	1023	1390	621	846	246	307	312	662	79	344	419	0	149	428
SVN	76	103	151	85	303	162	118	146	145	225	195	175	92	175	46	38	54	142	29	70	65	115	0	107
LVA	115	140	304	127	554	246	204	221	262	360	306	603	229	354	74	82	94	273	62	104	162	333	62	0

HOL

common bulls below diagonal																								
common three quarter															sib group above diagonal									
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN	LVA	
AUS	0	500	935	462	171	788	671	756	928	643	505	1129	475	594	304	584	560	101	437	351	557	104	253	
BEL	447	0	676	514	202	669	624	800	747	644	662	772	410	583	235	424	540	100	404	285	566	126	246	
CAN	868	661	0	839	470	1193	1375	1328	1683	1823	971	3403	895	1221	371	1199	1163	184	467	749	1055	184	513	
CHE	429	517	748	0	251	583	580	667	727	709	589	877	366	538	214	402	473	89	369	290	478	111	244	
DEU	140	191	436	213	0	341	294	387	387	580	570	504	151	415	26	162	279	84	108	120	201	143	200	
DFS	532	602	895	533	307	0	1001	1411	1355	1187	987	1678	725	1139	380	808	1081	203	555	467	829	190	433	
ESP	522	623	899	486	193	740	0	1221	1148	1286	785	1617	732	985	370	874	927	154	447	532	876	165	410	
FRA	585	818	971	621	331	854	993	0	1438	1451	1042	2005	809	1447	342	999	1216	162	535	528	887	181	435	
GBR	804	763	1712	726	332	956	950	1026	0	1491	1032	2203	785	1195	390	921	1082	184	754	543	955	183	460	
ITA	550	659	1623	648	524	973	966	998	1299	0	1207	2386	838	1370	295	935	1211	205	465	617	1004	237	555	
NLD	480	721	992	562	579	922	701	890	997	1143	0	1181	503	1031	208	499	1003	193	404	360	705	209	384	
USA	962	691	3456	813	444	1062	1087	1150	2033	2033	1092	0	1158	1666	461	1741	1650	240	604	916	1316	205	708	
HUN	345	340	795	311	99	528	573	561	638	711	403	1051	0	736	296	611	840	121	335	449	646	122	333	
POL	397	473	945	390	345	760	665	934	930	1085	907	1423	574	0	286	768	1146	204	422	533	883	205	519	
ZAF	283	209	347	188	18	299	340	295	366	258	187	491	255	214	0	304	298	51	234	229	315	50	135	
JPN	309	243	437	234	91	324	331	331	371	385	288	500	251	269	193	0	764	116	345	532	623	119	327	
CZE	365	408	813	350	206	632	655	795	776	937	971	1264	715	815	222	247	0	160	417	512	792	188	440	
EST	53	60	101	45	52	129	72	81	101	124	136	165	67	121	23	31	89	0	72	87	129	55	118	
IRL	401	395	439	365	86	446	434	493	812	429	401	561	282	313	224	201	314	39	0	220	394	83	184	
KOR	246	204	696	206	91	314	383	330	412	527	274	1038	350	388	176	254	360	35	153	0	490	97	271	
PRT	437	574	1088	436	180	738	860	822	890	1006	722	1388	620	835	303	309	662	77	343	418	0	142	422	
SVN	75	102	150	85	134	156	122	143	144	219	192	174	92	169	34	53	142	29	68	65	113	0	101	
LVA	115	140	304	125	148	246	220	218	262	360	247	603	229	354	81	94	273	62	104	162	333	61	0	

HOL

common bulls below diagonal																								
common three quarter		sib group												above diagonal										
AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA	
AUS	0	517	935	479	902	790	654	885	931	644	929	1132	478	602	513	308	586	560	103	439	352	110	566	253
BEL	450	0	697	546	933	694	614	880	772	654	1069	810	422	608	292	247	441	550	103	416	291	135	581	250
CAN	868	666	0	876	2134	1203	1360	1494	1685	1825	1425	3403	899	1237	389	376	1202	1163	188	469	753	199	1070	513
CHE	434	543	778	0	1016	599	578	706	741	726	852	933	376	563	257	218	406	498	93	373	294	121	496	249
DEU	623	875	1324	862	0	2127	1478	2368	1906	2261	2661	2911	1026	1836	464	372	1211	1693	266	610	607	324	1140	731
DFS	532	606	895	543	1248	0	973	1598	1373	1206	1692	1699	736	1169	468	384	819	1090	207	561	475	207	853	435
ESP	507	590	884	476	832	700	0	1267	1115	1265	1133	1586	721	965	332	368	864	902	149	430	528	173	866	399
FRA	623	866	1026	653	1264	886	965	0	1584	1477	2024	2438	856	1556	524	390	1156	1271	173	583	567	197	946	448
GBR	804	771	1712	736	1292	957	903	1071	0	1492	1734	2211	791	1214	499	396	924	1083	187	766	546	198	976	461
ITA	550	663	1623	657	1511	976	937	1007	1299	0	1490	2392	841	1394	296	299	940	1213	212	467	623	256	1017	556
NLD	781	1171	1285	834	1961	1252	966	1306	1468	1306	0	2275	807	1413	645	383	942	1430	235	696	520	230	1030	496
USA	963	700	3456	866	1643	1063	1060	1348	2035	2033	1847	0	1164	1689	561	467	1744	1651	242	609	924	221	1341	708
HUN	345	343	795	316	689	529	558	574	639	712	613	1053	0	747	280	300	612	842	122	339	453	129	657	334
POL	397	484	945	410	1215	765	628	983	936	1097	1093	1424	577	0	325	291	777	1161	211	429	540	227	907	524
NZL	416	226	334	214	322	301	271	307	393	250	575	475	208	203	0	204	332	344	52	350	194	63	314	143
ZAF	286	212	350	192	293	302	340	319	369	262	346	496	257	217	186	0	308	303	54	237	233	57	322	137
JPN	313	246	441	237	361	326	332	340	376	388	370	506	251	270	162	196	0	765	117	347	534	128	628	327
CZE	365	408	813	362	1131	632	626	826	776	937	1219	1264	715	815	226	226	248	0	163	419	514	201	806	440
EST	53	61	101	45	157	129	66	82	101	125	154	165	68	123	24	23	31	89	0	74	87	57	135	119
IRL	402	398	439	369	493	446	411	512	821	431	635	561	282	315	285	226	201	314	39	0	222	88	404	184
KOR	246	205	698	208	371	315	376	339	414	529	362	1046	352	390	134	178	256	361	35	153	0	105	492	271
SVN	77	104	152	86	304	163	119	148	146	227	198	176	93	176	46	38	56	143	29	71	66	0	150	108
PRT	437	580	1088	446	932	743	834	836	892	1011	1025	1389	620	845	246	307	312	662	79	344	419	115	0	428
LVA	115	140	304	127	554	246	200	221	262	360	307	603	229	354	74	82	94	273	62	104	162	62	333	0

HOL

common bulls below diagonal																								
common three quarter		sib group												above diagonal										
AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN	LVA	
AUS	0	492	935	479	902	790	654	885	931	644	927	1132	478	602	513	308	392	560	103	439	350	566	109	253
BEL	447	0	677	539	911	673	598	833	741	652	980	763	407	596	277	235	331	536	103	401	280	573	134	249
CAN	868	656	0	876	2134	1203	1362	1494	1685	1825	1422	3403	899	1237	389	376	900	1163	188	469	749	1070	198	513
CHE	434	539	778	0	1016	599	578	707	741	726	852	933	376	563	257	218	344	498	93	373	291	496	119	249
DEU	623	869	1324	862	0	2127	1481	2369	1906	2261	2659	2911	1026	1836	464	372	972	1693	266	610	603	1140	322	731
DFS	532	601	895	543	1248	0	976	1598	1373	1206	1684	1699	736	1169	468	384	591	1090	207	561	471	853	205	435
ESP	507	585	887	476	836	703	0	1269	1118	1268	1132	1589	722	966	333	368	685	903	149	430	526	867	172	399
FRA	623	853	1026	654	1265	887	969	0	1584	1477	2013	2438	856	1556	524	390	813	1271	173	583	563	946	195	448
GBR	804	754	1712	736	1292	957	907	1071	0	1492	1731	2211	791	1214	499	396	683	1083	187	766	543	976	196	461
ITA	550	663	1623	657	1511	976	941	1007	1299	0	1490	2392	841	1394	296	299	857	1213	212	467	619	1017	254	556
NLD	781	1074	1285	834	1960	1252	968	1307	1467	1306	0	2268	807	1412	644	383	696	1430	234	695	514	1030	227	495
USA	963	685	3456	866	1643	1063	1064	1348	2035	2033	1844	0	1164	1689	561	467	1223	1651	242	609	918	1341	219	708
HUN	345	339	795	316	689	529	558	574	639	712	613	1053	0	747	280	300	494	842	122	339	451	657	128	334
POL	397	481	945	410	1215	765	630	983	936	1097	1093	1424	577	0	325	291	673	1161	211	429	537	907	225	524
NZL	416	220	334	214	322	301	273	307	393	250	575	475	208	203	0	204	219	344	52	350	192	314	63	143
ZAF	285	209	349	191	292	301	339	318	368	261	345	495	256	216	186	0	210	303	54	237	231	322	55	137
JPN	271	218	401	218	333	296	289	303	327	374	327	447	223	260	138	151	0	622	105	259	447	512	124	287
CZE	365	405	813	362	1131	632	627	826	776	937	1219	1264	715	815	226	226	229	0	163	419	512	806	199	440
EST	53	61	101	45	157	129	66	82	101	125	154	165	68	123	24	23	31	89	0	74	87	135	56	119
IRL	402	392	439	369	493	446	411	512	821	431	635	561	282	315	285	225	177	314	39	0	220	404	87	184
KOR	246	204	697	207	370	314	378	338	413	528	361	1041	352	389	134	177	240	360	35	153	0	491	104	270
PRT	437	577	1088	446	932	743	836	836	892	1011	1025	1389	620	845	246	306	282	662	79	344	419	0	149	428
SVN	76	103	151	85	303	162	118	146	145	225	195	175	92	175	46	38	55	142	29	70	65	115	0	107
LVA	115	140	304	127	554	246	200	221	262	360	307	603	229	354	74	82	90	273	62	104	162	333	62	0

HOL

common bulls below diagonal																								
common three quarter		sib group												above diagonal										
AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA	
AUS	0	517	935	479	902	790	658	885	931	644	929	1132	478	602	513	308	584	560	103	439	351	110	566	253

BEL	450	0	697	546	933	694	621	880	772	654	1069	810	422	608	292	247	439	550	103	416	289	135	582	250
CAN	868	666	0	876	2134	1203	1367	1494	1685	1825	1425	3403	899	1237	389	376	1199	1163	188	469	749	199	1072	513
CHE	434	543	778	0	1016	599	581	706	741	726	852	933	376	563	257	218	404	498	93	373	292	121	497	249
DEU	623	875	1324	862	0	2127	1495	2368	1906	2261	2661	2911	1026	1836	464	372	1208	1693	266	610	602	324	1141	731
DFS	532	606	895	543	1248	0	986	1598	1373	1206	1692	1699	736	1169	468	384	818	1090	207	561	472	207	854	435
ESP	510	598	889	482	852	712	0	1281	1126	1274	1145	1597	724	974	337	369	866	910	151	433	528	173	872	403
FRA	623	866	1026	653	1264	887	982	0	1584	1477	2024	2438	856	1556	524	390	1154	1271	173	583	562	197	948	448
GBR	804	771	1712	736	1292	957	916	1071	0	1492	1734	2211	791	1214	499	396	922	1083	187	766	543	198	976	461
ITA	550	663	1623	657	1511	976	948	1007	1299	0	1490	2392	841	1394	296	299	937	1213	212	467	617	256	1018	556
NLD	781	1171	1285	834	1961	1252	979	1306	1468	1306	0	2275	807	1413	645	383	939	1430	235	696	514	230	1032	496
USA	963	700	3456	866	1643	1064	1070	1348	2035	2033	1847	0	1164	1689	561	467	1741	1651	242	609	916	221	1343	708
HUN	345	343	795	316	689	529	561	574	639	712	613	1053	0	747	280	300	612	842	122	339	450	129	658	334
POL	397	484	945	410	1215	765	637	983	936	1097	1093	1424	577	0	325	291	777	1161	211	429	537	227	908	524
NZL	416	226	334	214	322	301	275	307	393	250	575	475	208	203	0	204	332	344	52	350	193	63	314	143
ZAF	286	212	350	192	293	302	342	319	369	262	346	496	257	217	186	0	307	303	54	237	232	57	322	137
JPN	309	243	437	234	358	324	328	335	371	385	364	500	251	269	162	194	0	764	117	347	532	127	628	327
CZE	365	408	813	362	1131	632	634	826	776	937	1219	1264	715	815	226	226	247	0	163	419	512	201	806	440
EST	53	61	101	45	157	129	67	82	101	125	154	165	68	123	24	23	31	89	0	74	87	57	135	119
IRL	402	398	439	369	493	446	414	512	821	431	635	561	282	315	285	226	201	314	39	0	220	88	404	184
KOR	246	204	696	207	370	314	378	336	412	527	359	1038	350	388	134	177	254	360	35	153	0	105	490	271
SVN	77	104	152	86	304	163	119	148	146	227	198	176	93	176	46	38	55	143	29	71	66	0	150	108
PRT	437	582	1089	447	932	743	844	838	894	1013	1028	1393	623	846	246	307	309	663	79	344	419	115	0	428
LVA	115	140	304	127	554	246	205	221	262	360	307	603	229	354	74	82	94	273	62	104	162	62	334	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	472	854	479	899	789	656	637	928	644	835	1131	476	563	260	546	442	102	424	266	109	563	229
BEL	440	0	648	528	884	644	589	727	712	649	923	732	397	564	207	396	459	100	378	234	134	564	229
CAN	813	645	0	853	2069	1107	1299	1193	1591	1818	1287	3209	877	1186	313	1077	1029	185	439	647	198	1052	485
CHE	434	529	763	0	1015	598	583	649	741	726	825	933	374	545	198	397	432	93	366	245	119	493	230
DEU	623	851	1321	862	0	2125	1497	2036	1902	2260	2595	2908	1021	1798	336	1179	1488	265	592	528	322	1138	704
DFS	532	592	892	543	1248	0	982	1221	1367	1206	1577	1697	731	1116	332	775	900	206	534	384	205	848	409
ESP	512	587	879	483	860	718	0	1088	1126	1277	1095	1597	725	945	324	832	805	150	423	450	173	875	384
FRA	521	736	900	591	1151	796	867	0	1234	1417	1493	1672	742	1395	272	853	1037	160	457	448	195	837	401
GBR	803	735	1639	735	1291	955	925	895	0	1492	1619	2203	788	1168	342	875	927	186	720	456	196	970	434
ITA	550	661	1623	657	1511	976	952	988	1299	0	1481	2391	841	1386	292	932	1169	212	462	573	254	1018	547
NLD	719	1014	1208	806	1937	1224	944	1086	1391	1301	0	1944	769	1339	316	837	1259	232	633	427	227	1003	462
USA	963	675	3343	866	1643	1063	1074	986	2034	2033	1570	0	1161	1638	401	1609	1442	242	581	784	219	1336	677
HUN	345	330	789	316	689	529	564	514	638	712	599	1053	0	720	273	597	726	122	325	394	128	657	317
POL	382	467	924	397	1198	742	615	923	913	1094	1058	1394	559	0	252	741	1057	209	391	490	225	886	504
ZAF	248	194	307	177	274	279	302	244	321	260	288	414	241	201	0	254	241	53	197	167	55	306	122
JPN	304	242	435	234	358	323	324	316	367	385	358	493	250	263	182	0	653	115	320	445	126	620	307
CZE	309	352	737	306	1014	552	537	669	664	910	1107	1112	606	759	178	232	0	156	337	440	197	731	411
EST	53	60	101	45	157	129	67	78	101	125	153	165	68	122	23	31	84	0	72	82	56	135	113
IRL	398	383	436	366	491	444	417	424	786	430	605	555	280	301	196	200	258	39	0	166	87	390	166
KOR	185	179	607	180	332	270	314	299	336	494	302	885	301	366	119	221	314	33	119	0	103	432	246
SVN	76	103	151	85	303	162	119	146	145	225	195	175	92	175	38	54	141	29	70	65	0	149	107
PRT	434	572	1068	444	932	741	848	778	891	1013	1006	1389	622	834	297	308	602	79	341	372	115	0	411
LVA	103	129	290	117	533	232	194	206	244	357	286	582	216	342	74	90	260	57	94	151	62	321	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	490	935	479	638	789	668	881	931	644	893	1132	477	601	308	584	560	103	438	350	109	571	253
BEL	447	0	675	538	736	669	616	827	740	652	974	762	407	595	235	417	536	103	400	281	134	577	248
CAN	868	656	0	876	1750	1203	1373	1478	1685	1825	1380	3403	898	1235	376	1199	1163	188	469	748	198	1075	513
CHE	434	539	778	0	857	599	588	703	741	725	842	933	376	561	218	404	497	93	373	292	119	500	249
DEU	511	719	1202	721	0	1528	1241	1743	1458	2100	2057	2206	791	1564	252	895	1328	240	448	507	316	932	671
DFS	532	601	895	543	1066	0	1002	1570	1371	1205	1637	1697	734	1166	384	818	1090	207	560	472	205	859	435
ESP	520	613	898	489	712	732	0	1290	1145	1283	1145	1613	731	987	373	870	923	154	446	531	176	890	407
FRA	623	849	1026	653	1041	885	1016	0	1570	1477	1856	2396	853	1546	389	1139	1266	171	577	557	195	951	447
GBR	804	755	1712	736	1083	957	943	1072	0	1492	1690	2208	790	1210	395	921	1083	187	760	543	196	980	461

ITA	550	663	1623	657	1427	976	962	1007	1299	0	1481	2392	841	1393	299	937	1213	212	467	616	254	1018	556
NLD	771	1072	1272	832	1655	1249	1001	1262	1448	1304	0	2104	791	1390	371	898	1420	234	682	508	227	1026	490
USA	963	685	3456	866	1385	1063	1085	1313	2035	2033	1789	0	1163	1685	467	1740	1651	242	607	914	219	1345	708
HUN	345	339	795	316	539	528	569	574	639	712	611	1053	0	746	299	612	841	122	338	448	128	659	334
POL	397	481	945	409	1101	764	655	983	935	1097	1085	1424	576	0	290	777	1158	209	427	535	224	909	523
ZAF	286	210	350	192	202	302	344	319	369	262	340	496	257	217	0	306	303	54	237	232	55	328	137
JPN	309	243	437	234	314	324	330	334	370	385	361	499	251	269	193	0	764	117	347	531	126	633	327
CZE	365	405	813	362	932	632	650	826	776	937	1217	1264	715	815	226	247	0	162	419	511	199	807	440
EST	53	61	101	45	143	129	70	82	101	125	154	165	68	122	23	31	89	0	74	87	56	134	119
IRL	401	392	439	369	385	446	431	512	815	431	631	561	282	315	226	201	314	39	0	220	87	405	184
KOR	245	204	695	207	331	314	379	334	412	526	355	1031	349	387	177	253	359	35	153	0	103	492	270
SVN	76	103	151	85	303	162	123	146	145	225	195	175	92	175	38	54	142	29	70	64	0	149	107
PRT	439	582	1091	450	801	747	865	841	900	1013	1026	1396	626	849	308	309	666	78	345	419	115	0	428
LVA	115	140	304	127	525	246	212	221	262	360	306	603	229	354	82	94	273	62	104	161	62	334	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	510	935	479	902	789	668	839	931	644	873	1132	478	601	513	308	584	560	103	439	351	107	566	253
BEL	449	0	693	545	929	689	634	861	767	653	1017	795	419	605	288	245	432	548	103	414	289	132	581	250
CAN	868	666	0	876	2133	1203	1373	1422	1685	1825	1350	3403	899	1237	389	376	1199	1163	188	469	751	196	1071	513
CHE	434	542	778	0	1016	599	588	704	741	726	832	933	376	563	257	218	404	498	93	373	292	118	496	249
DEU	623	875	1324	862	0	2127	1514	2350	1906	2261	2617	2911	1026	1835	464	372	1208	1693	266	610	605	318	1141	731
DFS	532	605	895	543	1249	0	1002	1524	1372	1206	1614	1698	735	1168	467	384	818	1090	207	560	473	202	854	435
ESP	520	621	898	489	880	732	0	1270	1146	1283	1130	1613	732	989	345	373	871	923	154	446	533	174	885	407
FRA	622	863	1021	652	1263	884	1013	0	1535	1472	1821	2246	843	1546	496	377	1081	1260	171	569	550	193	939	443
GBR	804	772	1712	736	1292	957	943	1064	0	1492	1667	2210	791	1214	499	396	922	1083	187	764	544	194	976	461
ITA	550	663	1623	657	1511	976	962	1006	1299	0	1476	2391	841	1394	296	299	936	1213	212	467	621	251	1018	556
NLD	747	1111	1228	811	1930	1227	975	1238	1414	1295	0	2038	786	1389	618	364	869	1410	232	682	501	225	1012	485
USA	963	699	3456	866	1643	1064	1085	1278	2035	2033	1599	0	1164	1689	561	467	1741	1651	242	608	921	218	1342	708
HUN	345	343	795	316	689	529	569	572	639	712	595	1053	0	747	280	300	612	842	122	339	453	128	658	334
POL	397	484	945	410	1215	765	656	982	936	1097	1083	1424	577	0	325	291	777	1161	211	429	539	224	908	524
NZL	416	226	334	214	322	301	281	306	393	250	554	475	208	203	0	204	332	344	52	350	193	62	314	143
ZAF	286	212	350	192	293	302	344	318	369	262	326	496	257	217	186	0	307	303	54	237	232	55	322	137
JPN	309	243	437	234	358	324	331	335	371	385	361	500	251	269	162	194	0	764	117	347	532	125	628	327
CZE	365	408	813	362	1131	632	650	823	776	937	1201	1264	715	815	226	226	247	0	163	419	513	199	806	440
EST	53	61	101	45	157	129	70	82	101	125	153	165	68	123	24	23	31	89	0	74	87	56	135	119
IRL	402	398	439	369	493	446	431	508	819	431	620	561	282	315	285	226	201	314	39	0	221	86	404	184
KOR	246	204	697	207	370	314	382	338	413	528	351	1041	352	389	134	177	254	360	35	153	0	103	492	271
SVN	75	102	150	85	298	159	122	146	144	223	195	174	92	175	45	37	53	142	29	69	65	0	147	106
PRT	437	581	1088	446	932	743	859	834	893	1012	1010	1390	622	846	246	307	309	662	79	344	419	114	0	428
LVA	115	140	304	127	554	246	212	221	262	360	303	603	229	354	74	82	94	273	62	104	162	61	333	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	510	935	479	902	743	659	881	931	644	902	1132	478	602	513	308	585	560	103	439	351	109	565	253
BEL	449	0	693	545	929	678	620	866	766	653	1030	795	419	605	288	245	433	548	103	414	290	134	580	250
CAN	868	666	0	876	2134	1125	1368	1479	1685	1825	1393	3403	899	1237	389	376	1200	1163	188	469	752	198	1069	513
CHE	434	542	778	0	1016	595	583	706	741	726	844	933	376	563	257	218	404	498	93	373	293	120	496	249
DEU	623	875	1324	862	0	2073	1497	2364	1906	2261	2645	2911	1026	1836	464	372	1209	1693	266	610	606	323	1139	731
DFS	532	605	895	543	1248	0	945	1487	1313	1204	1616	1605	719	1148	440	357	765	1056	205	543	461	206	844	431
ESP	510	600	891	483	854	714	0	1271	1128	1275	1130	1599	725	976	338	371	868	911	151	434	530	172	871	404
FRA	623	865	1026	653	1263	886	985	0	1571	1477	1900	2399	854	1553	520	389	1142	1266	172	578	562	196	943	447
GBR	804	770	1711	736	1291	956	916	1069	0	1492	1703	2210	791	1214	499	396	923	1083	187	764	545	197	974	461
ITA	550	663	1623	657	1511	975	950	1007	1298	0	1482	2392	841	1394	296	299	938	1213	212	467	622	255	1018	556
NLD	776	1141	1277	833	1957	1250	978	1281	1453	1301	0	2144	798	1402	631	373	906	1424	234	689	514	229	1024	490
USA	963	699	3456	866	1643	1063	1072	1313	2035	2033	1801	0	1164	1689	561	467	1742	1651	242	608	923	220	1340	708
HUN	345	343	795	316	689	529	563	574	639	712	612	1053	0	747	280	300	612	842	122	339	453	128	658	334
POL	397	484	945	410	1215	765	640	983	936	1097	1091	1424	577	0	325	291	777	1161	211	429	540	226	906	524
NZL	416	226	334	214	322	301	275	307	393	250	573	475	208	203	0	204	332	344	52	350	193	63	314	143
ZAF	286	212	350	192	293	302	343	319	369	262	344	496	257	217	186	0	308	303	54	237	232	56	321	137
JPN	309	244	438	234	359	325	330	336	372	386	364	501	251	269	162	195	0	765	117	347	533	126	629	327

CZE	365	408	813	362	1131	632	635	826	776	937	1217	1264	715	815	226	226	247	0	163	419	514	200	805	440
EST	53	61	101	45	157	129	67	82	101	125	154	165	68	123	24	23	31	89	0	74	87	56	134	119
IRL	402	398	439	369	493	446	415	512	819	431	632	561	282	315	285	226	201	314	39	0	221	87	404	184
KOR	246	205	698	208	371	315	380	339	414	529	359	1043	352	390	134	178	255	361	35	153	0	104	492	271
SVN	76	103	151	85	303	162	118	147	145	226	197	175	92	175	46	38	54	142	29	70	65	0	149	107
PRT	437	581	1088	446	932	740	845	836	893	1012	1023	1390	622	846	246	307	310	662	79	344	419	115	0	428
LVA	115	140	304	127	554	246	206	221	262	360	306	603	229	354	74	82	94	273	62	104	162	62	333	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	510	935	479	902	790	671	885	931	644	928	1132	478	602	513	308	584	560	103	439	351	110	566	253
BEL	449	0	693	545	929	690	636	870	767	653	1039	795	419	605	288	245	432	548	103	414	289	135	582	250
CAN	868	666	0	876	2134	1203	1375	1494	1685	1825	1424	3403	899	1237	389	376	1199	1163	188	469	749	199	1072	513
CHE	434	542	778	0	1016	599	588	706	741	726	850	933	376	563	257	218	404	498	93	373	292	121	497	249
DEU	623	875	1324	862	0	2127	1523	2368	1906	2261	2658	2911	1026	1836	464	372	1208	1693	266	610	602	324	1141	731
DFS	532	605	896	543	1249	0	1008	1598	1373	1206	1692	1699	736	1169	468	384	818	1090	207	561	472	207	854	435
ESP	521	624	899	489	895	739	0	1309	1151	1287	1176	1618	734	996	348	373	874	927	155	448	532	177	889	410
FRA	623	866	1026	653	1264	887	1030	0	1585	1477	2023	2438	856	1556	524	390	1154	1271	173	583	562	197	948	448
GBR	804	772	1712	736	1292	957	950	1072	0	1492	1733	2211	791	1214	499	396	922	1083	187	766	543	198	976	461
ITA	550	663	1623	657	1511	976	966	1007	1299	0	1486	2392	841	1394	296	299	937	1213	212	467	617	256	1018	556
NLD	781	1149	1284	834	1959	1251	1019	1306	1467	1302	0	2272	807	1411	644	383	939	1429	235	696	514	230	1031	495
USA	963	699	3456	866	1643	1065	1087	1348	2035	2033	1843	0	1164	1689	561	467	1741	1651	242	609	915	221	1343	708
HUN	345	343	795	316	689	530	572	574	639	712	612	1053	0	747	280	300	612	842	122	339	450	129	658	334
POL	397	484	945	410	1215	765	664	983	936	1097	1092	1424	577	0	325	291	777	1161	211	429	537	227	908	524
NZL	416	226	334	214	322	301	283	307	393	250	575	475	208	203	0	204	332	344	52	350	193	63	314	143
ZAF	286	212	350	192	293	303	344	319	369	262	346	496	257	217	186	0	307	303	54	237	232	57	322	137
JPN	309	243	437	234	358	324	331	335	371	385	364	500	251	269	162	194	0	764	117	347	532	127	628	327
CZE	365	408	813	362	1131	632	653	826	776	937	1218	1264	715	815	226	226	247	0	163	419	512	201	806	440
EST	53	61	101	45	157	129	71	82	101	125	154	165	68	123	24	23	31	89	0	74	87	57	135	119
IRL	402	398	439	369	493	446	433	512	821	431	635	561	282	315	285	226	201	314	39	0	220	88	404	184
KOR	246	204	696	207	370	314	382	336	412	527	359	1037	350	388	134	177	254	360	35	153	0	105	490	271
SVN	77	104	152	86	304	163	124	148	146	227	198	176	93	176	46	38	55	143	29	71	66	0	150	108
PRT	437	582	1089	447	932	743	862	838	894	1013	1027	1393	623	846	246	307	309	663	79	344	419	115	0	428
LVA	115	140	304	127	554	246	220	221	262	360	307	603	229	354	74	82	94	273	62	104	162	62	334	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	514	935	479	902	790	656	885	931	644	930	1132	478	602	308	586	560	103	438	351	110	566	253
BEL	448	0	694	544	928	690	618	874	767	654	1065	805	420	606	244	438	549	103	411	287	135	581	250
CAN	868	662	0	876	2134	1203	1365	1494	1685	1825	1458	3403	899	1237	376	1202	1163	188	469	750	199	1070	513
CHE	434	541	778	0	1016	599	579	706	741	726	856	933	376	563	218	406	498	93	373	292	121	496	249
DEU	623	874	1324	862	0	2127	1487	2368	1906	2261	2696	2911	1026	1836	372	1211	1693	266	610	604	324	1140	731
DFS	532	605	896	543	1248	0	981	1598	1373	1206	1702	1699	736	1169	384	819	1090	207	561	472	207	853	435
ESP	508	593	887	478	843	707	0	1275	1123	1272	1152	1592	723	971	368	868	907	151	432	527	173	870	402
FRA	623	864	1026	653	1264	887	973	0	1584	1477	2037	2438	856	1556	390	1156	1271	173	583	564	197	946	448
GBR	804	767	1712	736	1292	957	911	1071	0	1492	1756	2211	791	1214	396	924	1083	187	763	544	198	976	461
ITA	550	663	1623	657	1511	976	944	1007	1299	0	1514	2393	842	1395	299	940	1213	212	467	620	256	1017	556
NLD	786	1165	1324	842	2002	1259	980	1316	1492	1334	0	2307	812	1433	383	946	1445	240	699	523	234	1038	503
USA	963	696	3456	866	1643	1065	1066	1348	2035	2033	1884	0	1164	1690	467	1744	1651	242	609	920	221	1341	708
HUN	345	342	795	316	689	530	559	574	639	712	616	1053	0	748	300	612	842	122	339	452	129	657	334
POL	397	484	945	410	1215	765	634	983	936	1098	1114	1424	578	0	291	777	1161	211	429	538	227	907	524
ZAF	286	212	350	192	293	303	340	319	369	262	347	496	257	217	0	308	303	54	237	232	57	322	137
JPN	313	246	441	237	361	326	332	340	376	388	372	506	251	270	196	0	765	117	347	533	128	628	327
CZE	365	408	813	362	1131	632	630	826	776	937	1225	1264	715	815	226	248	0	163	419	513	201	806	440
EST	53	61	101	45	157	129	67	82	101	125	155	165	68	123	23	31	89	0	74	87	57	135	119
IRL	401	397	439	369	493	446	412	512	818	431	638	561	282	315	226	201	314	39	0	221	88	404	184
KOR	246	204	697	207	370	314	378	338	413	528	368	1042	352	389	178	256	360	35	153	0	105	492	271
SVN	77	104	152	86	304	163	119	148	146	227	202	176	93	176	38	56	143	29	71	66	0	150	108
PRT	437	580	1088	446	932	743	839	836	892	1011	1030	1389	620	845	307	312	662	79	344	419	115	0	428
LVA	115	140	304	127	554	246	203	221	262	360	312	603	229	354	82	94	273	62	104	162	62	333	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
AUS	0	510	935	479	902	790	659	885	931	644	930	1132	478	602	513	308	586	560	102	439	351	108	566	229
BEL	449	0	693	545	929	690	620	869	766	653	1041	795	419	605	288	245	434	548	103	414	289	133	581	231
CAN	868	666	0	876	2134	1203	1367	1494	1685	1825	1458	3403	899	1237	389	376	1202	1163	188	469	751	196	1070	487
CHE	434	542	778	0	1016	599	582	706	741	726	856	933	376	563	257	218	406	498	93	373	292	118	496	230
DEU	623	875	1324	862	0	2127	1496	2368	1906	2261	2696	2911	1026	1837	464	372	1211	1693	265	610	605	318	1140	703
DFS	532	605	896	543	1248	0	986	1598	1373	1206	1702	1699	736	1169	468	384	819	1090	206	561	473	202	853	409
ESP	510	600	890	482	853	713	0	1282	1127	1274	1157	1598	724	975	338	370	868	910	150	433	529	171	872	382
FRA	623	865	1026	653	1264	887	984	0	1584	1477	2037	2438	856	1556	524	390	1156	1271	172	583	565	193	946	423
GBR	804	771	1712	736	1292	957	917	1071	0	1492	1756	2211	791	1214	499	396	924	1083	187	766	544	194	976	433
ITA	550	663	1623	657	1511	976	949	1007	1299	0	1514	2393	842	1396	296	299	940	1213	212	467	621	252	1017	547
NLD	786	1152	1324	842	2002	1259	985	1316	1492	1334	0	2307	812	1433	645	383	946	1445	239	699	525	229	1038	470
USA	963	699	3456	866	1643	1064	1071	1348	2035	2033	1884	0	1164	1691	561	467	1744	1651	242	609	922	218	1341	677
HUN	345	343	795	316	689	530	562	574	639	712	616	1053	0	748	280	300	612	842	122	339	453	129	657	317
POL	397	484	945	410	1215	765	639	983	936	1099	1114	1424	578	0	325	291	777	1161	210	429	539	225	907	503
NZL	416	226	334	214	322	301	275	307	393	250	576	475	208	203	0	204	332	344	52	350	193	62	314	125
ZAF	286	212	350	192	293	303	342	319	369	262	347	496	257	217	186	0	308	303	54	237	232	56	322	124
JPN	312	246	441	237	361	326	332	339	375	388	371	505	251	270	162	196	0	765	117	347	533	127	628	309
CZE	365	408	813	362	1131	632	634	826	776	937	1225	1264	715	815	226	226	247	0	163	419	513	199	806	425
EST	53	61	101	45	157	129	67	82	101	125	155	165	68	123	24	23	31	89	0	74	87	57	135	113
IRL	402	398	439	369	493	446	414	512	821	431	638	561	282	315	285	226	201	314	39	0	221	87	404	170
KOR	246	204	697	207	370	314	379	338	413	528	368	1042	352	389	134	178	256	360	35	153	0	104	492	261
SVN	76	103	151	86	298	159	118	146	145	224	200	175	93	176	45	37	55	143	29	70	66	0	148	107
PRT	437	580	1088	446	932	743	843	836	892	1011	1030	1389	620	845	246	307	312	662	79	344	419	114	0	411
LVA	103	129	290	117	532	232	192	210	244	357	291	582	216	342	64	74	90	265	57	94	160	61	321	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA	NZL
AUS	0	517	935	479	902	790	656	885	931	644	928	1132	466	602	308	578	560	103	438	352	108	566	253	65
BEL	450	0	697	546	933	694	621	880	772	654	1069	810	415	608	247	440	550	103	416	291	133	581	250	51
CAN	868	666	0	876	2134	1203	1366	1494	1685	1825	1424	3403	885	1237	376	1195	1163	188	469	753	196	1070	513	76
CHE	434	543	778	0	1016	599	580	706	741	726	850	933	372	563	218	406	498	93	373	294	118	496	249	55
DEU	623	875	1324	862	0	2127	1489	2368	1906	2261	2658	2911	1017	1837	372	1209	1693	266	610	607	318	1140	731	83
DFS	532	606	896	543	1248	0	982	1598	1373	1206	1692	1699	722	1169	384	813	1090	207	561	475	202	853	435	56
ESP	508	596	888	479	845	708	0	1276	1123	1273	1140	1594	714	972	368	858	908	151	432	529	171	870	402	63
FRA	623	866	1026	653	1264	887	974	0	1584	1477	2022	2438	838	1556	390	1143	1271	173	583	567	193	946	448	61
GBR	804	771	1712	736	1292	957	912	1071	0	1492	1732	2211	777	1214	396	919	1083	187	763	546	194	976	461	74
ITA	550	663	1623	657	1511	976	945	1007	1299	0	1486	2392	840	1395	299	940	1213	212	467	623	252	1017	556	76
NLD	781	1171	1284	834	1959	1251	976	1305	1466	1302	0	2272	790	1411	383	936	1429	235	696	520	225	1029	495	110
USA	963	700	3456	866	1643	1065	1067	1348	2035	2033	1843	0	1135	1690	467	1724	1651	242	609	924	218	1341	708	78
HUN	332	334	781	312	682	521	545	563	623	709	599	1027	0	742	292	603	830	122	333	452	129	655	334	43
POL	397	484	945	410	1215	765	635	983	936	1098	1092	1424	573	0	291	775	1161	211	429	540	225	907	524	57
ZAF	286	212	350	192	293	303	340	319	369	262	346	496	246	217	0	305	303	54	237	233	56	322	137	20
JPN	312	246	441	237	361	326	332	339	375	388	369	505	245	270	196	0	764	116	345	534	127	628	327	56
CZE	365	408	813	362	1131	632	631	826	776	937	1218	1264	704	815	226	247	0	163	419	514	199	806	440	59
EST	53	61	101	45	157	129	67	82	101	125	154	165	68	123	23	31	89	0	74	87	57	135	119	19
IRL	401	398	439	369	493	446	413	512	818	431	635	561	274	315	226	201	314	39	0	222	87	404	184	51
KOR	246	205	698	208	371	315	378	339	414	529	362	1046	350	390	178	256	361	35	153	0	104	492	271	47
SVN	76	103	151	86	298	159	118	146	145	224	196	175	93	176	37	55	143	29	70	66	0	148	107	29
PRT	437	580	1088	446	932	743	840	836	892	1011	1024	1389	617	845	307	312	662	79	344	419	114	0	428	56
LVA	115	140	304	127	554	246	204	221	262	360	307	603	229	354	82	94	273	62	104	162	61	333	0	32
NZL	70	46	76	47	76	50	58	57	70	68	106	80	28	42	21	51	46	7	43	41	18	54	16	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	POL	NZL	JPN	CZE	EST	IRL	KOR	SVN	PRT	ZAF	HUN	LVA
AUS	0	504	934	461	897	665	661	883	795	643	775	852	498	506	390	441	102	372	229	108	479	167	321	253

BEL	448	0	686	519	918	634	622	854	687	653	929	691	521	284	332	464	103	354	208	133	509	144	307	250
CAN	867	661	0	839	2126	1046	1368	1493	1506	1823	1307	2989	1133	384	899	1033	187	404	572	196	952	227	729	513
CHE	429	518	748	0	926	556	576	687	696	709	737	846	488	252	342	418	92	330	219	117	432	133	293	244
DEU	622	873	1323	806	0	1977	1498	2339	1744	2258	2546	2584	1700	454	970	1485	265	537	468	318	1025	223	798	731
DFS	493	567	865	502	1202	0	882	1361	1127	1185	1483	1302	1012	379	578	875	200	447	326	202	730	212	531	422
ESP	511	605	892	480	858	666	0	1289	1018	1276	1061	1427	878	339	686	804	150	365	398	172	776	219	564	405
FRA	623	860	1026	638	1248	829	995	0	1295	1475	1628	1736	1388	515	813	1083	171	467	412	193	816	215	645	447
GBR	716	706	1556	680	1232	853	809	940	0	1466	1458	1836	1068	392	667	900	175	573	394	193	833	221	578	444
ITA	550	663	1623	648	1510	963	952	1007	1291	0	1493	2339	1359	294	856	1169	211	449	514	252	967	230	767	556
NLD	692	1011	1209	732	1936	1162	909	1169	1262	1322	0	1697	1273	521	690	1257	233	562	379	229	888	212	598	486
USA	792	660	3185	787	1561	964	965	1057	1814	2023	1438	0	1497	387	1182	1391	232	482	679	218	1136	258	865	686
POL	339	420	887	346	1119	686	548	881	842	1070	1006	1303	0	247	651	1025	198	345	441	223	805	188	605	498
NZL	413	224	332	211	321	270	277	306	325	250	478	347	159	0	217	254	51	285	122	62	247	100	160	142
JPN	270	218	400	217	332	295	289	303	327	373	328	446	247	138	0	595	104	242	376	123	492	164	439	287
CZE	309	352	737	297	1013	548	537	683	657	910	1107	1096	739	176	225	0	155	325	385	197	695	203	642	418
EST	53	61	101	45	157	126	67	82	98	125	151	162	114	24	31	84	0	67	78	57	127	46	110	119
IRL	355	359	398	332	461	385	363	433	592	423	543	486	263	242	177	257	39	0	140	87	332	125	229	176
KOR	170	160	542	163	300	236	274	268	293	442	275	779	333	92	199	273	32	102	0	103	367	129	327	223
SVN	76	103	151	86	298	159	119	146	145	224	200	175	176	45	54	142	29	70	66	0	148	54	126	107
PRT	373	503	944	381	843	631	722	716	748	961	872	1181	758	194	269	572	74	285	321	114	0	211	507	405
ZAF	160	132	212	111	182	187	192	189	197	202	186	263	160	92	124	155	21	119	88	36	202	0	171	104
HUN	245	249	658	243	536	402	409	432	462	641	455	801	484	117	199	546	61	197	250	92	486	151	0	299
LVA	115	140	304	125	554	245	208	220	258	360	306	592	339	74	90	263	62	104	137	61	315	64	202	0

HOL

 common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0	517	935	479	901	790	656	763	931	644	929	1129	478	601	513	585	560	102	439	352	109	566
BEL	450	0	695	544	931	692	624	819	771	653	1068	805	422	607	292	440	550	103	415	291	133	580
CAN	868	666	0	876	2133	1203	1358	1338	1685	1825	1425	3381	899	1236	389	1201	1163	188	469	755	197	1070
CHE	434	543	778	0	1015	599	583	683	741	726	852	928	376	562	257	405	498	93	373	294	118	496
DEU	623	874	1324	862	0	2126	1498	2242	1905	2260	2660	2901	1025	1831	463	1209	1692	265	609	606	318	1139
DFS	532	606	896	543	1248	0	985	1434	1373	1206	1692	1696	736	1166	468	819	1090	206	560	476	202	853
ESP	512	607	892	483	860	718	0	1208	1130	1277	1154	1593	728	980	343	864	915	150	439	532	173	879
FRA	593	825	981	638	1201	862	967	0	1447	1460	1734	2018	816	1471	443	1008	1218	168	540	535	193	908
GBR	804	772	1712	736	1292	957	926	1039	0	1492	1735	2205	791	1213	499	924	1083	187	765	546	195	974
ITA	550	663	1623	657	1511	976	952	1002	1299	0	1490	2387	841	1394	296	939	1213	212	467	624	253	1018
NLD	781	1172	1285	834	1961	1252	990	1201	1469	1306	0	2268	807	1411	645	941	1430	234	696	520	225	1031
USA	959	698	3422	860	1635	1060	1071	1168	2027	2026	1839	0	1161	1684	560	1739	1645	241	606	926	218	1339
HUN	345	343	795	316	689	530	564	566	639	712	613	1051	0	746	280	612	842	122	339	453	128	657
POL	397	484	945	410	1215	765	643	939	936	1097	1093	1420	577	0	325	776	1161	210	429	540	225	908
NZL	416	226	334	214	322	301	278	288	393	250	575	473	208	203	0	332	344	52	350	195	63	314
JPN	311	245	439	236	360	326	331	337	375	387	368	504	251	270	162	0	765	117	347	535	126	629
CZE	365	408	813	362	1131	632	639	799	776	937	1219	1258	715	815	226	248	0	163	419	514	197	805
EST	53	61	101	45	157	129	67	81	101	125	154	165	68	123	24	31	89	0	74	87	56	135
IRL	402	398	439	369	493	446	421	497	821	431	635	560	282	315	285	201	314	39	0	222	87	404
KOR	246	205	698	208	371	315	381	332	414	529	362	1044	352	390	134	256	361	35	153	0	104	492
SVN	76	102	151	85	299	159	119	144	145	224	194	175	92	175	46	54	141	29	70	65	0	149
PRT	437	581	1088	446	932	743	850	822	893	1012	1027	1382	622	846	246	311	662	79	344	419	115	0

HOL

 common bulls below diagonal

common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	JPN	CZE	EST	IRL	SVN	PRT
AUS	0	517	935	479	901	790	662	885	931	644	928	1132	478	602	513	585	560	102	426	108	566
BEL	450	0	697	546	933	694	628	880	773	654	1070	810	422	608	292	441	550	103	404	132	581
CAN	868	666	0	876	2134	1203	1369	1494	1685	1825	1424	3403	899	1237	389	1201	1163	188	455	196	1070
CHE	434	543	778	0	1015	599	584	705	741	726	850	933	376	563	257	405	498	93	366	118	496
DEU	623	875	1324	862	0	2127	1502	2364	1906	2261	2658	2911	1026	1836	463	1210	1693	265	594	316	1140
DFS	532	606	896	543	1248	0	992	1597	1373	1206	1692	1699	736	1169	468	819	1090	206	537	201	854
ESP	512	607	892	483	860	718	0	1291	1136	1277	1155	1605	728	982	344	870	916	150	426	172	879
FRA	623	867	1026	653	1260	887	995	0	1585	1477	2019	2438	856	1556	524	1156	1271	172	554	192	947
GBR	804	770	1711	736	1290	956	923	1070	0	1492	1733	2211	791	1214	499	924	1083	187	728	194	976
ITA	550	663	1623	657	1511	976	952	1007	1298	0	1486	2392	841	1394	296	939	1213	212	463	251	1018

NLD	781	1172	1284	834	1959	1251	990	1306	1465	1302	0	2272	807	1411	644	941	1429	234	660	223	1030
USA	963	700	3456	866	1643	1065	1077	1348	2035	2033	1843	0	1164	1689	561	1743	1651	242	583	218	1342
HUN	345	343	795	316	689	530	564	574	639	712	612	1053	0	747	280	612	842	122	328	129	657
POL	397	484	945	410	1215	765	643	983	936	1097	1092	1424	577	0	325	777	1161	210	418	225	908
NZL	416	226	334	214	322	301	279	307	393	250	575	475	208	203	0	332	344	52	336	62	314
JPN	311	245	439	236	360	326	331	339	375	387	368	504	251	270	162	0	765	117	333	126	629
CZE	365	408	813	362	1131	632	639	826	775	937	1218	1264	715	815	226	248	0	163	404	198	806
EST	53	61	101	45	157	129	67	82	101	125	154	165	68	123	24	31	89	0	73	57	135
IRL	400	397	438	367	491	445	418	505	797	431	627	555	280	315	281	201	313	39	0	87	393
SVN	76	102	151	86	296	158	119	145	145	223	194	175	93	176	45	54	142	29	70	0	148
PRT	437	581	1088	446	932	743	850	836	892	1012	1026	1390	622	846	246	311	662	79	344	114	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	JPN	CZE	EST	IRL	SVN	PRT
AUS	0	509	935	479	901	790	664	759	931	644	909	1130	466	600	576	560	102	425	109	571
BEL	449	0	690	541	925	687	626	813	764	652	1022	788	411	602	427	547	103	401	133	583
CAN	868	665	0	876	2133	1203	1371	1333	1685	1825	1394	3395	885	1236	1185	1163	188	455	197	1077
CHE	434	540	778	0	1015	599	586	678	741	726	843	931	372	562	403	498	93	366	118	501
DEU	623	874	1324	862	0	2126	1505	2236	1905	2260	2635	2910	1016	1830	1204	1692	265	593	318	1146
DFS	532	604	896	543	1248	0	996	1430	1373	1206	1664	1685	722	1166	808	1090	206	537	202	861
ESP	514	614	894	486	866	723	0	1206	1138	1279	1143	1603	720	984	859	918	152	427	174	888
FRA	586	821	971	629	1194	860	965	0	1442	1459	1708	2008	807	1469	996	1217	168	527	193	913
GBR	804	769	1711	736	1290	956	929	1026	0	1492	1710	2204	777	1213	912	1083	187	725	195	981
ITA	550	663	1623	657	1511	976	956	1001	1298	0	1486	2391	840	1394	937	1213	212	463	253	1019
NLD	755	1114	1238	813	1934	1230	968	1167	1429	1300	0	2165	783	1400	903	1419	233	654	225	1027
USA	959	695	3456	866	1642	1065	1078	1152	2034	2033	1637	0	1135	1687	1690	1649	242	581	218	1349
HUN	332	334	781	312	682	521	552	553	623	709	584	1027	0	741	602	830	122	323	128	658
POL	397	483	945	410	1215	765	646	938	936	1097	1085	1424	573	0	774	1161	210	418	225	912
JPN	309	244	438	234	359	325	331	332	372	386	363	501	245	269	0	762	116	329	126	633
CZE	365	407	813	362	1131	632	642	795	775	937	1202	1263	704	815	247	0	163	404	197	808
EST	53	61	101	45	157	129	69	81	101	125	153	165	68	123	31	89	0	73	56	135
IRL	399	397	438	367	491	445	420	491	794	431	617	555	273	315	201	313	39	0	87	395
SVN	76	102	151	85	299	159	120	144	145	224	194	175	92	175	54	141	29	70	0	149
PRT	439	585	1092	450	937	749	860	828	901	1013	1018	1395	623	850	310	666	79	345	115	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	CZE	IRL	KOR	SVN	PRT	EST	HUN	POL
BEL	0	645	453	760	640	565	768	708	604	867	730	451	376	194	107	497	73	305	366
CAN	645	0	764	1804	1107	1258	1301	1590	1719	1206	3207	1013	439	513	167	937	140	727	784
CHE	452	672	0	812	510	494	598	640	650	660	789	393	305	200	96	408	70	285	331
DEU	734	1206	683	0	1672	1279	1831	1547	1956	2128	2346	1347	478	414	246	915	194	762	1102
DFS	588	893	456	1100	0	905	1426	1362	1074	1433	1679	882	534	296	158	724	153	536	696
ESP	561	827	390	723	676	0	1143	1037	1175	1001	1474	793	389	363	144	760	109	561	635
FRA	794	967	536	1042	859	911	0	1439	1297	1490	2006	1048	526	370	152	796	122	643	969
GBR	733	1638	607	1100	954	825	1027	0	1378	1442	2195	910	719	353	164	837	138	585	754
ITA	627	1551	598	1372	912	895	948	1227	0	1318	2177	1073	413	457	204	902	167	727	943
NLD	944	1138	635	1671	1150	841	1084	1238	1212	0	1688	1205	573	338	179	851	169	585	844
USA	675	3342	708	1414	1064	943	1152	2032	1921	1373	0	1411	580	602	187	1153	169	878	1032
CZE	349	725	279	943	538	536	665	649	844	1071	1086	0	327	336	166	675	113	637	734
IRL	383	435	293	401	445	378	491	788	400	548	555	250	0	129	73	329	48	231	249
KOR	151	498	151	279	219	257	248	268	400	251	697	239	96	0	85	328	57	294	320
SVN	86	131	70	231	129	104	116	129	184	159	154	123	60	57	0	128	41	106	168
PRT	494	938	359	786	624	708	706	738	900	838	1177	553	281	289	98	0	90	502	573
EST	43	79	32	111	100	47	59	82	95	110	102	61	27	23	18	51	0	83	137
HUN	247	651	235	520	402	405	429	457	620	447	795	537	195	223	78	479	44	0	464
POL	284	607	231	710	468	392	584	589	732	635	815	495	197	224	138	524	72	370	0

HOL

common bulls below diagonal
common three quarter sib group above diagonal

	BEL	CHE	DEU	DFS	FRA	GBR	ITA	NLD	USA	CZE	JPN	IRL	KOR	CAN	PRT	ESP	SVN	EST	HUN	NZL	POL
BEL	0	500	737	302	613	699	613	913	715	409	269	346	197	531	377	568	131	83	260	215	442
CHE	502	0	894	247	584	713	710	799	903	400	294	326	218	743	341	554	119	81	259	204	437
DEU	708	754	0	802	1638	1556	2099	2192	2363	1283	780	430	453	1658	776	1285	318	226	677	285	1450
DFS	241	201	368	0	495	625	531	788	686	437	220	276	133	322	270	419	82	61	225	195	421
FRA	618	527	1015	259	0	1030	1294	1240	1406	873	623	350	382	1022	599	977	192	138	552	229	1138
GBR	720	698	1116	352	788	0	1465	1594	2160	843	559	656	394	1288	646	1066	196	160	517	357	957
ITA	630	648	1408	365	927	1277	0	1428	2340	1099	752	411	511	1666	785	1243	252	193	681	256	1235
NLD	992	781	1720	504	966	1362	1269	0	1900	1167	553	563	369	1063	665	1051	227	199	513	464	1102
USA	648	836	1432	343	887	2022	1996	1517	0	1316	987	535	678	2578	917	1528	219	196	791	358	1366
CZE	319	284	918	231	591	608	856	1038	1032	0	496	276	377	883	540	736	196	134	555	200	907
JPN	178	186	293	107	264	284	335	285	393	202	0	179	355	712	374	588	117	84	376	152	548
IRL	353	327	374	206	341	722	393	537	517	211	136	0	128	332	215	373	81	53	182	241	269
KOR	148	162	299	78	266	292	439	266	781	268	197	94	0	541	341	396	103	72	314	116	428
CAN	552	681	1204	247	823	1384	1535	1087	2916	680	353	350	527	0	727	1069	195	153	628	227	978
PRT	369	297	673	197	558	569	784	641	973	443	226	184	295	748	0	591	145	107	416	169	661
ESP	570	454	718	275	787	874	933	902	1020	489	253	374	274	767	539	0	173	127	505	243	770
SVN	100	85	303	55	145	145	222	195	175	141	53	64	65	151	109	119	0	54	123	59	217
EST	51	39	135	26	71	91	114	136	129	75	29	31	32	94	67	60	29	0	97	39	178
HUN	209	208	470	148	384	411	573	392	724	471	174	151	242	603	406	363	90	55	0	129	540
NZL	181	180	238	127	193	298	228	427	312	146	115	202	90	230	144	209	44	20	99	0	169
POL	359	318	1014	255	775	777	985	888	1229	664	224	217	325	854	638	489	172	107	446	129	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	157	91	106	35	154	261	134	17	15
CAN	163	0	103	140	37	78	463	146	13	23
DFS	68	91	0	110	47	97	164	128	22	34
GBR	104	144	106	0	43	77	176	115	16	34
ITA	35	35	46	41	0	33	47	47	10	16
NZL	156	79	76	79	30	0	152	104	17	19
USA	256	465	133	183	50	158	0	255	34	36
ZAF	138	146	111	113	48	100	262	0	26	25
NLD	13	8	16	13	7	14	34	21	0	4
CHE	13	21	33	32	17	17	36	25	3	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	157	91	106	35	154	261	127	17	22
CAN	163	0	103	140	37	78	463	135	13	28
DFS	68	91	0	110	47	97	164	119	22	44
GBR	104	144	106	0	43	77	176	110	16	41
ITA	35	35	46	41	0	33	47	47	10	23
NZL	156	79	76	79	30	0	152	95	17	25
USA	256	465	133	183	50	158	0	235	34	43
ZAF	132	137	105	109	48	92	244	0	26	37
NLD	13	8	16	13	7	14	34	21	0	8
CHE	20	27	43	40	24	23	44	37	6	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD	USA	CHE
AUS	0	157	91	106	35	154	127	17	261	26
CAN	163	0	103	140	37	78	135	13	463	32
DFS	68	91	0	110	47	97	119	22	164	47
GBR	104	144	106	0	43	77	110	16	176	44
ITA	35	35	46	41	0	33	47	10	47	26

NZL	156	79	76	79	30	0	95	17	152	29
ZAF	132	137	105	109	48	92	0	26	235	41
NLD	13	8	16	13	7	14	21	0	34	10
USA	256	465	133	183	50	158	244	34	0	47
CHE	23	29	46	43	26	27	40	7	48	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

AUS CAN DFS GBR ITA USA ZAF NLD CHE

AUS	0	157	88	105	35	261	133	5	26
CAN	163	0	103	140	37	463	146	5	32
DFS	65	90	0	108	47	164	127	11	47
GBR	103	144	104	0	43	176	115	10	44
ITA	35	35	46	41	0	47	47	5	26
USA	256	465	132	183	50	0	254	17	47
ZAF	137	146	110	113	48	261	0	11	41
NLD	2	3	10	8	4	15	9	0	5
CHE	23	29	46	43	26	48	40	5	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

AUS CAN DFS GBR ITA NZL USA ZAF NLD CHE

AUS	0	157	91	106	35	154	261	134	17	26
CAN	163	0	103	140	37	78	463	146	13	32
DFS	68	91	0	110	47	97	164	128	22	47
GBR	104	144	106	0	43	77	176	115	16	44
ITA	35	35	46	41	0	33	47	47	10	26
NZL	156	79	76	79	30	0	152	104	17	29
USA	256	465	133	183	50	158	0	255	34	47
ZAF	138	146	111	113	48	100	262	0	26	41
NLD	13	8	16	13	7	14	34	21	0	10
CHE	23	29	46	43	26	27	48	40	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

AUS CAN DFS GBR ITA NZL USA ZAF NLD CHE

AUS	0	157	86	106	35	154	261	134	17	26
CAN	163	0	92	140	37	78	463	146	13	32
DFS	60	77	0	106	44	90	153	121	20	46
GBR	104	144	99	0	43	77	176	115	16	44
ITA	35	35	41	41	0	33	47	47	10	26
NZL	156	79	68	79	30	0	152	104	17	29
USA	256	465	119	183	50	158	0	255	34	47
ZAF	138	146	101	113	48	100	262	0	26	41
NLD	13	8	14	13	7	14	34	21	0	10
CHE	23	29	45	43	26	27	48	40	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

AUS CAN DFS GBR ITA NZL USA ZAF NLD CHE

AUS	0	157	91	106	35	154	261	134	17	26
CAN	163	0	103	140	37	78	463	146	13	32
DFS	68	91	0	110	47	97	164	128	22	47
GBR	104	144	106	0	43	77	176	115	16	44
ITA	35	35	46	41	0	33	47	47	10	26
NZL	156	79	76	79	30	0	152	104	17	29
USA	256	465	133	183	50	158	0	255	34	47

ZAF	138	146	111	113	48	100	262	0	26	41
NLD	13	8	16	13	7	14	34	21	0	10
CHE	23	29	46	43	26	27	48	40	7	0

JER

common bulls below diagonal
common three quarter sib group above diagonal
AUS CAN DFS ITA ZAF NLD USA CHE

AUS	0	157	83	35	105	17	261	26
CAN	163	0	92	37	121	13	463	32
DFS	58	77	0	44	91	20	153	46
ITA	35	35	41	0	44	10	47	26
ZAF	107	117	77	44	0	23	200	41
NLD	13	8	14	7	16	0	34	10
USA	256	465	119	50	198	34	0	47
CHE	23	29	45	26	40	7	48	0

JER

common bulls below diagonal
common three quarter sib group above diagonal
AUS CAN DFS GBR ITA USA ZAF NLD CHE

AUS	0	157	88	105	35	261	133	17	26
CAN	163	0	103	140	37	463	146	13	32
DFS	66	91	0	108	47	164	127	22	47
GBR	103	144	104	0	43	176	115	16	44
ITA	35	35	46	41	0	47	47	10	26
USA	256	465	133	183	50	0	254	34	47
ZAF	137	146	110	113	48	261	0	26	41
NLD	13	8	16	13	7	34	21	0	10
CHE	23	29	46	43	26	48	40	7	0

JER

common bulls below diagonal
common three quarter sib group above diagonal
AUS CAN DFS GBR ITA NZL USA ZAF NLD CHE

AUS	0	157	91	106	35	154	261	134	17	26
CAN	163	0	103	140	37	78	463	146	13	32
DFS	68	91	0	110	47	97	164	128	22	47
GBR	104	144	106	0	43	77	176	115	16	44
ITA	35	35	46	41	0	33	47	47	10	26
NZL	156	79	76	79	30	0	152	104	17	29
USA	256	465	133	183	50	158	0	255	34	47
ZAF	138	146	111	113	48	100	262	0	26	41
NLD	13	8	16	13	7	14	34	21	0	10
CHE	23	29	46	43	26	27	48	40	7	0

JER

common bulls below diagonal
common three quarter sib group above diagonal
AUS CAN DFS GBR ITA NZL USA ZAF NLD CHE

AUS	0	157	83	106	35	154	261	134	17	26
CAN	163	0	86	140	37	78	463	146	13	32
DFS	58	75	0	97	44	83	146	116	20	46
GBR	104	144	95	0	43	77	176	115	16	44
ITA	35	35	41	41	0	33	47	47	10	26
NZL	156	79	63	79	30	0	152	104	17	29
USA	256	465	114	183	50	158	0	255	34	47
ZAF	138	146	99	113	48	100	262	0	26	41
NLD	13	8	14	13	7	14	34	21	0	10
CHE	23	29	45	43	26	27	48	40	7	0

JER

common bulls below diagonal

common three quarter	sib	group	above diagonal								
AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE		
AUS	0	157	91	106	35	154	261	134	17	26	
CAN	163	0	103	140	37	78	463	146	13	32	
DFS	68	91	0	110	47	97	164	128	22	47	
GBR	104	144	106	0	43	77	176	115	16	44	
ITA	35	35	46	41	0	33	47	47	10	26	
NZL	156	79	76	79	30	0	152	104	17	29	
USA	256	465	133	183	50	158	0	255	34	47	
ZAF	138	146	111	113	48	100	262	0	26	41	
NLD	13	8	16	13	7	14	34	21	0	10	
CHE	23	29	46	43	26	27	48	40	7	0	

JER

common bulls below diagonal

common three quarter	sib	group	above diagonal							
AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE		
AUS	0	157	89	105	35	261	134	18	26	
CAN	163	0	103	140	37	460	146	15	32	
DFS	67	91	0	108	47	164	128	29	47	
GBR	103	144	104	0	43	176	115	21	44	
ITA	35	35	46	41	0	47	47	10	26	
USA	256	463	133	183	50	0	254	38	47	
ZAF	138	146	111	113	48	261	0	31	41	
NLD	14	10	23	18	7	38	26	0	12	
CHE	23	29	46	43	26	48	40	9	0	

JER

common bulls below diagonal

common three quarter	sib	group	above diagonal								
AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE		
AUS	0	157	91	106	35	154	261	134	18	26	
CAN	163	0	103	140	37	78	463	146	15	32	
DFS	68	91	0	110	46	97	164	128	29	47	
GBR	104	144	106	0	43	77	176	115	21	44	
ITA	35	35	45	41	0	33	46	47	10	26	
NZL	156	79	76	79	30	0	152	104	19	29	
USA	256	465	133	183	49	158	0	255	38	47	
ZAF	138	146	111	113	48	100	262	0	31	41	
NLD	14	10	23	18	7	16	38	26	0	12	
CHE	23	29	46	43	26	27	48	40	9	0	

JER

common bulls below diagonal

common three quarter	sib	group	above diagonal								
AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	NZL		
AUS	0	157	88	105	35	261	126	17	26	20	
CAN	163	0	103	140	37	463	135	13	32	14	
DFS	66	91	0	108	47	164	118	22	47	20	
GBR	103	144	104	0	43	176	110	16	44	13	
ITA	35	35	46	41	0	47	47	10	26	3	
USA	256	465	133	183	50	0	235	34	47	18	
ZAF	131	137	104	109	48	244	0	26	41	14	
NLD	13	8	16	13	7	34	21	0	10	3	
CHE	23	29	46	43	26	48	40	7	0	5	
NZL	20	13	19	12	1	16	12	1	4	0	

JER

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common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  NZL  ZAF  NLD  USA  CHE
-----
AUS   0  157  75  154  124  18  261  26
CAN  163   0  81  78  132  15  463  32
DFS   53  72   0  76  103  27  139  46
NZL  156  79  58   0  91  19  152  29
ZAF  127 131  87  84   0  31  230  41
NLD   14  10  21  16  26   0  38  12
USA  256 465 109 158 231  38   0  47
CHE   23  29  45  27  40   9  48   0
-----

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JER

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common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  GBR  ITA  NZL  USA  NLD  CHE
-----
AUS   0  157  91  35  35  154  261  17  22
CAN  163   0 103  37  37  78  463  13  28
DFS   68  91   0  32  47  97  164  22  44
GBR   40  42  30   0  12  35   37   4   3
ITA   35  35  46  13   0  33  47  10  23
NZL  156  79  76  39  30   0  152  17  25
USA  256 465 133  40  50  158   0  34  43
NLD   13   8  16   5   7  14  34   0   8
CHE   20  27  43   4  24  23  44   6   0
-----

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JER

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common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  GBR  NZL  USA  NLD  CHE  ITA
-----
AUS   0  157  88 106  154  261  17  22  35
CAN  163   0  97 140  78  460  13  28  37
DFS   66  89   0 100  89  157  22  44  46
GBR  104 144 101   0  74  176  16  41  43
NZL  156  79  70  76   0  152  17  25  33
USA  256 463 128 183  158   0  34  43  46
NLD   13   8  16  13  14  34   0   8  10
CHE   20  27  43  40  23  44   6   0  23
ITA   35  35  45  41  30  49   7  24   0
-----

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JER

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common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  GBR  ITA  USA  NLD  CHE
-----
AUS   0  124  74  83  32  212  15  19
CAN  129   0 103 140  37  463  13  28
DFS   53  91   0 108  47  164  22  44
GBR   81 144 104   0  43  176  16  41
ITA   31  35  46  41   0  47  10  23
USA  201 465 133 183  50   0  34  43
NLD   11   8  16  13   7  34   0   8
CHE   17  27  43  40  24  44   6   0
-----

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JER

JER

RDC

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common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  NZL  USA  NLD  CAM  LVA
-----

```

AUS	0	26	13	53	12	17	25	16	10	5	16
CAN	26	0	10	147	77	4	34	153	3	0	10
DEU	13	10	0	56	4	12	11	4	12	0	29
DFS	41	148	47	0	60	85	59	83	34	0	122
GBR	10	76	4	55	0	0	27	64	1	0	3
NOR	13	4	11	65	0	0	6	0	24	0	11
NZL	24	32	11	57	24	5	0	23	2	2	6
USA	16	147	4	79	60	0	22	0	2	0	4
NLD	10	3	11	33	1	23	2	2	0	0	12
CAM	5	0	0	0	0	0	0	2	0	0	0
LVA	15	10	23	84	3	9	6	4	11	0	0

RDC

common bulls below diagonal											
common three quarter sib group above diagonal											
	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR	LVA
AUS	0	26	13	53	12	25	16	10	5	10	15
CAN	26	0	10	147	77	34	153	3	0	2	10
DEU	13	10	0	56	4	11	4	12	0	6	27
DFS	41	148	47	0	60	57	83	32	0	51	103
GBR	10	76	4	55	0	27	64	1	0	0	3
NZL	24	32	11	55	24	0	23	2	2	3	5
USA	16	147	4	79	60	22	0	2	0	0	4
NLD	10	3	11	31	1	2	2	0	0	14	11
CAM	5	0	0	0	0	2	0	0	0	0	0
NOR	9	1	5	38	0	3	0	13	0	0	1
LVA	14	10	21	69	3	5	4	10	0	0	0

RDC

common bulls below diagonal											
common three quarter sib group above diagonal											
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0	26	13	53	12	10	25	16	10	5	16
CAN	26	0	10	147	77	1	34	151	3	0	10
DEU	13	10	0	56	4	7	11	4	12	0	29
DFS	41	148	47	0	60	61	57	83	32	0	122
GBR	10	76	4	55	0	0	27	63	1	0	3
NOR	9	1	6	45	0	0	3	0	19	0	2
NZL	24	32	11	55	24	3	0	23	2	2	6
USA	16	146	4	79	59	0	22	0	2	0	4
NLD	10	3	11	31	1	18	2	2	0	0	12
CAM	5	0	0	0	0	0	2	0	0	0	0
LVA	15	10	23	84	3	1	6	4	11	0	0

RDC

common bulls below diagonal											
common three quarter sib group above diagonal											
	AUS	CAN	DEU	DFS	GBR	USA	NLD	CAM	NOR	LVA	
AUS	0	26	3	53	12	16	10	5	11	16	
CAN	26	0	0	147	77	153	3	0	3	10	
DEU	3	0	0	16	0	0	0	0	3	1	
DFS	41	148	14	0	60	83	31	0	61	122	
GBR	10	76	0	55	0	64	1	0	0	3	
USA	16	147	0	79	60	0	2	0	0	4	
NLD	10	3	0	30	1	2	0	0	14	11	
CAM	5	0	0	0	0	0	0	0	0	0	
NOR	10	2	3	49	0	0	13	0	0	1	
LVA	15	10	0	84	3	4	10	0	0	0	

RDC

common bulls below diagonal

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common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  NZL  USA  NLD  CAM  LVA
-----
AUS   0   26   13   53   12   19   25   16   10   5   16
CAN   26   0   10  147   77   4   34  153   3   0   10
DEU   13   0   0   56   4   12   11   4   12   0   29
DFS   41  148   47   0   60   95   56   83   33   0  122
GBR   10   76   4   55   0   0   27   64   1   0   3
NOR   15   4   11   73   0   0   7   0   24   0  12
NZL   24   32   11   52   24   6   0   23   2   2   6
USA   16  147   4   79   60   0   22   0   2   0   4
NLD   10   3   11   32   1   23   2   2   0   0  12
CAM    5   0   0   0   0   0   2   0   0   0   0
LVA   15   0   23   84   3   10   6   4   11   0   0
-----

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RDC
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NZL  USA  NLD  CAM  NOR  LVA
-----
AUS   0   26   13   53   12   25   16   10   5   10  16
CAN   26   0   10  147   77   34  153   3   0   1   10
DEU   13   0   0   56   4   11   4   12   0   6   29
DFS   41  148   47   0   60   57   83   33   0  49  122
GBR   10   76   4   55   0   27   64   1   0   0   3
NZL   24   32   11   55   24   0   23   2   2   3   6
USA   16  147   4   79   60   22   0   2   0   0   4
NLD   10   3   11   32   1   2   2   0   0  14  12
CAM    5   0   0   0   0   2   0   0   0   0   0
NOR    9   1   5   36   0   3   0   13   0   0   1
LVA   15   0   23   84   3   6   4   11   0   0   0
-----

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RDC
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  NZL  USA  NLD  CAM  LVA
-----
AUS   0   26   13   53   12   19   25   16   10   5   16
CAN   26   0   10  147   77   4   34  153   3   0   10
DEU   13   0   0   56   4   12   11   4   12   0   29
DFS   41  148   47   0   60   98   59   83   34   0  122
GBR   10   76   4   55   0   0   27   64   1   0   3
NOR   15   4   11   75   0   0   7   0   24   0  12
NZL   24   32   11   57   24   6   0   23   2   2   6
USA   16  147   4   79   60   0   22   0   2   0   4
NLD   10   3   11   33   1   23   2   2   0   0  12
CAM    5   0   0   0   0   0   2   0   0   0   0
LVA   15   0   23   84   3   10   6   4   11   0   0
-----

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RDC
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  NOR  NLD  USA  CAM  LVA
-----
AUS   0   26   13   53   19   10   16   5   15
CAN   26   0   10  146   4   3  153   0   10
DEU   13   0   0   56  12  12   4   0   27
DFS   41  147   47   0  95  31   83   0  103
NOR   15   4   11   73   0  24   0   0   10
NLD   10   3   11   30  23   0   2   0   11
USA   16  147   4   79   0   2   0   0   4
CAM    5   0   0   0   0   0   0   0   0
LVA   14   0   21   69   8  10   4   0   0
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RDC
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common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  USA  NLD  CAM  LVA
-----
AUS   0   26   10   53   12   19   16   10   5   16
CAN  26   0    8  147   77   4  153   3   0   10
DEU  10   8    0   47   4  11   4  12   0   16
DFS  41  148   41   0   60  95  83  32   0  122
GBR  10   76   4   55   0   0   64   1   0   3
NOR  15   4   10   73   0   0   0  24   0  12
USA  16  147   4   79   60   0   0   2   0   4
NLD  10   3   11   31   1  23   2   0   0  12
CAM   5   0   0   0   0   0   0   0   0   0
LVA  15  10  13   84   3  10   4  11   0   0
-----

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RDC
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  NZL  USA  NLD  CAM  LVA
-----
AUS   0   26  13   53  12  19  25  16  10   5  16
CAN  26   0  10  147  77   4  34 153   3   0  10
DEU  13  10   0   56   4  12  11   4  12   0  29
DFS  41 148  47   0  60  98  59  83  32   0 122
GBR  10   76   4   55   0   0  27  64   1   0   3
NOR  15   4  11  75   0   0   7   0  24   0  12
NZL  24  32  11  57  24   6   0  23   2   2   6
USA  16 147   4   79  60   0  22   0   2   0   4
NLD  10   3  11  31   1  23   2   2   0   0  12
CAM   5   0   0   0   0   0   2   0   0   0   0
LVA  15  10  23  84   3  10   6   4  11   0   0
-----

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RDC
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  NZL  USA  NLD  CAM  LVA
-----
AUS   0   26  13   53  12  19  25  16  10   5  16
CAN  26   0  10  147  77   4  34 153   3   0  10
DEU  13  10   0   56   4  12  11   4  12   0  29
DFS  41 148  47   0  60  95  57  83  32   0 116
GBR  10   76   4   55   0   0  27  64   1   0   3
NOR  15   4  11  73   0   0   7   0  24   0  12
NZL  24  32  11  54  24   6   0  23   2   2   6
USA  16 147   4   79  60   0  22   0   2   0   4
NLD  10   3  11  31   1  23   2   2   0   0  12
CAM   5   0   0   0   0   0   2   0   0   0   0
LVA  15  10  23  80   3  10   6   4  11   0   0
-----

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RDC
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  NZL  USA  NLD  CAM  LVA
-----
AUS   0   26  13   53  12  19  25  16  10   5  16
CAN  26   0  10  147  77   4  34 153   3   0  10
DEU  13  10   0   56   4  13  11   4  12   0  29
DFS  41 148  47   0  60  90  59  83  34   0 122
GBR  10   76   4   55   0   0  27  64   1   0   3
NOR  15   4  12  70   0   0   7   0  24   0  12
NZL  24  32  11  57  24   6   0  23   2   2   6
USA  16 147   4   79  60   0  22   0   2   0   4
NLD  10   3  11  33   1  23   2   2   0   0  12
CAM   5   0   0   0   0   0   2   0   0   0   0
LVA  15  10  23  84   3  10   6   4  11   0   0
-----

```

RDC

```

-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  USA  NLD  CAM  LVA
-----
AUS   0   26  13  53  12  19  16  10  5  16
CAN  26   0  10 147  77  4 150  3  0  10
DEU  13  10  0  56  4  12  4  14  0  29
DFS  41 148  47  0  60 98  83  41  0 122
GBR  10  76  4  55  0  0  64  1  0  3
NOR  15  4  11 75  0  0  0  31  0 12
USA  16 146  4  79  60  0  0  2  0  4
NLD  10  3  13 40  1 30  2  0  0 12
CAM   5  0  0  0  0  0  0  0  0  0
LVA  15  10  23 84  3 10  4 11  0  0
-----

```

RDC

```

-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  NZL  USA  NLD  CAM  LVA
-----
AUS   0   26  13  53  12  19  25  16  10  5  15
CAN  26   0  10 147  77  4  34 153  3  0  10
DEU  13  10  0  56  4  13  11  4  14  0  27
DFS  41 148  47  0  60 97  57  83  40  0 103
GBR  10  76  4  55  0  0  27  64  1  0  3
NOR  15  4  12 75  0  0  7  0  31  0 11
NZL  24  32  11 55  24  6  0  23  3  2  5
USA  16 147  4  79  60  0  22  0  2  0  4
NLD  10  3  13 39  1 30  3  2  0  0 11
CAM   5  0  0  0  0  0  2  0  0  0  0
LVA  14  10  21 69  3  9  5  4  10  0  0
-----

```

RDC

```

-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  USA  NLD  CAM  LVA  NZL
-----
AUS   0   26  13  53  12  19  16  10  5  16  5
CAN  26   0  10 147  77  4 151  3  0  10  3
DEU  13  10  0  56  4  12  4  12  0  29  4
DFS  41 148  47  0  60 92  83  34  0 122  9
GBR  10  76  4  55  0  0  63  1  0  3  4
NOR  15  4  11 70  0  0  0  24  0 12  1
USA  16 146  4  79  59  0  0  2  0  4  3
NLD  10  3  11 33  1 23  2  0  0 12  0
CAM   5  0  0  0  0  0  0  0  0  0  0
LVA  15  10  23 84  3 10  4 11  0  0  0
NZL   5  3  4  9  4  1  3  0  0  0  0
-----

```

RDC

```

-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  NOR  NZL  NLD  USA  CAM  LVA
-----
AUS   0   26  13  48  19  25  10  16  5  16
CAN  26   0  10 141  4  34  3 153  0  10
DEU  13  10  0  53  13  11  14  4  0  29
DFS  38 141  47  0  89  52  38  78  0 105
NOR  15  4  12 70  0  7  31  0  0 12
NZL  24  32  11 51  6  0  2  23  2  6
NLD  10  3  13 37  30  2  0  2  0 11
USA  16 147  4  75  0  22  2  0  0  4
CAM   5  0  0  0  0  2  0  0  0  0
LVA  15  10  23 72  10  6  10  4  0  0
-----

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