

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:

AUS (ALL)	Decrease in information due to the data clean-up, pedigree changes, bulls' statue changes and rounding effect
FRA (ALL)	All proofs sent to MACE are now genomic-free single-step proofs, issued from a BLUP evaluation running on single-step preadjusted performances, as suggested as one of the methods of choice to provide unbiased genomic-free proofs to Interbull by the Interbull working group on this topic. In addition to these changes, unknown parent groups have been modified for all traits.
ISR (HOL)	Decrease in information due to the data edits, paternity correction and updated UPG grouping and number of iterations.
EST (HOL)	Updated VCE for ANG. Decrease in information due to updated definition of herd, data inclusion (now from Jan 1995, prev Jan 1994).
PRT (HOL)	EDC affected by changes in pedigree.
ESP (HOL)	Base change
BEL(HOL)	Small decrease in information due to the pedigree(alias) correction and rounding effect
NZL(HOL,JER,RDC)	Small decrease in information due to parentage verification.
POL (HOL)	Decrease in information due to the data edits.
NLD(HOL)	Decrease in information due to pedigree changes /correction.
CHE(HOL)	Decrease in information due to the edits in database, and change in hys assignment.
DEA (BSW)	Base change, decrease in info due to the pedigree correction based on genotyping, and type of proof changes for some bulls

INTERBULL CHANGES COMPARED TO THE PREVIOUS ROUTINE RUN

Post-processing Windows:

According to the decision taken by ITC in Orlando (2015) to review the post-processing windows every 5 years, during the 2020 the relative working group has been re-activated and new windows have been identified.

As before, the upper bounds have been set to 0.99 as these were judged to have very little effect on evaluations while the lower values have been reduced to the 10th percentile. This reduction would provide post-processed correlations to be closer to the real estimated ones. Over the past five years, in fact, the previous adopted lower value (25th percentile) had been found too high causing estimated and post-processed correlations to differ significantly from each other. The new lower values have been applied to all breeds and traits.

The weight assigned to the magnitude of the changes tested by each country has also been revised. The new weight will allow post-processed correlations to take more in consideration the value of the new estimated ones even when no changes are applied by the countries.

The new weights are as follows:

No changes :: 2
Small changes:: 1
Big changes :: 0

More information can be read on https://interbull.org/ib/rg_procedure

DATA AND METHOD OF ANALYSIS

Data were national genetic evaluations of AI sampled bulls with at least 10 daughters or 10 EDC (for clinical mastitis and maternal calving traits at least 50 daughters or 50 EDC, and for direct calving traits at least 50 calvings or 50 EDC) in at least 10 herds. Table 1 presents the amount of data included in this Interbull evaluation for all breeds.

National proofs were first de-regressed within country and then analysed jointly with a linear model including the effects of evaluation country, genetic group of bull and bull merit. Heritability estimates used in both the de-regression and international evaluation were as in each country's national evaluation.

Table 2 presents the date of evaluation as supplied by each country

Estimated genetic parameters and sire standard deviations are shown in APPENDIX I and the corresponding number of common bulls are listed in APPENDIX II.

SCIENTIFIC LITERATURE

The international genetic evaluation procedure is based on international work described in the following scientific publications:

International genetic evaluation computation:
Schaeffer. 1994. J. Dairy Sci. 77:2671-2678
Klei, 1998. Interbull Bulletin 17:3-7

Verification and Genetic trend validation:
Klei et al., 2002. Interbull Bulletin 29:178-182.
Boichard et al., 1995. J. Dairy Sci. 78:431-437

Weighting factors:
Fikse and Banos, 2001. J. Dairy Sci. 84:1759-1767

De-regression:
Sigurdsson and G. Banos. 1995. Acta Agric. Scand. 45:207-219
Jairath et al. 1998. J. Dairy Sci. Vol. 81:550-562

Genetic parameter estimation:
Klei and Weigel, 1998, Interbull Bulletin 17:8-14
Sullivan, 1999. Interbull Bulletin 22:146-148

Post-processing of estimated genetic correlations:
Mark et al., 2003, Interbull Bulletin 30:126-135
Jorjani et al., 2003. J. Dairy Sci. 86:677-679
<https://wiki.interbull.org/public/rG%20procedure?action=print>

Time edits
Weigel and Banos. 1997. J. Dairy Sci. 80:3425-3430

International reliability estimation
Harris and Johnson. 1998. Interbull Bulletin 17:31-36

NEXT ROUTINE INTERNATIONAL EVALUATION

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

NEXT TEST INTERNATIONAL EVALUATION

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

PUBLICATION OF INTERBULL ROUTINE RUN

Results were distributed by the Interbull Centre to designated representatives in each country. The international evaluation file comprised international proofs expressed on the base and unit of each country included in the analysis. Such records readily provide more information on bull performance in various countries, thereby minimizing the need to resort to conversions.

At the same time, all recipients of Interbull results are expected to honor the agreed code of practice, decided by the Interbull Steering Committee, and only publish international evaluations on their own country scale. Evaluations expressed on another country scale are confidential and may only be used internally for research and review purposes.

PUBLICATION OF INTERBULL TEST RUN

Test evaluation results are meant for review purposes only and should not be published.

^LTable 1. National evaluation data considered in the Interbull evaluation for conformation traits (December Routine Evaluation 2023).
 Number of records for stature by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		45	3925	760	249	
BEL			1716			
CAN	249	104	12756	838	906	
CHE	2944		3116	51		
CZE			4460			
DEA	3765					
DEU			21517		275	
DFS			12390	2117	6472	
ESP			4460			
EST			903			
FRA	442		18085			
FRM						
GBR	23	231	6493	464	346	
HUN			2817			
IRL			1918			
ISR						
ITA	2260		8709	74		
JPN			6312			
KOR			1618			
LTU						
LVA			1343		613	
NLD	139		15532	52	59	
NOR					2525	
NZL			7051	4271	594	
POL			9362			
PRT			2562			
SVK						
SVN	250		598			
URY						
USA	937	731	34194	4518	274	
ZAF			853	557		
HRV						
CAM					40	
=====						
No. Records	11009	1111	182690	13702	12353	
Pub. Proofs	8762	945	140553	11902	12968	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	6.47								
CHE	0.95	12.48							
FRA	0.98	0.97	0.94						
ITA	0.96	0.95	0.95	13.82					
NLD	0.95	0.95	0.97	0.91	4.28				
USA	0.98	0.95	0.97	0.95	0.93	1.63			
DEA	0.96	0.97	0.98	0.95	0.95	0.96	11.25		
SVN	0.92	0.91	0.91	0.93	0.90	0.90	0.90	17.19	
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	7.91								
CHE	0.91	10.24							
FRA	0.87	0.91	0.83						
ITA	0.81	0.85	0.85	21.24					
NLD	0.92	0.84	0.88	0.71	4.83				
USA	0.89	0.90	0.91	0.86	0.83	0.89			
DEA	0.86	0.82	0.86	0.74	0.77	0.81	11.44		
SVN	0.89	0.91	0.91	0.81	0.85	0.85	0.90	24.83	
GBR	0.91	0.84	0.81	0.70	0.90	0.80	0.83	0.80	1.45

 BSW bde

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA
CAN	6.99								
CHE	0.84	10.36							
FRA	0.73	0.87	0.91						
ITA	0.79	0.92	0.90	17.84					
NLD	0.82	0.85	0.84	0.85	4.58				
DEA	0.79	0.90	0.91	0.88	0.80	11.14			
SVN	0.78	0.73	0.80	0.81	0.78	0.71	25.26		
GBR	0.87	0.88	0.78	0.84	0.89	0.86	0.83	1.67	
USA	0.72	0.75	0.84	0.78	0.86	0.80	0.77	0.86	0.83

 BSW ang

	CAN	CHE	FRA	NLD	USA	GBR
CAN	8.68					
CHE	0.69	11.04				
FRA	0.87	0.67	0.85			
NLD	0.79	0.68	0.66	3.77		
USA	0.85	0.67	0.74	0.77	1.09	
GBR	0.89	0.77	0.79	0.82	0.90	0.77

 BSW ran

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.96								
CHE	0.94	10.66							
FRA	0.97	0.96	0.91						
ITA	0.94	0.93	0.93	23.17					
NLD	0.95	0.92	0.96	0.92	4.67				
USA	0.97	0.94	0.96	0.91	0.95	1.36			
DEA	0.97	0.94	0.96	0.94	0.92	0.97	11.81		

SVN	0.91	0.88	0.89	0.89	0.90	0.90	0.88	23.20	
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	7.22								
CHE	0.89	10.33							
FRA	0.95	0.87	0.97						
NLD	0.93	0.85	0.93	4.14					
USA	0.91	0.85	0.86	0.80	0.97				
DEA	0.90	0.88	0.92	0.78	0.89	13.33			
GBR	0.92	0.84	0.90	0.88	0.92	0.82	1.23		
SVN	0.89	0.79	0.93	0.86	0.81	0.89	0.86	25.78	
ITA	0.87	0.79	0.90	0.79	0.86	0.87	0.87	0.90	19.31

 BSW rls

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.62								
CHE	0.92	13.09							
FRA	0.92	0.93	0.97						
ITA	0.91	0.86	0.92	23.67					
NLD	0.88	0.85	0.88	0.84	5.09				
USA	0.95	0.93	0.90	0.87	0.86	0.80			
DEA	0.91	0.91	0.93	0.89	0.81	0.89	12.18		
SVN	0.85	0.78	0.86	0.81	0.80	0.83	0.86	22.82	
GBR	0.85	0.86	0.90	0.83	0.86	0.83	0.87	0.80	1.48

 BSW fan

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.83								
CHE	0.68	14.14							
FRA	0.74	0.73	1.05						
ITA	0.69	0.84	0.80	21.44					
NLD	0.73	0.67	0.80	0.69	5.07				
USA	0.81	0.72	0.80	0.85	0.80	0.85			
DEA	0.62	0.89	0.67	0.89	0.62	0.65	11.56		
SVN	0.71	0.76	0.71	0.78	0.67	0.71	0.82	25.02	
GBR	0.80	0.72	0.84	0.73	0.88	0.82	0.67	0.76	1.28

 BSW hde

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	8.18							
CHE	0.86	12.71						
FRA	0.79	0.82	1.07					
ITA	0.79	0.83	0.82	21.10				
NLD	0.75	0.73	0.80	0.72	5.07			
DEA	0.76	0.87	0.85	0.93	0.76	12.05		
SVN	0.81	0.84	0.86	0.88	0.75	0.90	31.93	
USA	0.85	0.73	0.80	0.89	0.81	0.79	0.82	0.85

 BSW fua

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.80								
CHE	0.86	12.32							
FRA	0.89	0.88	0.83						
ITA	0.88	0.85	0.85	19.67					
NLD	0.89	0.85	0.86	0.85	4.77				
USA	0.94	0.86	0.86	0.93	0.87	1.27			
DEA	0.82	0.84	0.89	0.82	0.77	0.83	11.14		

SVN	0.73	0.73	0.77	0.81	0.77	0.73	0.90	22.48	
GBR	0.91	0.83	0.87	0.87	0.91	0.91	0.72	0.61	1.40

BSW ruh

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.45								
CHE	0.91	12.16							
FRA	0.85	0.82	0.90						
ITA	0.75	0.84	0.86	12.85					
NLD	0.76	0.81	0.87	0.84	4.23				
USA	0.82	0.80	0.88	0.85	0.88	1.07			
DEA	0.83	0.84	0.91	0.92	0.85	0.82	11.73		
SVN	0.80	0.81	0.81	0.86	0.88	0.83	0.87	21.51	
GBR	0.73	0.79	0.86	0.81	0.87	0.91	0.76	0.78	1.76

BSW ruw

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN
CAN	8.35							
CHE	0.91	12.08						
FRA	0.84	0.88	0.83					
ITA	0.78	0.88	0.80	13.25				
NLD	0.69	0.66	0.80	0.69	4.23			
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	12.18	
SVN	0.83	0.85	0.81	0.80	0.68	0.83	0.81	21.06

BSW usu

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.42								
CHE	0.90	12.05							
FRA	0.83	0.91	0.88						
ITA	0.88	0.91	0.88	18.97					
NLD	0.82	0.83	0.89	0.81	4.24				
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	11.45		
SVN	0.81	0.79	0.68	0.75	0.64	0.70	0.80	20.72	
GBR	0.79	0.79	0.85	0.84	0.91	0.92	0.73	0.62	2.75

BSW ude

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.80								
CHE	0.96	12.18							
FRA	0.96	0.96	0.97						
ITA	0.95	0.96	0.97	19.95					
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	0.92	0.97	0.94	0.97	0.94	0.93	12.09		
SVN	0.92	0.95	0.92	0.96	0.95	0.92	0.96	23.22	
GBR	0.96	0.94	0.96	0.94	0.96	0.96	0.90	0.93	2.13

BSW ftp

	CAN	CHE	FRA	NLD	USA	DEA	SVN	GBR	ITA
CAN	7.51								
CHE	0.97	14.01							
FRA	0.97	0.96	0.91						
NLD	0.97	0.95	0.96	5.03					
USA	0.92	0.91	0.88	0.91	1.30				
DEA	0.95	0.98	0.95	0.96	0.90	11.05			
SVN	0.93	0.93	0.93	0.95	0.91	0.95	18.41		

GBR	0.95	0.93	0.89	0.94	0.94	0.93	0.93	1.38	
ITA	0.87	0.86	0.86	0.86	0.87	0.86	0.87	0.87	21.03

 BSW ft1

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.52								
CHE	0.90	14.72							
FRA	0.95	0.95	0.97						
ITA	0.93	0.94	0.95	18.17					
NLD	0.92	0.96	0.92	0.92	5.03				
USA	0.93	0.96	0.95	0.93	0.95	1.74			
DEA	0.90	0.98	0.98	0.96	0.94	0.96	11.08		
SVN	0.90	0.92	0.90	0.91	0.93	0.90	0.91	18.77	
GBR	0.95	0.94	0.93	0.94	0.97	0.96	0.92	0.92	1.52

 BSW rtp

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	6.77							
CHE	0.98	14.54						
FRA	0.97	0.98	0.90					
ITA	0.92	0.95	0.94	20.03				
NLD	0.96	0.95	0.96	0.92	4.60			
DEA	0.97	0.99	0.97	0.96	0.94	12.01		
SVN	0.94	0.93	0.94	0.93	0.95	0.93	18.37	
USA	0.91	0.88	0.90	0.89	0.94	0.87	0.89	1.30

 BSW ocs

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.63								
CHE	0.80	9.38							
FRA	0.73	0.82	0.99						
ITA	0.77	0.81	0.87	9.01					
NLD	0.73	0.69	0.77	0.69	3.95				
USA	0.80	0.73	0.80	0.81	0.82	0.52			
DEA	0.81	0.90	0.86	0.88	0.58	0.72	10.59		
SVN	0.59	0.63	0.65	0.63	0.61	0.62	0.73	20.31	
GBR	0.74	0.82	0.84	0.78	0.86	0.86	0.69	0.67	1.71

 BSW ous

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.87								
CHE	0.85	13.95							
FRA	0.89	0.87	0.96						
ITA	0.81	0.88	0.84	10.19					
NLD	0.88	0.85	0.89	0.78	5.07				
USA	0.89	0.81	0.83	0.79	0.86	0.79			
DEA	0.85	0.94	0.84	0.91	0.79	0.79	12.39		
SVN	0.75	0.83	0.71	0.81	0.76	0.72	0.91	20.26	
GBR	0.76	0.83	0.74	0.80	0.77	0.86	0.74	0.72	1.66

 BSW of1

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.44								
CHE	0.82	11.76							
FRA	0.63	0.63	1.69						
ITA	0.60	0.71	0.83	17.30					
NLD	0.65	0.65	0.74	0.63	4.68				
USA	0.59	0.62	0.66	0.67	0.65	0.83			
DEA	0.68	0.84	0.64	0.81	0.58	0.57	11.24		

SVN	0.73	0.85	0.62	0.71	0.63	0.66	0.88	26.89	
GBR	0.66	0.75	0.81	0.66	0.73	0.72	0.65	0.62	1.49

BSW	ofr								
	CAN	CHE	DEA	ITA	SVN	USA	FRA		
CAN	7.03								
CHE	0.80	11.98							
DEA	0.80	0.90	11.50						
ITA	0.77	0.91	0.93	16.94					
SVN	0.73	0.78	0.79	0.80	23.27				
USA	0.76	0.83	0.90	0.86	0.74	1.63			
FRA	0.73	0.90	0.91	0.90	0.78	0.87	0.87		

BSW	tpl								
	CAN	CHE	DEA	ITA	SVN	FRA			
CAN	7.01								
CHE	0.88	12.26							
DEA	0.89	0.90	11.73						
ITA	0.90	0.91	0.91	23.64					
SVN	0.88	0.86	0.84	0.85	24.73				
FRA	0.96	0.93	0.93	0.90	0.86	1.26			

BSW	oru								
	CAN	CHE	DEA	ITA	SVN	USA	FRA		
CAN	7.42								
CHE	0.76	16.51							
DEA	0.71	0.87	12.52						
ITA	0.92	0.76	0.76	17.33					
SVN	0.82	0.59	0.70	0.77	27.48				
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	11.77								
DEA	0.95	12.29							
ITA	0.81	0.85	19.14						
SVN	0.77	0.76	0.82	24.81					
USA	0.55	0.51	0.76	0.67	0.97				
FRA	0.93	0.94	0.86	0.77	0.74	1.04			

BSW	thp								
	CAN	CHE	DEA	ITA	SVN	USA	FRA		
CAN	7.29								
CHE	0.83	11.37							
DEA	0.78	0.83	12.06						
ITA	0.88	0.91	0.85	29.55					
SVN	0.78	0.85	0.85	0.88	35.78				
USA	0.88	0.87	0.71	0.83	0.72	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	7.08								
CHE	0.91	12.16							
DEA	0.92	0.89	12.54						
ITA	0.91	0.84	0.85	19.56					

SVN	0.94	0.88	0.91	0.91	21.74	
FRA	0.91	0.85	0.87	0.87	0.89	0.99

BSW ful

	CHE	DEA	ITA	SVN	FRA
CHE	11.88				
DEA	0.91	12.28			
ITA	0.92	0.95	12.80		
SVN	0.82	0.91	0.85	21.62	
FRA	0.75	0.85	0.78	0.75	0.88

BSW udb

	CHE	DEA	ITA	SVN	FRA
CHE	12.39				
DEA	0.96	13.35			
ITA	0.93	0.96	26.38		
SVN	0.84	0.86	0.85	24.97	
FRA	0.91	0.88	0.86	0.81	0.91

BSW tdi

	CHE	DEA	ITA	SVN	FRA
CHE	15.81				
DEA	0.96	11.35			
ITA	0.94	0.95	20.52		
SVN	0.90	0.93	0.92	18.91	
FRA	0.97	0.97	0.91	0.91	0.87

BSW tth

	CHE	DEA	ITA	SVN	FRA
CHE	14.47				
DEA	0.98	12.96			
ITA	0.94	0.95	23.23		
SVN	0.88	0.87	0.88	20.87	
FRA	0.93	0.95	0.95	0.87	0.87

GUE sta

	CAN	GBR	USA	AUS
CAN	6.53			
GBR	0.97	1.21		
USA	0.98	0.96	2.76	
AUS	0.90	0.93	0.91	0.84

GUE cwi

	CAN	GBR	USA	AUS
CAN	6.82			
GBR	0.92	1.79		
USA	0.85	0.85	1.51	
AUS	0.72	0.80	0.66	0.34

GUE bde

	CAN	GBR	USA	AUS
CAN	6.45			
GBR	0.87	1.55		
USA	0.75	0.88	1.75	
AUS	0.80	0.77	0.69	0.45

GUE ang				
	CAN	GBR	USA	AUS
CAN	7.94			
GBR	0.88	1.67		
USA	0.88	0.91	1.86	
AUS	0.65	0.76	0.68	0.39

GUE ran				
	CAN	GBR	USA	AUS
CAN	6.46			
GBR	0.97	1.68		
USA	0.97	0.97	1.99	
AUS	0.90	0.93	0.89	0.76

GUE rwi				
	CAN	GBR	USA	AUS
CAN	7.10			
GBR	0.93	1.58		
USA	0.92	0.92	1.70	
AUS	0.85	0.84	0.77	0.64

GUE rls				
	CAN	GBR	USA	AUS
CAN	8.69			
GBR	0.82	1.84		
USA	0.93	0.81	0.89	
AUS	0.70	0.79	0.70	0.32

GUE rlr				
	CAN	USA	AUS	
CAN	7.15			
USA	0.85	0.92		
AUS	0.61	0.54	0.19	

GUE fan				
	CAN	GBR	USA	AUS
CAN	8.74			
GBR	0.79	1.73		
USA	0.84	0.75	0.86	
AUS	0.62	0.76	0.65	0.26

GUE fua				
	CAN	GBR	USA	AUS
CAN	7.36			
GBR	0.94	1.45		
USA	0.92	0.91	1.82	
AUS	0.78	0.78	0.76	0.38

GUE ruh				
	CAN	GBR	USA	AUS
CAN	6.85			
GBR	0.73	1.97		

USA	0.80	0.91	1.45	
AUS	0.76	0.77	0.76	0.36

GUE usu

	CAN	GBR	USA	AUS
CAN	6.74			
GBR	0.79	1.60		
USA	0.79	0.87	1.35	
AUS	0.76	0.78	0.75	0.29

GUE ude

	CAN	GBR	USA	AUS
CAN	6.30			
GBR	0.97	1.41		
USA	0.95	0.95	1.84	
AUS	0.89	0.89	0.88	0.53

GUE ftp

	CAN	GBR	USA	AUS
CAN	6.00			
GBR	0.95	1.29		
USA	0.92	0.92	1.60	
AUS	0.92	0.91	0.86	0.40

GUE ftl

	CAN	GBR	USA	AUS
CAN	4.67			
GBR	0.94	1.89		
USA	0.94	0.97	2.01	
AUS	0.93	0.94	0.93	0.95

GUE rtp

	CAN	AUS	USA	
CAN	5.34			
AUS	0.88	0.35		
USA	0.93	0.88	1.60	

GUE ocs

	CAN	GBR	USA	AUS
CAN	7.95			
GBR	0.77	2.15		
USA	0.73	0.86	0.86	
AUS	0.58	0.62	0.56	0.83

GUE ous

	CAN	GBR	USA	AUS
CAN	8.07			
GBR	0.78	1.51		
USA	0.87	0.83	0.82	
AUS	0.69	0.82	0.73	1.06

GUE ofl

	CAN	GBR	USA	AUS
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ESP	0.63	0.74	0.68	0.74	0.74	0.85															
FRA	0.79	0.77	0.72	0.82	0.70	0.76	0.96														
GBR	0.66	0.69	0.89	0.82	0.65	0.79	0.85	1.51													
ITA	0.60	0.69	0.63	0.74	0.60	0.76	0.77	0.73	1.92												
NLD	0.85	0.82	0.69	0.82	0.78	0.70	0.82	0.78	0.64	4.64											
USA	0.66	0.78	0.50	0.78	0.74	0.74	0.73	0.68	0.75	0.68	1.57										
CZE	0.51	0.61	0.54	0.63	0.61	0.64	0.61	0.66	0.69	0.50	0.61	20.47									
IRL	0.57	0.56	0.52	0.63	0.51	0.63	0.68	0.72	0.62	0.61	0.55	0.51	1.63								
KOR	0.56	0.58	0.52	0.51	0.53	0.59	0.62	0.51	0.52	0.52	0.51	0.52	0.51	9.98							
SVN	0.74	0.70	0.57	0.74	0.71	0.71	0.82	0.65	0.69	0.66	0.67	0.66	0.53	0.54	27.54						
PRT	0.50	0.50	0.54	0.59	0.50	0.60	0.54	0.60	0.59	0.52	0.50	0.63	0.50	0.51	0.68	2.00					
EST	0.54	0.52	0.53	0.53	0.53	0.52	0.55	0.52	0.52	0.52	0.51	0.54	0.53	0.67	0.68	0.53	22.57				
HUN	0.69	0.69	0.51	0.67	0.73	0.62	0.75	0.68	0.64	0.65	0.66	0.82	0.51	0.60	0.78	0.55	0.62	1.18			
POL	0.51	0.56	0.52	0.64	0.50	0.54	0.62	0.54	0.63	0.50	0.67	0.72	0.51	0.51	0.75	0.50	0.53	0.67	15.78		

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	0.72	11.74																			
DEU	0.72	0.90	14.12																		
DFS	0.75	0.90	0.95	12.18																	
FRA	0.71	0.93	0.95	0.95	0.94																
GBR	0.75	0.91	0.90	0.90	0.92	1.61															
ITA	0.72	0.91	0.95	0.95	0.96	0.90	6.61														
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	0.76	0.78	0.76	1.37												
CZE	0.73	0.87	0.96	0.95	0.92	0.89	0.94	0.93	0.77	13.85											
JPN	0.79	0.92	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	2.39								
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	5.94							
PRT	0.71	0.85	0.87	0.86	0.89	0.87	0.85	0.86	0.71	0.83	0.87	0.79	0.83	0.89	1.79						
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	0.86	0.94	0.88	1.02					
SVN	0.72	0.88	0.91	0.90	0.88	0.80	0.89	0.91	0.72	0.91	0.89	0.74	0.79	0.85	0.75	0.84	20.78				
EST	0.72	0.83	0.90	0.87	0.88	0.77	0.87	0.91	0.82	0.88	0.89	0.72	0.74	0.87	0.76	0.79	0.86	16.50			
HUN	0.72	0.87	0.94	0.92	0.92	0.87	0.94	0.89	0.75	0.95	0.93	0.76	0.85	0.93	0.84	0.91	0.87	0.83	0.99		
NZL	0.71	0.90	0.92	0.91	0.92	0.92	0.91	0.88	0.73	0.88	0.92	0.87	0.80	0.91	0.85	0.87	0.84	0.82	0.89	0.16	
POL	0.72	0.85	0.91	0.89	0.89	0.88	0.90	0.87	0.74	0.90	0.92	0.79	0.79	0.91	0.85	0.87	0.83	0.79	0.91	0.85	11.20

JER sta

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.54									
CAN	0.89	6.75								
DFS	0.90	0.97	11.74							
GBR	0.91	0.96	0.94	1.15						
ITA	0.87	0.95	0.93	0.95	1.55					
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	8.75		
NLD	0.89	0.95	0.97	0.94	0.92	0.85	0.93	0.86	5.09	
CHE	0.89	0.96	0.96	0.95	0.93	0.85	0.94	0.87	0.97	11.64

JER cwi

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.29									
CAN	0.74	6.56								
DFS	0.71	0.80	15.65							
GBR	0.81	0.91	0.85	1.85						
ITA	0.65	0.78	0.69	0.74	1.62					
NZL	0.81	0.73	0.66	0.75	0.66	0.37				
USA	0.74	0.89	0.80	0.85	0.91	0.67	1.01			
ZAF	0.68	0.78	0.73	0.80	0.73	0.75	0.77	8.54		
NLD	0.73	0.91	0.89	0.90	0.71	0.69	0.84	0.80	4.41	

CHE 0.67 0.85 0.86 0.82 0.81 0.68 0.85 0.72 0.87 12.27

JER bde

	AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD	USA	CHE
AUS	0.33									
CAN	0.77	5.66								
DFS	0.75	0.86	13.73							
GBR	0.74	0.86	0.85	1.50						
ITA	0.70	0.74	0.78	0.85	1.62					
NZL	0.78	0.69	0.70	0.69	0.70	0.37				
ZAF	0.78	0.72	0.82	0.80	0.71	0.75	8.71			
NLD	0.70	0.83	0.83	0.89	0.88	0.70	0.78	4.59		
USA	0.69	0.70	0.73	0.76	0.91	0.69	0.71	0.86	1.01	
CHE	0.74	0.87	0.91	0.89	0.84	0.71	0.79	0.90	0.82	13.44

JER ang

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.33								
CAN	0.67	7.58							
DFS	0.71	0.82	13.20						
GBR	0.80	0.83	0.86	1.32					
ITA	0.73	0.85	0.81	0.85	1.54				
USA	0.70	0.83	0.85	0.83	0.79	1.01			
ZAF	0.61	0.63	0.66	0.80	0.82	0.67	8.63		
NLD	0.72	0.82	0.73	0.82	0.79	0.73	0.65	6.00	
CHE	0.63	0.78	0.71	0.72	0.75	0.72	0.65	0.74	9.52

JER ran

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.36									
CAN	0.88	5.79								
DFS	0.89	0.96	11.54							
GBR	0.94	0.95	0.96	1.24						
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	0.89	0.88	0.88	0.89	0.88	0.88	0.88	8.91		
NLD	0.90	0.96	0.95	0.96	0.94	0.89	0.95	0.91	4.73	
CHE	0.91	0.96	0.95	0.95	0.94	0.90	0.94	0.89	0.95	13.04

JER rwi

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.32									
CAN	0.80	6.22								
DFS	0.81	0.91	12.07							
GBR	0.80	0.92	0.86	1.39						
ITA	0.77	0.85	0.81	0.85	1.47					
NZL	0.88	0.82	0.82	0.80	0.80	0.30				
USA	0.77	0.82	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	9.10		
NLD	0.85	0.93	0.91	0.87	0.79	0.84	0.80	0.79	5.04	
CHE	0.82	0.92	0.83	0.86	0.79	0.80	0.79	0.78	0.91	12.88

JER rls

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.18									
CAN	0.67	6.17								
DFS	0.67	0.91	12.58							
GBR	0.71	0.84	0.75	1.72						

CAN	0.73	6.39								
DFS	0.71	0.84	13.51							
GBR	0.79	0.86	0.85	1.75						
ITA	0.65	0.76	0.75	0.84	1.75					
NZL	0.58	0.59	0.59	0.62	0.64	0.40				
USA	0.73	0.82	0.89	0.84	0.82	0.60	0.97			
ZAF	0.75	0.76	0.71	0.80	0.65	0.59	0.76	10.00		
NLD	0.81	0.82	0.88	0.91	0.79	0.60	0.88	0.79	4.65	
CHE	0.75	0.90	0.86	0.81	0.79	0.61	0.83	0.78	0.85	11.05

JER ude

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0.35									
CAN	0.91	5.50								
DFS	0.89	0.93	12.15							
GBR	0.89	0.97	0.93	1.45						
ITA	0.91	0.95	0.95	0.94	1.71					
USA	0.88	0.96	0.95	0.94	0.96	1.77				
ZAF	0.88	0.89	0.89	0.90	0.88	0.88	10.37			
NLD	0.90	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	9.93	

JER ftp

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.46									
CAN	0.89	6.30								
DFS	0.88	0.91	12.76							
GBR	0.90	0.94	0.88	1.37						
ITA	0.87	0.87	0.86	0.86	1.65					
NZL	0.87	0.92	0.87	0.88	0.87	0.31				
USA	0.86	0.95	0.91	0.93	0.86	0.88	1.31			
ZAF	0.87	0.93	0.87	0.92	0.87	0.90	0.90	10.08		
NLD	0.92	0.97	0.94	0.93	0.86	0.90	0.90	0.90	5.61	
CHE	0.92	0.95	0.93	0.90	0.87	0.88	0.90	0.88	0.96	9.92

JER ftl

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	NZL
AUS	0.33									
CAN	0.91	5.61								
DFS	0.92	0.91	13.90							
GBR	0.91	0.93	0.94	1.50						
ITA	0.90	0.92	0.91	0.93	1.77					
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	10.88			
NLD	0.93	0.93	0.96	0.97	0.92	0.95	0.93	4.42		
CHE	0.92	0.92	0.94	0.96	0.90	0.94	0.93	0.96	11.54	
NZL	0.92	0.95	0.92	0.94	0.91	0.93	0.92	0.93	0.92	0.52

JER rtp

	AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE		
AUS	0.32									
CAN	0.87	6.29								
DFS	0.87	0.94	13.10							
NZL	0.87	0.95	0.90	0.42						
ZAF	0.87	0.90	0.87	0.87	9.28					
NLD	0.89	0.96	0.95	0.92	0.87	5.15				
USA	0.87	0.92	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	11.06		

JER ocs

	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE
AUS	0.77								
CAN	0.54	5.21							
DFS	0.50	0.62	12.61						
GBR	0.62	0.75	0.81	2.81					
ITA	0.48	0.70	0.72	0.79	1.32				
NZL	0.62	0.57	0.47	0.56	0.54	0.30			
USA	0.62	0.79	0.68	0.84	0.78	0.57	0.87		
NLD	0.56	0.72	0.86	0.87	0.80	0.63	0.81	3.49	
CHE	0.55	0.83	0.74	0.88	0.79	0.53	0.75	0.83	8.14

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	0.70	1.44					
NZL		0.81	0.72	0.68	0.75	0.44				
USA		0.68	0.89	0.82	0.84	0.71	0.98			
NLD		0.70	0.88	0.87	0.78	0.80	0.86	5.32		
CHE		0.76	0.87	0.79	0.84	0.78	0.86	0.92	10.69	
ITA		0.69	0.83	0.88	0.78	0.72	0.85	0.84	0.86	1.70

JER	ofl	AUS	CAN	DFS	GBR	ITA	USA	NLD	CHE
AUS		6.32							
CAN		0.47	4.97						
DFS		0.37	0.72	13.64					
GBR		0.62	0.62	0.63	1.33				
ITA		0.46	0.59	0.67	0.65	1.80			
USA		0.60	0.64	0.62	0.64	0.73	1.39		
NLD		0.44	0.67	0.64	0.72	0.68	0.66	4.91	
CHE		0.54	0.83	0.70	0.70	0.70	0.78	0.71	11.04

RDC	sta	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS		0.66										
CAN		0.88	6.14									
DEU		0.89	0.97	13.34								
DFS		0.87	0.96	0.97	8.66							
GBR		0.92	0.96	0.96	0.93	1.29						
NOR		0.87	0.93	0.94	0.97	0.92	13.58					
NZL		0.89	0.89	0.86	0.89	0.92	0.91	0.49				
USA		0.90	0.97	0.96	0.94	0.97	0.91	0.89	2.31			
NLD		0.87	0.95	0.97	0.97	0.94	0.96	0.84	0.93	4.82		
CAM		0.92	0.90	0.91	0.91	0.91	0.91	0.91	0.90	0.90	6.02	
LVA		0.85	0.85	0.86	0.91	0.84	0.90	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	6.96									
DEU		0.72	0.88	11.57								
DFS		0.77	0.82	0.89	13.70							
GBR		0.82	0.87	0.90	0.88	1.59						
NZL		0.79	0.69	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	0.68	0.81	5.18			
CAM		0.76	0.79	0.79	0.79	0.79	0.79	0.79	0.80	6.76		
NOR		0.83	0.79	0.81	0.88	0.82	0.82	0.82	0.87	0.79	14.49	

LVA 0.68 0.70 0.68 0.66 0.66 0.70 0.65 0.70 0.79 0.80 0.30

RDC bde

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.50										
CAN	0.80	5.89									
DEU	0.76	0.87	10.07								
DFS	0.78	0.83	0.92	11.86							
GBR	0.78	0.86	0.92	0.90	1.55						
NOR	0.77	0.81	0.82	0.89	0.83	15.22					
NZL	0.77	0.70	0.73	0.73	0.75	0.82	0.35				
USA	0.70	0.76	0.89	0.83	0.89	0.83	0.73	1.28			
NLD	0.69	0.83	0.90	0.85	0.91	0.88	0.69	0.90	4.54		
CAM	0.85	0.82	0.84	0.83	0.83	0.83	0.85	0.83	0.83	5.77	
LVA	0.73	0.77	0.80	0.82	0.79	0.84	0.75	0.69	0.74	0.83	0.34

RDC ang

	AUS	CAN	DEU	DFS	GBR	USA	NLD	CAM	NOR	LVA
AUS	0.46									
CAN	0.65	6.83								
DEU	0.63	0.61	6.95							
DFS	0.72	0.75	0.67	9.06						
GBR	0.77	0.81	0.62	0.82	1.36					
USA	0.69	0.86	0.61	0.81	0.85	1.18				
NLD	0.73	0.82	0.61	0.74	0.82	0.74	5.18			
CAM	0.81	0.78	0.79	0.79	0.79	0.79	0.79	7.28		
NOR	0.72	0.76	0.79	0.63	0.77	0.78	0.75	0.77	16.02	
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	0.42										
CAN	0.90	5.73									
DEU	0.91	0.97	8.94								
DFS	0.90	0.95	0.95	10.03							
GBR	0.93	0.97	0.97	0.95	1.57						
NOR	0.90	0.94	0.90	0.91	0.93	12.12					
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	1.61			
NLD	0.90	0.97	0.98	0.96	0.97	0.95	0.89	0.96	5.66		
CAM	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	5.65	
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	0.47										
CAN	0.85	6.11									
DEU	0.80	0.95	9.88								
DFS	0.80	0.93	0.93	10.49							
GBR	0.84	0.92	0.89	0.88	1.44						
NZL	0.82	0.89	0.81	0.88	0.90	0.33					
USA	0.77	0.91	0.85	0.89	0.93	0.87	1.40				
NLD	0.84	0.94	0.96	0.92	0.88	0.83	0.81	6.19			
CAM	0.86	0.87	0.87	0.87	0.87	0.87	0.87	0.87	6.63		
NOR	0.83	0.87	0.85	0.94	0.87	0.88	0.87	0.88	0.87	13.82	
LVA	0.79	0.82	0.82	0.85	0.78	0.81	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	0.72	0.94	9.14										
DFS	0.68	0.97	0.94	9.28									
GBR	0.78	0.77	0.85	0.78	1.55								
NOR	0.72	0.86	0.85	0.93	0.80	11.80							
NZL	0.68	0.67	0.68	0.67	0.69	0.74	0.12						
USA	0.69	0.92	0.93	0.93	0.82	0.83	0.67	0.90					
NLD	0.72	0.92	0.93	0.88	0.86	0.80	0.66	0.90	5.34				
CAM	0.84	0.80	0.80	0.79	0.80	0.80	0.79	0.80	0.80	6.71			
LVA	0.70	0.77	0.82	0.73	0.75	0.71	0.71	0.77	0.81	0.80	0.28		

RDC rlr

	AUS	CAN	DEU	DFS	NOR	NLD	USA	CAM	LVA
AUS	0.20								
CAN	0.58	6.54							
DEU	0.61	0.88	10.44						
DFS	0.55	0.82	0.90	10.91					
NOR	0.58	0.77	0.81	0.84	13.27				
NLD	0.58	0.87	0.91	0.88	0.83	5.06			
USA	0.55	0.72	0.77	0.66	0.71	0.80	0.90		
CAM	0.73	0.72	0.72	0.73	0.71	0.71	0.71	6.90	
LVA	0.63	0.72	0.76	0.78	0.66	0.70	0.70	0.73	0.24

RDC fan

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA
AUS	0.29									
CAN	0.65	6.41								
DEU	0.68	0.81	13.81							
DFS	0.63	0.69	0.79	9.33						
GBR	0.74	0.79	0.90	0.74	1.59					
NOR	0.68	0.73	0.85	0.62	0.77	12.82				
USA	0.67	0.84	0.83	0.71	0.83	0.77	1.05			
NLD	0.68	0.74	0.88	0.78	0.88	0.69	0.80	5.11		
CAM	0.75	0.78	0.77	0.77	0.77	0.77	0.78	0.78	7.69	
LVA	0.71	0.64	0.66	0.64	0.66	0.69	0.68	0.67	0.77	0.27

RDC fua

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.39										
CAN	0.77	5.52									
DEU	0.74	0.91	12.56								
DFS	0.72	0.79	0.84	11.66							
GBR	0.77	0.87	0.95	0.86	1.54						
NOR	0.73	0.81	0.77	0.85	0.80	12.05					
NZL	0.77	0.82	0.81	0.69	0.78	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	0.86	0.93	0.83	0.83	0.89	3.95		
CAM	0.83	0.81	0.79	0.80	0.79	0.80	0.79	0.80	0.81	6.61	
LVA	0.68	0.75	0.76	0.80	0.75	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	0.48										
CAN	0.78	5.69									
DEU	0.79	0.87	14.55								
DFS	0.78	0.87	0.89	10.72							
GBR	0.78	0.75	0.85	0.85	1.43						
NOR	0.75	0.84	0.88	0.87	0.82	12.23					
NZL	0.83	0.73	0.81	0.76	0.92	0.77	0.33				
USA	0.77	0.84	0.90	0.93	0.90	0.83	0.85	1.33			

NLD	0.74	0.75	0.91	0.91	0.88	0.91	0.82	0.86	3.98		
CAM	0.84	0.83	0.82	0.84	0.83	0.82	0.83	0.82	0.82	6.10	
LVA	0.75	0.73	0.75	0.84	0.72	0.74	0.74	0.72	0.75	0.82	0.39

RDC	usu										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.34										
CAN	0.75	5.90									
DEU	0.72	0.90	12.35								
DFS	0.66	0.75	0.79	13.06							
GBR	0.80	0.80	0.75	0.79	1.83						
NOR	0.66	0.71	0.66	0.72	0.76	12.08					
NZL	0.66	0.71	0.61	0.59	0.67	0.69	0.32				
USA	0.77	0.82	0.75	0.85	0.89	0.77	0.70	1.18			
NLD	0.78	0.82	0.79	0.89	0.92	0.74	0.58	0.91	4.51		
CAM	0.81	0.77	0.76	0.76	0.78	0.76	0.76	0.77	0.78	6.06	
LVA	0.63	0.64	0.62	0.60	0.74	0.67	0.67	0.68	0.67	0.76	0.32

RDC	ude										
	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA	
AUS	0.54										
CAN	0.88	5.61									
DEU	0.90	0.97	12.71								
DFS	0.88	0.96	0.94	10.66							
GBR	0.89	0.96	0.96	0.93	1.81						
NOR	0.90	0.91	0.90	0.88	0.92	14.20					
USA	0.88	0.96	0.95	0.95	0.96	0.92	1.29				
NLD	0.89	0.97	0.97	0.95	0.97	0.89	0.96	4.26			
CAM	0.92	0.93	0.93	0.93	0.93	0.92	0.93	0.93	4.49		
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	0.53										
CAN	0.92	5.76									
DEU	0.93	0.97	12.98								
DFS	0.89	0.94	0.93	11.93							
GBR	0.91	0.93	0.94	0.89	1.48						
NOR	0.88	0.92	0.89	0.93	0.91	14.18					
NZL	0.92	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	0.93	0.98	0.97	0.95	0.94	0.89	0.91	0.90	4.62		
CAM	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.61	
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	0.57										
CAN	0.93	4.96									
DEU	0.93	0.94	14.00								
DFS	0.92	0.90	0.97	10.59							
GBR	0.95	0.93	0.98	0.93	1.41						
NOR	0.91	0.92	0.92	0.94	0.93	12.50					
USA	0.94	0.93	0.95	0.93	0.97	0.93	1.64				
NLD	0.93	0.93	0.98	0.97	0.97	0.95	0.95	5.23			
CAM	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93	7.32		
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	0.91	0.36

RDC rtp

	AUS	CAN	DEU	DFS	NOR	NZL	NLD	USA	CAM	LVA
AUS	0.39									
CAN	0.89	5.85								
DEU	0.89	0.96	13.92							
DFS	0.87	0.93	0.96	12.30						
NOR	0.89	0.90	0.89	0.87	13.12					
NZL	0.92	0.95	0.93	0.88	0.89	0.35				
NLD	0.90	0.97	0.98	0.96	0.88	0.93	5.45			
USA	0.88	0.91	0.95	0.91	0.91	0.89	0.96	1.42		
CAM	0.90	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.11	
LVA	0.90	0.90	0.89	0.88	0.88	0.90	0.91	0.87	0.91	0.38

RDC ocs

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	1.11									
CAN	0.64	4.77								
DEU	0.54	0.74	20.75							
DFS	0.63	0.60	0.73	10.51						
GBR	0.65	0.74	0.88	0.74	1.64					
NOR	0.55	0.69	0.69	0.75	0.75	16.31				
NZL	0.73	0.56	0.61	0.51	0.65	0.63	0.27			
USA	0.62	0.76	0.83	0.72	0.87	0.75	0.70	0.56		
NLD	0.59	0.71	0.86	0.81	0.88	0.72	0.64	0.86	3.35	
CAM	0.73	0.76	0.75	0.76	0.76	0.76	0.73	0.78	0.78	6.29

RDC ous

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	1.45									
CAN	0.71	5.41								
DEU	0.75	0.87	17.26							
DFS	0.68	0.79	0.81	10.78						
GBR	0.83	0.79	0.82	0.71	1.62					
NOR	0.72	0.79	0.78	0.78	0.82	13.05				
NZL	0.83	0.81	0.79	0.74	0.81	0.75	0.36			
USA	0.75	0.88	0.85	0.85	0.86	0.82	0.87	0.97		
NLD	0.70	0.88	0.90	0.86	0.78	0.81	0.82	0.85	4.40	
CAM	0.85	0.83	0.83	0.82	0.83	0.82	0.85	0.84	0.84	6.67

RDC ofl

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0.63								
CAN	0.37	4.41							
DEU	0.41	0.73	16.42						
DFS	0.38	0.80	0.81	13.83					
GBR	0.51	0.68	0.73	0.66	1.44				
NOR	0.47	0.70	0.70	0.58	0.76	12.96			
USA	0.54	0.60	0.74	0.63	0.69	0.75	1.31		
NLD	0.44	0.67	0.76	0.64	0.73	0.69	0.68	7.01	
CAM	0.60	0.75	0.75	0.75	0.75	0.75	0.75	0.75	6.85

^LAPPENDIX II. Number of common bulls

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	137	86	138	42	157	120	25	20
CHE	120	0	177	499	71	279	544	55	18
FRA	79	144	0	207	60	101	203	39	14

ITA	119	442	175	0	93	219	608	73	19
NLD	34	68	50	73	0	61	85	28	12
USA	147	248	79	160	48	0	233	25	20
DEA	101	447	165	523	74	187	0	67	15
SVN	23	53	40	68	28	22	63	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	129	52	138	35	157	118	25	20
CHE	113	0	110	444	66	250	481	56	18
FRA	47	85	0	123	41	62	133	39	10
ITA	119	388	104	0	85	219	572	73	19
NLD	30	65	38	69	0	47	79	28	12
USA	147	215	46	160	39	0	215	25	20
DEA	100	388	106	486	72	162	0	67	14
SVN	23	53	40	68	28	22	63	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	137	86	138	35	120	23	20	157
CHE	120	0	177	499	70	544	48	18	279
FRA	79	144	0	207	54	203	37	14	101
ITA	119	442	175	0	85	608	67	19	219
NLD	30	68	47	69	0	80	27	12	47
DEA	101	447	165	523	73	0	60	15	233
SVN	21	46	38	61	27	56	0	6	22
GBR	17	16	13	17	10	13	4	0	20
USA	147	248	79	160	39	187	20	18	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	NLD	USA	GBR
CAN	0	136	85	24	156	20
CHE	120	0	171	48	277	18
FRA	78	140	0	37	100	14
NLD	21	49	34	0	32	9
USA	146	248	78	28	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	137	86	138	42	157	120	25	20
CHE	120	0	177	499	71	279	544	55	18
FRA	79	144	0	207	60	101	203	39	14
ITA	119	442	175	0	93	219	608	73	19
NLD	34	68	50	73	0	61	85	28	12
USA	147	248	79	160	48	0	233	25	20
DEA	101	447	165	523	74	187	0	67	15
SVN	23	53	40	68	28	22	63	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

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-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  CHE  FRA  NLD  USA  DEA  GBR  SVN  ITA
-----
CAN   0  137  52  42  157  120  20  23  134
CHE  120   0  110  71  279  544  18  48  492
FRA   47   85   0  41   62  133  10  37  123
NLD   34   68  38   0   61   85  12  27   91
USA  147  248  46  48   0  233  20  22  205
DEA  101  447  107  74  187   0  15  60  602
GBR   17   16   9  10  18  13   0   6  19
SVN   21  46  38  27  20  56   4   0  67
ITA  116  436  104  72  146  515  17  61   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  137  86  138  42  157  120  25  20
CHE  120   0  177  499  71  279  544  55  18
FRA   79  144   0  207  60  101  203  39  14
ITA  119  442  175   0  93  219  608  73  19
NLD   34   68  50  73   0  61  85  28  12
USA  147  248  79  160  48   0  233  25  20
DEA  101  447  165  523  74  187   0  67  15
SVN   23  53  40  68  28  22  63   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  137  86  138  34  157  120  25  20
CHE  120   0  177  499  69  279  544  55  18
FRA   79  144   0  207  54  101  203  39  14
ITA  119  442  175   0  84  219  608  73  19
NLD   29   67  47  68   0  46  79  28  12
USA  147  248  79  160  37   0  233  25  20
DEA  101  447  165  523  72  187   0  67  15
SVN   23  53  40  68  28  22  63   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  USA
-----
CAN   0  137  86  134  34  120  25  157
CHE  120   0  177  493  69  544  55  279
FRA   79  144   0  206  54  203  39  101
ITA  116  437  175   0  83  602  73  205
NLD   29   67  47  67   0  79  28  46
DEA  101  447  165  515  72   0  67  233
SVN   23  53  40  68  28  63   0  25
USA  147  248  79  146  37  187  22   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  137  52  95  34  157  87  25  20
-----

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CHE	120	0	110	328	70	278	350	56	18
FRA	47	85	0	115	40	62	123	39	10
ITA	84	281	97	0	64	121	325	67	16
NLD	29	68	37	57	0	46	68	28	12
USA	147	248	46	87	38	0	136	25	20
DEA	75	281	99	289	62	98	0	66	12
SVN	23	53	40	63	28	22	62	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	137	86	138	35	157	120	25	20
CHE	120	0	177	499	70	279	544	56	18
FRA	79	144	0	207	54	101	203	39	14
ITA	119	442	175	0	85	219	608	73	19
NLD	30	68	47	69	0	47	80	28	12
USA	147	248	79	160	39	0	233	25	20
DEA	101	447	165	523	73	187	0	67	15
SVN	23	53	40	68	28	22	63	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	137	86	138	35	157	120	25
CHE	120	0	177	499	70	279	544	56
FRA	79	144	0	207	54	101	203	39
ITA	119	442	175	0	85	219	608	73
NLD	30	68	47	69	0	47	80	28
USA	147	248	79	160	39	0	233	25
DEA	101	447	165	523	73	187	0	67
SVN	23	53	40	68	28	22	63	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	137	86	138	42	157	120	25	20
CHE	120	0	177	499	71	279	544	56	18
FRA	79	144	0	207	60	101	203	39	14
ITA	119	442	175	0	93	219	608	73	19
NLD	34	68	50	73	0	61	85	28	12
USA	147	248	79	160	48	0	233	25	20
DEA	101	447	165	523	74	187	0	67	15
SVN	23	53	40	68	28	22	63	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	137	86	138	42	155	120	25	20
CHE	120	0	177	499	72	279	544	56	18
FRA	79	144	0	207	62	101	203	39	14
ITA	119	442	175	0	97	219	608	73	19
NLD	34	69	52	77	0	61	88	28	12
USA	146	248	79	160	48	0	233	25	20
DEA	101	447	165	523	77	187	0	67	15

SVN	23	53	40	68	28	22	63	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	137	86	42	157	109	25	20	126
CHE	120	0	177	72	279	512	56	18	457
FRA	79	144	0	62	101	190	39	14	190
NLD	34	69	52	0	61	82	28	12	87
USA	147	248	79	48	0	208	25	20	175
DEA	93	416	155	75	159	0	67	14	514
SVN	23	53	40	28	22	63	0	6	72
GBR	17	16	13	10	18	13	4	0	19
ITA	109	405	161	72	127	450	67	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	137	86	138	42	157	120	25	20
CHE	120	0	177	499	71	279	544	56	18
FRA	79	144	0	207	60	101	203	39	14
ITA	119	442	175	0	93	217	608	73	19
NLD	34	68	50	73	0	61	85	28	12
USA	147	248	79	159	48	0	233	25	20
DEA	101	447	165	523	74	187	0	67	15
SVN	23	53	40	68	28	22	63	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	137	86	95	30	87	25	157
CHE	120	0	174	328	67	350	56	278
FRA	79	141	0	139	53	144	39	101
ITA	84	281	117	0	67	325	67	121
NLD	26	67	47	61	0	70	28	41
DEA	75	281	112	289	65	0	66	136
SVN	23	53	40	63	28	62	0	25
USA	147	248	79	87	34	98	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	129	75	138	42	157	87	25	20
CHE	113	0	140	443	66	250	345	54	18
FRA	70	112	0	168	51	84	135	38	14
ITA	119	386	144	0	91	216	361	71	19
NLD	34	65	46	73	0	61	68	28	12
USA	147	215	66	160	48	0	136	25	20
DEA	75	277	109	324	62	98	0	65	12
SVN	23	52	39	66	28	22	61	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	129	75	138	42	156	120	25	20
CHE	113	0	140	444	66	250	489	55	18
FRA	70	112	0	169	51	84	170	39	14
ITA	119	388	144	0	93	219	601	72	19
NLD	34	65	46	73	0	61	85	28	12
USA	146	215	66	160	48	0	231	25	20
DEA	100	398	138	519	74	183	0	67	15
SVN	23	52	40	67	28	22	63	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	129	75	134	42	157	120	25	20
CHE	113	0	140	443	66	250	489	55	18
FRA	70	112	0	168	51	84	170	39	14
ITA	116	387	144	0	91	205	596	73	19
NLD	34	65	46	72	0	61	85	28	12
USA	147	215	66	146	48	0	231	25	20
DEA	100	398	138	512	74	183	0	67	15
SVN	23	53	40	68	28	22	63	0	6
GBR	17	16	13	17	10	18	13	4	0

BSW

BSW

BSW

common bulls below diagonal							
common three quarter sib group above diagonal							
	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	0	128	119	96	24	158	53
CHE	112	0	483	328	55	249	110
DEA	101	395	0	366	66	227	133
ITA	85	280	314	0	66	121	115
SVN	23	53	62	62	0	25	38
USA	147	215	182	87	22	0	62
FRA	48	85	107	97	39	46	0

BSW

common bulls below diagonal						
common three quarter sib group above diagonal						
	CAN	CHE	DEA	ITA	SVN	FRA
CAN	0	135	121	139	25	87
CHE	119	0	544	499	55	177
DEA	101	447	0	606	67	202
ITA	120	442	522	0	72	205
SVN	23	53	63	68	0	39
FRA	80	144	165	174	40	0

BSW

common bulls below diagonal							
common three quarter sib group above diagonal							
	CAN	CHE	DEA	ITA	SVN	FRA	
CAN	0	128	97	96	24	158	53
CHE	112	0	380	328	55	249	110
DEA	85	308	0	332	65	164	125

ITA	85	280	296	0	66	121	115
SVN	23	53	61	62	0	25	38
USA	147	215	122	87	22	0	62
FRA	48	85	101	97	39	46	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal
CHE DEA ITA SVN USA FRA

CHE	0	526	328	48	278	175
DEA	432	0	365	59	218	197
ITA	281	313	0	60	121	139
SVN	46	55	55	0	22	36
USA	248	171	87	20	0	100
FRA	143	162	117	37	79	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal
CAN CHE DEA ITA SVN USA FRA

CAN	0	85	71	77	23	90	41
CHE	73	0	380	328	52	249	110
DEA	59	308	0	332	63	164	125
ITA	68	280	296	0	60	121	115
SVN	22	50	59	56	0	22	38
USA	80	215	122	87	19	0	62
FRA	36	85	101	97	39	46	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal
CAN CHE DEA ITA SVN FRA

CAN	0	135	121	135	25	87
CHE	119	0	544	493	54	177
DEA	101	447	0	600	67	202
ITA	117	437	514	0	72	204
SVN	23	53	63	68	0	39
FRA	80	144	165	174	40	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal
CHE DEA ITA SVN FRA

CHE	0	543	496	55	173
DEA	446	0	606	67	200
ITA	439	522	0	72	202
SVN	53	63	68	0	39
FRA	141	164	173	40	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal
CHE DEA ITA SVN FRA

CHE	0	316	303	55	123
DEA	266	0	323	66	143
ITA	265	289	0	67	136
SVN	53	62	63	0	39
FRA	100	111	115	40	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	543	490	54	173
DEA	446	0	600	67	200
ITA	434	514	0	71	201
SVN	52	63	67	0	39
FRA	141	164	173	40	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	349	326	55	105
DEA	280	0	324	66	121
ITA	279	289	0	67	113
SVN	53	62	63	0	39
FRA	83	98	95	40	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	25	66	19
GBR	22	0	79	11
USA	56	77	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	25	66	19
GBR	22	0	79	11
USA	56	77	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	25	66	19
GBR	22	0	79	11
USA	56	77	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	25	66	19
GBR	22	0	79	11
USA	56	77	0	22
AUS	19	9	19	0

GUE

```

-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  GBR  USA  AUS
-----
CAN   0  25  66  19
GBR  22   0  79  11
USA  56  77   0  22
AUS  19   9  19   0
-----

```

```

GUE
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  GBR  USA  AUS
-----
CAN   0  25  66  19
GBR  22   0  79  11
USA  56  77   0  22
AUS  19   9  19   0
-----

```

```

GUE
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  GBR  USA  AUS
-----
CAN   0  25  66  19
GBR  22   0  79  11
USA  56  77   0  22
AUS  19   9  19   0
-----

```

```

GUE
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  USA  AUS
-----
CAN   0  39  19
USA  37   0   6
AUS  19   4   0
-----

```

```

GUE
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  GBR  USA  AUS
-----
CAN   0  25  66  19
GBR  22   0  79  11
USA  56  77   0  22
AUS  19   9  19   0
-----

```

```

GUE
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  GBR  USA  AUS
-----
CAN   0  25  66  19
GBR  22   0  79  11
USA  56  77   0  22
AUS  19   9  19   0
-----

```

```

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

```

CAN	0	25	66	19
GBR	22	0	79	11
USA	56	77	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

CAN	GBR	USA	AUS	
CAN	0	25	66	19
GBR	22	0	79	11
USA	56	77	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

CAN	GBR	USA	AUS	
CAN	0	25	64	18
GBR	22	0	79	11
USA	55	77	0	22
AUS	18	9	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

CAN	GBR	USA	AUS	
CAN	0	25	66	19
GBR	22	0	79	11
USA	56	77	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

CAN	GBR	USA	AUS	
CAN	0	25	66	19
GBR	22	0	79	11
USA	56	77	0	22
AUS	19	9	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

CAN	AUS	USA	
CAN	0	19	66
AUS	19	0	22
USA	56	19	0

GUE

common bulls below diagonal
common three quarter sib group above diagonal

CAN	GBR	USA	AUS	
CAN	0	12	66	19
GBR	9	0	33	9
USA	56	31	0	21

AUS	19	8	18	0

GUE				

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

CAN	0	23	64	18
GBR	20	0	77	10
USA	55	75	0	22
AUS	18	8	19	0

GUE				

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

CAN	0	23	66	19
GBR	20	0	77	10
USA	56	75	0	22
AUS	19	8	19	0

GUE

GUE

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	504	910	467	880	772	643	875	912	661	909	1102	471	588	504	306	577	546	99	435	343	106	551	249
BEL	433	0	689	544	923	689	611	870	764	678	1059	799	420	598	289	247	437	544	102	413	283	133	568	250
CAN	824	658	0	862	2114	1194	1360	1482	1663	1841	1410	3359	899	1216	380	376	1200	1146	183	467	745	193	1054	512
CHE	417	541	763	0	1005	598	580	698	733	733	843	923	376	553	253	218	405	497	92	371	290	119	491	248
DEU	594	862	1307	854	0	2111	1485	2352	1894	2335	2637	2889	1026	1808	455	372	1208	1678	263	607	599	315	1122	731
DFS	508	601	885	540	1232	0	977	1592	1371	1262	1678	1690	735	1164	463	384	817	1082	203	558	468	200	841	432
ESP	491	589	884	478	840	704	0	1268	1120	1313	1132	1592	722	959	330	368	866	902	147	429	525	170	856	400
FRA	604	856	1010	644	1243	878	968	0	1576	1537	2011	2429	855	1545	520	390	1152	1261	172	582	563	194	933	448
GBR	771	760	1688	726	1280	951	908	1060	0	1535	1725	2190	792	1201	491	396	920	1068	185	763	539	195	958	461
ITA	556	679	1623	671	1546	1010	980	1027	1324	0	1545	2443	872	1407	313	325	976	1237	216	482	638	250	1033	574
NLD	745	1158	1265	824	1929	1231	966	1289	1452	1338	0	2257	805	1398	626	381	937	1417	232	690	510	225	1011	495
USA	915	686	3407	854	1620	1057	1064	1337	2010	2038	1820	0	1164	1668	552	467	1741	1627	235	605	913	217	1322	707
HUN	332	341	795	316	689	529	558	573	639	742	608	1053	0	747	277	300	611	842	121	338	449	127	654	334
POL	381	477	927	399	1187	761	625	970	922	1099	1078	1402	577	0	319	291	775	1147	207	424	532	220	890	521
NZL	406	224	327	211	316	298	270	304	386	266	557	466	207	198	0	204	327	338	50	342	191	60	308	140
ZAF	281	212	350	192	293	302	340	319	369	288	343	496	257	217	186	0	308	303	54	237	232	56	323	137
JPN	303	246	441	237	360	327	332	338	374	393	366	505	252	269	160	197	0	761	116	345	532	126	622	326
CZE	348	406	801	361	1120	628	627	818	763	949	1202	1241	715	806	222	226	245	0	158	414	505	198	790	438
EST	49	60	96	45	153	126	65	81	101	123	151	157	68	119	23	23	31	88	0	73	85	55	129	118
IRL	389	395	436	367	489	443	410	511	817	448	630	557	280	310	281	226	200	308	39	0	220	84	398	182
KOR	239	200	691	206	363	312	376	338	408	541	354	1034	351	386	131	178	256	355	34	151	0	101	487	268
SVN	74	101	146	85	293	156	117	146	144	218	192	170	91	170	45	38	55	140	28	68	64	0	143	106
PRT	422	569	1074	443	917	734	829	825	884	1039	1008	1372	616	831	242	307	311	651	75	341	417	111	0	426
LVA	110	140	304	126	553	244	202	221	262	382	307	602	229	353	73	82	95	272	62	103	159	62	331	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	497	910	467	879	771	655	748	912	661	855	1102	471	586	504	256	574	546	98	435	342	106	554	227
BEL	432	0	683	541	917	682	625	803	757	676	1007	782	417	594	285	216	427	542	102	410	282	133	569	231
CAN	824	658	0	862	2112	1194	1370	1321	1663	1841	1337	3359	899	1215	380	323	1195	1146	183	467	742	193	1056	486
CHE	417	540	763	0	1004	598	589	670	733	733	825	923	376	552	253	197	402	497	92	371	289	119	492	229

DEU	594	862	1307	854	0	2110	1511	2220	1892	2334	2594	2888	1025	1801	454	334	1203	1677	262	606	594	315	1121	703
DFS	508	600	885	540	1233	0	1000	1423	1369	1262	1601	1689	734	1159	462	330	816	1082	202	556	466	200	844	406
ESP	501	616	895	489	879	730	0	1210	1144	1328	1126	1612	732	979	341	323	868	921	151	444	528	174	876	386
FRA	567	811	955	620	1173	851	976	0	1433	1513	1672	2006	813	1457	437	306	998	1207	167	536	526	194	900	417
GBR	771	761	1688	726	1280	951	941	1017	0	1535	1660	2188	792	1199	491	340	917	1068	185	760	537	195	960	433
ITA	556	679	1623	671	1546	1010	1001	1019	1324	0	1536	2443	872	1407	313	315	972	1237	216	482	633	250	1034	561
NLD	715	1101	1210	801	1900	1209	971	1147	1400	1329	0	2022	785	1374	601	319	864	1398	229	677	491	225	996	461
USA	915	685	3407	854	1620	1056	1083	1141	2010	2038	1578	0	1164	1666	552	398	1736	1627	235	603	906	217	1325	676
HUN	332	341	795	316	689	529	569	561	639	742	592	1053	0	746	277	272	611	842	121	338	446	127	657	317
POL	381	477	927	399	1187	761	649	925	921	1099	1067	1402	577	0	319	265	773	1147	206	424	529	220	892	500
NZL	406	224	327	211	316	298	278	280	386	266	537	466	207	198	0	167	327	338	50	342	190	60	309	122
ZAF	241	195	308	176	273	278	301	272	318	283	285	411	240	209	149	0	261	282	53	200	212	56	307	122
JPN	297	242	434	232	356	324	330	328	367	389	355	496	251	267	159	182	0	759	116	344	529	125	623	308
CZE	348	406	801	361	1120	628	649	787	763	949	1185	1241	715	806	222	214	244	0	158	414	504	198	792	423
EST	49	60	96	45	153	126	69	80	101	123	150	157	68	119	23	23	31	88	0	73	85	55	129	112
IRL	389	395	436	367	489	443	429	492	815	448	617	557	280	310	281	195	198	308	39	0	218	84	399	168
KOR	239	200	690	206	363	312	380	330	407	540	344	1028	349	385	131	161	253	355	34	151	0	101	486	258
SVN	74	101	146	85	293	156	122	146	144	218	192	170	91	170	45	38	54	140	28	68	64	0	143	106
PRT	423	571	1076	443	917	736	853	815	887	1039	996	1372	620	834	242	297	307	653	75	342	416	111	0	409
LVA	100	129	290	116	531	230	198	208	244	375	285	581	216	341	63	74	90	264	57	93	157	62	319	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	504	910	467	880	771	645	875	912	661	883	1102	471	588	504	306	575	546	99	435	342	554	106	249
BEL	433	0	689	544	923	688	614	870	764	678	1036	799	420	598	289	247	437	544	102	413	282	570	133	250
CAN	824	658	0	862	2114	1194	1363	1482	1663	1841	1379	3359	899	1216	380	376	1197	1146	183	467	743	1056	193	512
CHE	417	541	763	0	1005	598	581	699	733	733	837	923	376	553	253	218	403	497	92	371	289	492	118	248
DEU	594	862	1307	854	0	2111	1490	2353	1894	2335	2624	2889	1026	1808	455	372	1206	1678	263	607	596	1122	314	731
DFS	508	601	885	540	1232	0	980	1591	1370	1262	1636	1689	734	1163	462	384	817	1082	203	557	466	845	199	432
ESP	492	592	885	480	847	707	0	1272	1122	1316	1121	1595	723	962	332	368	864	905	149	430	523	861	170	402
FRA	604	856	1010	645	1244	878	973	0	1576	1537	1896	2429	855	1545	520	390	1152	1261	172	582	561	938	193	448
GBR	771	760	1688	726	1280	951	911	1060	0	1535	1696	2189	792	1201	491	396	919	1068	185	761	538	962	194	461
ITA	556	679	1623	671	1546	1010	983	1027	1324	0	1541	2443	872	1407	313	325	974	1237	216	482	635	1034	249	574
NLD	741	1134	1258	823	1927	1230	968	1267	1440	1337	0	2129	796	1389	613	371	901	1412	231	683	503	1008	223	490
USA	915	686	3407	854	1620	1056	1066	1337	2010	2038	1778	0	1164	1668	552	467	1738	1627	235	604	909	1325	216	707
HUN	332	341	795	316	689	529	559	573	639	742	608	1053	0	747	277	300	611	842	121	338	448	657	127	334
POL	381	477	927	399	1187	761	627	970	922	1099	1077	1402	577	0	319	291	774	1147	207	424	531	892	219	521
NZL	406	224	327	211	316	298	271	304	386	266	555	466	207	198	0	204	327	338	50	342	190	309	60	140
ZAF	281	212	350	192	293	302	341	319	369	288	341	496	257	217	186	0	308	303	54	237	231	323	55	137
JPN	299	245	437	234	358	326	330	336	371	391	361	500	251	268	159	196	0	760	116	344	530	624	125	326
CZE	348	406	801	361	1120	628	629	818	763	949	1201	1241	715	806	222	226	244	0	158	414	505	793	197	438
EST	49	60	96	45	153	126	66	81	101	123	151	157	68	119	23	23	31	88	0	73	85	129	55	118
IRL	389	395	436	367	489	443	411	511	815	448	627	557	280	310	281	226	198	308	39	0	219	399	84	182
KOR	239	200	691	206	363	312	376	338	408	541	351	1030	351	386	131	177	255	355	34	151	0	487	101	268
PRT	423	570	1076	443	917	736	834	829	886	1039	1007	1372	619	834	242	307	310	653	75	342	417	0	143	426
SVN	74	101	146	85	293	156	117	145	144	217	190	170	91	170	45	38	54	140	28	68	64	111	0	106
LVA	110	140	304	126	553	244	204	221	262	382	306	602	229	353	73	82	94	272	62	103	159	331	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	486	910	451	161	770	658	745	909	660	494	1099	468	580	302	574	546	97	433	342	545	101	249
BEL	430	0	667	512	193	663	617	789	738	665	655	760	407	573	235	419	533	99	401	277	554	125	246
CAN	824	653	0	825	451	1184	1372	1316	1661	1839	959	3359	895	1200	371	1195	1146	179	465	742	1041	179	512
CHE	413	515	733	0	241	582	581	659	719	714	581	867	366	528	214	400	472	88	367	287	474	110	243
DEU	128	181	418	205	0	325	291	370	375	557	545	483	151	389	26	158	263	81	105	114	186	137	200
DFS	508	597	885	530	290	0	999	1405	1353	1243	975	1669	724	1134	380	806	1073	199	552	461	821	186	430
ESP	503	618	896	486	191	738	0	1215	1147	1331	780	1616	732	975	370	871	924	152	445	528	867	164	410
FRA	566	808	955	612	310	845	988	0	1430	1505	1031	1996	808	1436	342	995	1206	161	534	525	879	180	435
GBR	771	752	1688	716	321	950	948	1015	0	1534	1024	2182	786	1182	390	916	1067	182	751	537	940	182	460
ITA	556	675	1623	659	502	1006	1006	1016	1323	0	1212	2438	869	1382	321	971	1235	209	480	633	1019	234	573
NLD	464	713	976	555	546	905	699	877	982	1139	0	1166	503	1017	208	495	991	190	400	353	689	207	383

USA	914	677	3407	801	421	1055	1085	1139	2008	2037	1070	0	1158	1645	461	1736	1626	233	600	906	1300	202	707
HUN	332	338	795	311	99	528	573	560	638	741	402	1051	0	736	296	610	840	120	334	445	646	121	333
POL	381	466	927	379	317	756	657	921	916	1086	895	1401	574	0	286	765	1132	200	417	525	868	200	516
ZAF	278	209	347	188	18	299	340	295	366	284	187	491	255	214	0	304	298	51	234	228	316	50	135
JPN	297	242	434	232	90	324	330	328	367	389	284	496	251	267	193	0	759	115	342	529	619	118	326
CZE	348	406	801	349	194	628	653	787	763	949	957	1241	715	806	222	244	0	155	412	504	779	187	438
EST	49	59	96	45	47	126	71	80	101	122	133	157	67	117	23	31	88	0	71	85	123	54	117
IRL	389	392	436	363	82	443	432	492	808	446	398	557	280	308	224	198	308	39	0	218	389	80	182
KOR	239	200	690	205	85	312	381	330	407	540	270	1027	349	385	176	253	355	34	151	0	485	94	268
PRT	423	563	1076	433	166	731	854	815	884	1033	709	1371	619	824	303	307	653	73	341	416	0	137	420
SVN	73	100	145	85	126	152	121	142	143	212	188	169	91	164	34	53	140	28	66	64	109	0	100
LVA	110	140	304	124	146	244	220	218	262	382	247	602	229	353	81	94	272	62	103	159	331	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	504	910	467	880	772	642	875	912	661	909	1102	471	588	504	306	576	546	99	435	343	107	554	249
BEL	433	0	689	544	923	689	607	870	764	678	1059	799	420	598	289	247	437	544	102	413	283	134	569	250
CAN	824	658	0	862	2114	1194	1357	1482	1663	1841	1410	3359	899	1216	380	376	1198	1146	183	467	745	194	1056	512
CHE	417	541	763	0	1005	598	579	698	733	733	843	923	376	553	253	218	404	497	92	371	290	120	492	248
DEU	594	862	1307	854	0	2111	1476	2352	1894	2335	2637	2889	1026	1808	455	372	1207	1678	263	607	599	316	1122	731
DFS	508	601	885	540	1232	0	971	1592	1371	1262	1678	1690	735	1164	463	384	817	1082	203	558	468	201	844	432
ESP	490	585	881	476	831	698	0	1261	1114	1306	1126	1585	721	955	328	368	861	899	147	428	524	171	857	399
FRA	604	856	1010	644	1243	877	960	0	1576	1537	2011	2429	855	1545	520	390	1152	1261	172	582	563	195	937	448
GBR	771	760	1688	726	1280	951	901	1060	0	1535	1725	2190	792	1201	491	396	920	1068	185	763	539	196	962	461
ITA	556	679	1623	671	1546	1010	973	1027	1324	0	1545	2443	872	1407	313	325	975	1237	216	482	638	251	1034	574
NLD	745	1158	1265	824	1929	1231	959	1289	1452	1338	0	2257	805	1398	626	381	936	1417	232	690	510	226	1012	495
USA	915	686	3407	854	1620	1056	1058	1337	2010	2038	1820	0	1164	1668	552	467	1739	1627	235	605	913	218	1324	707
HUN	332	341	795	316	689	529	558	573	639	742	608	1053	0	747	277	300	611	842	121	338	449	128	656	334
POL	381	477	927	399	1187	761	620	970	922	1099	1078	1402	577	0	319	291	775	1147	207	424	532	221	891	521
NZL	406	224	327	211	316	298	268	304	386	266	557	466	207	198	0	204	327	338	50	342	191	60	309	140
ZAF	281	212	350	192	293	302	340	319	369	288	343	496	257	217	186	0	308	303	54	237	232	57	323	137
JPN	301	245	438	235	358	326	330	337	373	392	364	502	251	268	159	196	0	761	116	345	531	126	624	326
CZE	348	406	801	361	1120	628	624	818	763	949	1202	1241	715	806	222	226	245	0	158	414	505	199	792	438
EST	49	60	96	45	153	126	65	81	101	123	151	157	68	119	23	23	31	88	0	73	85	56	129	118
IRL	389	395	436	367	489	443	409	511	817	448	630	557	280	310	281	226	199	308	39	0	220	85	399	182
KOR	239	200	691	206	363	312	374	338	408	541	354	1034	351	386	131	178	255	355	34	151	0	102	487	268
SVN	75	102	147	86	294	157	118	147	145	219	193	171	92	171	45	38	55	141	28	69	65	0	144	107
PRT	423	569	1076	443	917	735	828	828	886	1039	1009	1372	618	833	242	307	310	652	75	342	417	111	0	426
LVA	110	140	304	126	553	244	200	221	262	382	307	602	229	353	73	82	94	272	62	103	159	62	331	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	479	910	467	880	772	642	875	912	661	907	1102	471	588	504	306	381	546	99	435	341	554	106	249
BEL	430	0	669	537	901	668	591	823	733	674	971	752	405	586	274	235	327	530	102	398	273	562	133	249
CAN	824	648	0	862	2114	1194	1359	1482	1663	1841	1407	3359	899	1216	380	376	896	1146	183	467	742	1056	193	512
CHE	417	537	763	0	1005	598	579	699	733	733	843	923	376	553	253	218	341	497	92	371	288	492	118	248
DEU	594	856	1307	854	0	2111	1479	2353	1894	2335	2635	2889	1026	1808	455	372	968	1678	263	607	595	1122	314	731
DFS	508	596	885	540	1232	0	974	1592	1371	1262	1670	1690	735	1164	463	384	589	1082	203	558	465	845	199	432
ESP	490	580	884	476	835	701	0	1263	1117	1309	1125	1588	722	956	329	368	682	900	147	428	522	858	170	399
FRA	604	843	1010	645	1244	878	964	0	1576	1537	2000	2429	855	1545	520	390	809	1261	172	582	560	938	193	448
GBR	771	743	1688	726	1280	951	905	1060	0	1535	1722	2190	792	1201	491	396	679	1068	185	763	537	962	194	461
ITA	556	679	1623	671	1546	1010	977	1027	1324	0	1545	2443	872	1407	313	325	879	1237	216	482	634	1034	249	574
NLD	745	1062	1265	824	1928	1231	961	1290	1451	1338	0	2250	805	1397	625	381	692	1417	231	689	505	1013	223	494
USA	915	671	3407	854	1620	1056	1062	1337	2010	2038	1817	0	1164	1668	552	467	1218	1627	235	605	907	1325	216	707
HUN	332	337	795	316	689	529	558	573	639	742	608	1053	0	747	277	300	493	842	121	338	447	657	127	334
POL	381	474	927	399	1187	761	622	970	922	1099	1078	1402	577	0	319	291	671	1147	207	424	530	892	219	521
NZL	406	218	327	211	316	298	270	304	386	266	557	466	207	198	0	204	214	338	50	342	189	309	60	140
ZAF	280	209	349	191	292	301	339	318	368	287	342	495	256	216	186	0	210	303	54	237	230	323	55	137
JPN	261	217	398	216	330	296	287	300	324	373	323	443	223	258	135	151	0	618	104	257	444	508	122	286
CZE	348	403	801	361	1120	628	625	818	763	949	1202	1241	715	806	222	226	226	0	158	414	504	793	197	438
EST	49	60	96	45	153	126	65	81	101	123	151	157	68	119	23	23	31	88	0	73	85	129	55	118

IRL	389	389	436	367	489	443	409	511	817	448	630	557	280	310	281	225	175	308	39	0	218	399	84	182
KOR	239	200	691	206	363	312	376	338	408	541	354	1030	351	386	131	177	239	355	34	151	0	486	101	267
PRT	423	567	1076	443	917	736	830	829	886	1039	1010	1372	619	834	242	306	280	653	75	342	417	0	143	426
SVN	74	101	146	85	293	156	117	145	144	217	190	170	91	170	45	38	54	140	28	68	64	111	0	106
LVA	110	140	304	126	553	244	200	221	262	382	307	602	229	353	73	82	90	272	62	103	159	331	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	504	910	467	880	772	646	875	912	661	909	1102	471	588	504	306	574	546	99	435	342	107	554	249
BEL	433	0	689	544	923	689	614	870	764	678	1059	799	420	598	289	247	435	544	102	413	282	134	571	250
CAN	824	658	0	862	2114	1194	1364	1482	1663	1841	1410	3359	899	1216	380	376	1195	1146	183	467	742	194	1058	512
CHE	417	541	763	0	1005	598	582	698	733	733	843	923	376	553	253	218	402	497	92	371	289	120	493	248
DEU	594	862	1307	854	0	2111	1493	2352	1894	2335	2637	2889	1026	1808	455	372	1204	1678	263	607	595	316	1123	731
DFS	508	601	885	540	1232	0	984	1592	1371	1262	1678	1690	735	1164	463	384	816	1082	203	558	466	201	846	432
ESP	493	593	886	482	851	710	0	1275	1125	1317	1138	1596	724	964	333	369	863	907	149	431	524	171	863	403
FRA	604	856	1010	644	1243	878	977	0	1576	1537	2011	2429	855	1545	520	390	1150	1261	172	582	559	195	940	448
GBR	771	760	1688	726	1280	951	914	1060	0	1535	1725	2190	792	1201	491	396	917	1068	185	763	537	196	962	461
ITA	556	679	1623	671	1546	1010	985	1027	1324	0	1545	2443	872	1407	313	325	972	1237	216	482	633	251	1035	574
NLD	745	1158	1265	824	1929	1231	972	1289	1452	1338	0	2257	805	1398	626	381	933	1417	232	690	505	226	1015	495
USA	915	686	3407	854	1620	1057	1068	1337	2010	2038	1820	0	1164	1668	552	467	1736	1627	235	605	905	218	1327	707
HUN	332	341	795	316	689	529	561	573	639	742	608	1053	0	747	277	300	611	842	121	338	446	128	658	334
POL	381	477	927	399	1187	761	629	970	922	1099	1078	1402	577	0	319	291	774	1147	207	424	529	221	893	521
NZL	406	224	327	211	316	298	272	304	386	266	557	466	207	198	0	204	327	338	50	342	190	60	309	140
ZAF	281	212	350	192	293	302	342	319	369	288	343	496	257	217	186	0	307	303	54	237	231	57	323	137
JPN	297	242	434	232	356	324	327	332	367	389	358	496	251	267	159	194	0	759	116	344	529	126	624	326
CZE	348	406	801	361	1120	628	632	818	763	949	1202	1241	715	806	222	226	244	0	158	414	504	199	793	438
EST	49	60	96	45	153	126	66	81	101	123	151	157	68	119	23	23	31	88	0	73	85	56	129	118
IRL	389	395	436	367	489	443	412	511	817	448	630	557	280	310	281	226	198	308	39	0	218	85	399	182
KOR	238	200	690	206	363	312	376	336	406	540	352	1026	349	384	131	177	253	354	34	151	0	102	485	268
SVN	75	102	147	86	294	157	118	147	145	219	193	171	92	171	45	38	55	141	28	69	65	0	144	107
PRT	423	572	1077	444	917	736	838	831	888	1041	1013	1376	622	835	242	307	307	654	75	342	417	111	0	426
LVA	110	140	304	126	553	244	205	221	262	382	307	602	229	353	73	82	94	272	62	103	158	62	332	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	459	828	467	877	771	644	626	909	661	817	1101	469	549	258	536	430	98	420	258	106	551	227
BEL	424	0	640	526	874	639	582	717	704	668	915	721	395	554	207	392	453	99	375	227	133	553	229
CAN	771	637	0	839	2049	1098	1296	1181	1569	1833	1274	3165	877	1165	313	1073	1012	180	437	640	193	1038	484
CHE	417	527	748	0	1004	597	584	641	733	733	816	923	374	535	198	395	430	92	364	242	118	489	229
DEU	594	838	1304	854	0	2109	1495	2020	1890	2334	2571	2886	1021	1770	336	1175	1473	262	589	521	314	1120	704
DFS	508	587	882	540	1232	0	980	1215	1365	1262	1564	1688	730	1111	332	773	892	202	531	379	199	840	406
ESP	495	582	876	483	859	716	0	1082	1125	1321	1089	1596	725	935	324	829	802	148	421	446	171	866	384
FRA	505	726	884	582	1130	787	862	0	1226	1456	1481	1663	741	1384	272	849	1027	159	456	445	193	829	401
GBR	770	724	1615	725	1279	949	923	884	0	1535	1611	2182	789	1155	342	870	912	184	717	450	194	956	434
ITA	556	676	1623	671	1546	1010	989	998	1324	0	1535	2443	872	1396	317	967	1183	216	477	579	249	1035	561
NLD	688	1005	1190	796	1905	1204	939	1070	1376	1332	0	1927	768	1325	315	832	1247	229	628	420	223	987	461
USA	915	661	3294	854	1620	1056	1072	975	2009	2038	1545	0	1161	1617	401	1604	1418	235	577	773	216	1320	676
HUN	332	328	789	316	689	529	564	513	638	742	595	1053	0	720	273	596	726	121	324	390	127	657	317
POL	367	460	906	386	1170	738	607	910	899	1094	1045	1372	559	0	252	738	1043	205	386	482	219	871	501
ZAF	244	194	307	177	274	279	302	244	321	284	286	414	241	201	0	254	241	53	197	166	55	307	122
JPN	292	241	432	232	356	323	323	313	363	389	352	489	250	261	182	0	648	114	317	442	125	616	306
CZE	296	350	725	305	1003	548	535	661	651	911	1092	1089	606	750	178	229	0	151	332	433	195	718	409
EST	49	59	96	45	153	126	66	77	101	123	150	157	68	118	23	31	83	0	71	80	55	129	112
IRL	387	380	433	364	487	441	415	423	782	447	601	551	278	296	196	197	252	39	0	164	84	385	164
KOR	178	175	601	179	325	268	312	299	330	495	298	873	300	362	119	220	309	32	117	0	100	427	243
SVN	74	101	146	85	293	156	118	145	144	217	190	170	91	170	38	54	139	28	68	64	0	143	106
PRT	420	562	1056	441	917	734	842	771	885	1041	992	1372	621	823	297	306	593	75	339	370	111	0	409
LVA	100	129	290	116	532	230	194	206	244	375	286	581	216	341	74	90	259	57	93	147	62	319	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	477	910	467	621	771	655	871	912	661	873	1102	470	587	306	574	546	99	434	341	106	559	249						
BEL	430	0	667	536	726	664	609	817	732	673	965	751	405	585	235	413	530	102	397	274	133	565	248						
CAN	824	648	0	862	1730	1194	1370	1466	1663	1841	1365	3359	898	1214	376	1195	1146	183	467	741	193	1060	512						
CHE	417	537	763	0	845	598	589	695	733	732	833	923	376	551	218	402	496	92	371	289	118	496	248						
DEU	489	706	1185	713	0	1512	1239	1727	1444	2133	2035	2184	791	1536	252	891	1313	237	445	500	308	914	671						
DFS	508	596	885	540	1050	0	1000	1564	1369	1261	1623	1688	733	1161	384	816	1082	203	557	466	199	850	432						
ESP	501	608	895	489	711	730	0	1284	1144	1328	1138	1612	731	977	373	867	920	152	444	527	174	881	407						
FRA	604	839	1010	644	1020	876	1011	0	1562	1537	1843	2387	852	1535	389	1135	1256	170	576	554	193	942	447						
GBR	771	744	1688	726	1070	951	941	1061	0	1535	1681	2187	791	1197	395	916	1068	185	757	537	194	965	461						
ITA	556	679	1623	671	1438	1010	1001	1027	1324	0	1536	2443	872	1406	325	972	1237	216	482	632	249	1035	574						
NLD	736	1060	1252	822	1624	1228	994	1245	1432	1336	0	2086	789	1375	369	892	1407	231	676	499	223	1008	489						
USA	915	671	3407	854	1362	1056	1083	1302	2010	2038	1762	0	1163	1664	467	1735	1627	235	603	904	216	1328	707						
HUN	332	337	795	316	539	528	569	573	639	742	606	1053	0	746	299	611	841	121	337	444	127	658	334						
POL	381	474	927	398	1073	760	647	970	921	1099	1070	1402	576	0	290	774	1144	205	422	528	218	894	520						
ZAF	281	210	350	192	202	302	344	319	369	288	337	496	257	217	0	306	303	54	237	231	55	328	137						
JPN	297	242	434	232	312	324	329	331	366	389	355	495	251	267	193	0	759	116	344	528	125	628	326						
CZE	348	403	801	361	921	628	648	818	763	949	1200	1241	715	806	226	244	0	157	414	503	197	794	438						
EST	49	60	96	45	139	126	69	81	101	123	151	157	68	118	23	31	88	0	73	85	55	128	118						
IRL	389	389	436	367	381	443	429	511	811	448	626	557	280	310	226	198	308	39	0	218	84	400	182						
KOR	238	200	689	206	324	312	377	334	407	539	348	1020	348	384	177	252	354	34	151	0	100	487	267						
SVN	74	101	146	85	293	156	122	145	144	217	190	170	91	170	38	54	140	28	68	63	0	143	106						
PRT	425	571	1079	447	786	740	859	834	893	1041	1010	1379	624	838	308	307	657	74	343	417	111	0	426						
LVA	110	140	304	126	524	244	212	221	262	382	306	602	229	353	82	94	272	62	103	158	62	332	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	497	910	467	880	771	655	829	912	661	853	1102	471	587	504	306	574	546	99	435	342	104	554	249					
BEL	432	0	685	543	919	684	627	851	759	677	1009	784	417	595	285	245	428	542	102	411	282	131	570	250					
CAN	824	658	0	862	2113	1194	1370	1410	1663	1841	1336	3359	899	1216	380	376	1195	1146	183	467	744	191	1057	512					
CHE	417	540	763	0	1005	598	589	696	733	733	823	923	376	553	253	218	402	497	92	371	289	117	492	248					
DEU	594	862	1307	854	0	2111	1512	2334	1894	2335	2593	2889	1026	1807	455	372	1204	1678	263	607	597	312	1123	731					
DFS	508	600	885	540	1233	0	1000	1518	1370	1262	1601	1689	734	1163	462	384	816	1082	203	557	467	198	846	432					
ESP	501	616	895	489	879	730	0	1264	1145	1328	1125	1612	732	979	341	373	868	920	152	444	529	173	876	407					
FRA	603	853	1005	643	1242	875	1008	0	1527	1532	1809	2237	842	1535	492	377	1077	1250	170	568	547	192	931	443					
GBR	771	761	1688	726	1280	951	941	1053	0	1535	1659	2189	792	1201	491	396	917	1068	185	761	538	193	962	461					
ITA	556	679	1623	671	1546	1010	1001	1026	1324	0	1532	2443	872	1407	313	325	972	1237	216	482	636	248	1035	574					
NLD	715	1101	1210	800	1899	1207	970	1222	1400	1325	0	2020	785	1376	600	363	864	1396	229	677	493	223	996	484					
USA	915	685	3407	854	1620	1057	1083	1267	2010	2038	1574	0	1164	1668	552	467	1736	1627	235	604	910	215	1326	707					
HUN	332	341	795	316	689	529	569	571	639	742	591	1053	0	747	277	300	611	842	121	338	449	127	658	334					
POL	381	477	927	399	1187	761	648	969	922	1099	1068	1402	577	0	319	291	774	1147	207	424	532	219	893	521					
NZL	406	224	327	211	316	298	278	303	386	266	537	466	207	198	0	204	327	338	50	342	190	59	309	140					
ZAF	281	212	350	192	293	302	344	318	369	288	324	496	257	217	186	0	307	303	54	237	231	55	323	137					
JPN	297	242	434	232	356	324	330	332	367	389	355	496	251	267	159	194	0	759	116	344	529	124	624	326					
CZE	348	406	801	361	1120	628	648	815	763	949	1183	1241	715	806	222	226	244	0	158	414	505	198	793	438					
EST	49	60	96	45	153	126	69	81	101	123	150	157	68	119	23	23	31	88	0	73	85	55	129	118					
IRL	389	395	436	367	489	443	429	507	815	448	615	557	280	310	281	226	198	308	39	0	219	83	399	182					
KOR	239	200	691	206	363	312	380	338	408	541	345	1030	351	386	131	177	253	355	34	151	0	100	487	268					
SVN	73	100	145	85	290	155	121	145	143	216	191	169	91	170	44	37	53	140	28	67	64	0	142	105					
PRT	423	571	1076	443	917	736	853	827	887	1040	996	1373	621	835	242	307	307	653	75	342	417	110	0	426					
LVA	110	140	304	126	553	244	212	221	262	382	303	602	229	353	73	82	94	272	62	103	159	61	331	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	497	910	467	880	725	647	871	912	661	881	1102	471	588	504	306	575	546	99	435	342	106	553	249					
BEL	432	0	685	543	919	673	613	856	758	677	1021	784	417	595	285	245	429	542	102	411	282	133	569	250					
CAN	824	658	0	862	2114	1116	1365	1467	1663	1841	1378	3359	899	1216	380	376	1196	1146	183	467	744	193	1054	512					
CHE	417	540	763	0	1005	594	584	698	733	733	835	923	376	553	253	218	402	497	92	371	289	119	492	248					

DEU	594	862	1307	854	0	2057	1495	2348	1894	2335	2621	2889	1026	1808	455	372	1205	1678	263	607	597	315	1120	731
DFS	508	600	885	540	1232	0	943	1481	1311	1259	1602	1596	718	1143	435	357	763	1048	201	540	454	200	835	428
ESP	493	595	888	483	853	712	0	1265	1127	1318	1124	1598	725	966	334	371	865	908	149	432	526	170	862	404
FRA	604	855	1010	644	1242	877	980	0	1563	1537	1887	2390	853	1542	516	389	1138	1256	171	577	558	194	934	447
GBR	771	759	1687	726	1279	950	914	1058	0	1535	1694	2189	792	1201	491	396	918	1068	185	761	538	195	960	461
ITA	556	679	1623	671	1546	1009	987	1027	1323	0	1537	2443	872	1407	313	325	973	1237	216	482	636	250	1033	574
NLD	741	1129	1257	822	1926	1229	971	1264	1438	1333	0	2125	796	1389	612	371	900	1410	231	683	504	225	1006	489
USA	915	685	3407	854	1620	1056	1070	1302	2010	2038	1774	0	1164	1668	552	467	1737	1627	235	604	911	217	1323	707
HUN	332	341	795	316	689	529	563	573	639	742	607	1053	0	747	277	300	611	842	121	338	449	127	657	334
POL	381	477	927	399	1187	761	632	970	922	1099	1076	1402	577	0	319	291	774	1147	207	424	532	220	890	521
NZL	406	224	327	211	316	298	272	304	386	266	555	466	207	198	0	204	327	338	50	342	190	60	309	140
ZAF	281	212	350	192	293	302	343	319	369	288	341	496	257	217	186	0	308	303	54	237	231	56	322	137
JPN	297	243	435	232	357	325	329	333	368	390	358	497	251	267	159	195	0	760	116	344	530	125	624	326
CZE	348	406	801	361	1120	628	633	818	763	949	1199	1241	715	806	222	226	244	0	158	414	505	198	792	438
EST	49	60	96	45	153	126	66	81	101	123	151	157	68	119	23	23	31	88	0	73	85	55	128	118
IRL	389	395	436	367	489	443	413	511	815	448	626	557	280	310	281	226	198	308	39	0	219	84	399	182
KOR	239	200	691	206	363	312	378	338	408	541	351	1031	351	386	131	178	254	355	34	151	0	101	487	268
SVN	74	101	146	85	293	156	117	146	144	218	192	170	91	170	45	38	54	140	28	68	64	0	143	106
PRT	423	570	1076	443	917	733	838	829	886	1039	1006	1372	619	834	242	307	308	653	75	342	417	111	0	426
LVA	110	140	304	126	553	244	206	221	262	382	306	602	229	353	73	82	94	272	62	103	159	62	331	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	497	910	467	880	772	658	875	912	661	907	1102	471	588	504	306	574	546	99	435	342	107	554	249	
BEL	432	0	685	543	919	685	629	860	759	677	1030	784	417	595	285	245	428	542	102	411	282	134	571	250	
CAN	824	658	0	862	2114	1194	1372	1482	1663	1841	1409	3359	899	1216	380	376	1195	1146	183	467	742	194	1058	512	
CHE	417	540	763	0	1005	598	589	698	733	733	841	923	376	553	253	218	402	497	92	371	289	120	493	248	
DEU	594	862	1307	854	0	2111	1521	2352	1894	2335	2634	2889	1026	1808	455	372	1204	1678	263	607	595	316	1123	731	
DFS	508	600	886	540	1233	0	1006	1592	1371	1262	1678	1690	735	1164	463	384	816	1082	203	558	466	201	846	432	
ESP	502	619	896	489	894	737	0	1303	1150	1332	1170	1617	734	986	344	373	871	924	153	446	528	175	880	410	
FRA	604	856	1010	644	1243	878	1025	0	1577	1537	2010	2429	855	1545	520	390	1150	1261	172	582	559	195	940	448	
GBR	771	761	1688	726	1280	951	948	1061	0	1535	1724	2190	792	1201	491	396	917	1068	185	763	537	196	962	461	
ITA	556	679	1623	671	1546	1010	1006	1027	1324	0	1541	2443	872	1407	313	325	972	1237	216	482	633	251	1035	574	
NLD	745	1137	1264	823	1928	1230	1012	1289	1452	1334	0	2253	805	1398	625	381	933	1415	232	690	505	226	1014	494	
USA	915	685	3407	854	1620	1058	1085	1337	2010	2038	1816	0	1164	1668	552	467	1736	1627	235	605	904	218	1327	707	
HUN	332	341	795	316	689	530	572	573	639	742	607	1053	0	747	277	300	611	842	121	338	446	128	658	334	
POL	381	477	927	399	1187	761	656	970	922	1099	1077	1402	577	0	319	291	774	1147	207	424	529	221	893	521	
NZL	406	224	327	211	316	298	280	304	386	266	557	466	207	198	0	204	327	338	50	342	190	60	309	140	
ZAF	281	212	350	192	293	303	344	319	369	288	343	496	257	217	186	0	307	303	54	237	231	57	323	137	
JPN	297	242	434	232	356	324	330	332	367	389	358	496	251	267	159	194	0	759	116	344	529	126	624	326	
CZE	348	406	801	361	1120	628	651	818	763	949	1200	1241	715	806	222	226	244	0	158	414	504	199	793	438	
EST	49	60	96	45	153	126	70	81	101	123	151	157	68	119	23	23	31	88	0	73	85	56	129	118	
IRL	389	395	436	367	489	443	431	511	817	448	629	557	280	310	281	226	198	308	39	0	218	85	399	182	
KOR	238	200	690	206	363	312	380	336	406	540	352	1025	349	384	131	177	253	354	34	151	0	102	485	268	
SVN	75	102	147	86	294	157	123	147	145	219	193	171	92	171	45	38	55	141	28	69	65	0	144	107	
PRT	423	572	1077	444	917	736	856	831	888	1041	1012	1376	622	835	242	307	307	654	75	342	417	111	0	426	
LVA	110	140	304	126	553	244	220	221	262	382	307	602	229	353	73	82	94	272	62	103	158	62	332	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	500	910	467	880	772	644	875	912	661	909	1102	471	588	306	576	546	99	434	342	107	554	249		
BEL	431	0	685	542	917	684	611	863	758	678	1055	793	417	595	244	433	542	102	408	279	134	569	250		
CAN	824	654	0	862	2114	1194	1362	1482	1663	1841	1444	3359	899	1216	376	1198	1146	183	467	743	194	1056	512		
CHE	417	539	763	0	1005	598	580	698	733	733	848	923	376	553	218	404	497	92	371	289	120	492	248		
DEU	594	861	1307	854	0	2111	1485	2352	1894	2335	2670	2889	1026	1808	372	1207	1678	263	607	596	316	1122	731		
DFS	508	600	886	540	1232	0	979	1592	1371	1262	1688	1690	735	1164	384	817	1082	203	558	466	201	845	432		
ESP	491	588	884	478	842	705	0	1269	1122	1314	1148	1591	723	961	368	865	904	149	430	523	171	861	402		
FRA	604	854	1010	644	1243	878	968	0	1576	1537	2023	2429	855	1545	390	1152	1261	172	582	561	195	938	448		
GBR	771	756	1688	726	1280	951	909	1060	0	1535	1747	2190	792	1201	396	920	1068	185	760	538	196	962	461		
ITA	556	679	1623	671	1546	1010	980	1027	1324	0	1570	2444	873	1408	325	975	1237	216	482	635	251	1034	574		
NLD	750	1151	1305	831	1970	1238	974	1298	1478	1369	0	2290	810	1420	381	940	1431	237	693	514	230	1021	502		

USA	915	682	3407	854	1620	1058	1064	1337	2010	2038	1857	0	1164	1669	467	1739	1627	235	605	909	218	1325	707
HUN	332	340	795	316	689	530	559	573	639	742	612	1053	0	748	300	611	842	121	338	448	128	657	334
POL	381	477	927	399	1187	761	626	970	922	1100	1101	1402	578	0	291	775	1147	207	424	531	221	892	521
ZAF	281	212	350	192	293	303	340	319	369	288	344	496	257	217	0	308	303	54	237	231	57	323	137
JPN	301	245	438	235	358	326	330	337	373	392	366	502	251	268	196	0	761	116	345	530	126	624	326
CZE	348	406	801	361	1120	628	628	818	763	949	1210	1241	715	806	226	245	0	158	414	505	199	793	438
EST	49	60	96	45	153	126	66	81	101	123	153	157	68	119	23	31	88	0	73	85	56	129	118
IRL	389	394	436	367	489	443	410	511	814	448	632	557	280	310	226	199	308	39	0	219	85	399	182
KOR	239	200	691	206	363	312	376	338	408	541	359	1031	351	386	178	255	355	34	151	0	102	487	268
SVN	75	102	147	86	294	157	118	147	145	219	198	171	92	171	38	55	141	28	69	65	0	144	107
PRT	423	569	1076	443	917	736	833	829	886	1039	1016	1372	619	834	307	310	653	75	342	417	111	0	426
LVA	110	140	304	126	553	244	203	221	262	382	312	602	229	353	82	94	272	62	103	159	62	331	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	497	910	467	880	772	647	875	912	661	909	1102	471	588	504	306	575	546	98	435	342	105	554	227
BEL	432	0	685	543	919	685	613	859	758	677	1033	784	417	595	285	245	430	542	102	411	282	132	570	231
CAN	824	658	0	862	2114	1194	1364	1482	1663	1841	1444	3359	899	1216	380	376	1197	1146	183	467	744	191	1056	486
CHE	417	540	763	0	1005	598	583	698	733	733	848	923	376	553	253	218	403	497	92	371	289	117	492	229
DEU	594	862	1307	854	0	2111	1494	2352	1894	2335	2670	2889	1026	1809	455	372	1206	1678	262	607	597	312	1122	703
DFS	508	600	886	540	1232	0	984	1592	1371	1262	1688	1690	735	1164	463	384	817	1082	202	558	467	198	845	406
ESP	493	595	887	482	852	711	0	1276	1126	1317	1153	1597	724	965	334	370	864	907	148	431	525	170	863	382
FRA	604	855	1010	644	1243	878	979	0	1576	1537	2023	2429	855	1545	520	390	1152	1261	171	582	562	192	938	423
GBR	771	760	1688	726	1280	951	915	1060	0	1535	1747	2190	792	1201	491	396	919	1068	185	763	538	193	962	433
ITA	556	679	1623	671	1546	1010	986	1027	1324	0	1570	2444	873	1409	313	325	974	1237	216	482	636	249	1034	561
NLD	750	1140	1305	831	1970	1238	979	1298	1478	1369	0	2290	810	1420	625	381	939	1431	236	693	516	227	1021	469
USA	915	685	3407	854	1620	1057	1069	1337	2010	2038	1857	0	1164	1670	552	467	1738	1627	235	605	911	215	1325	676
HUN	332	341	795	316	689	530	562	573	639	742	612	1053	0	748	277	300	611	842	121	338	449	128	657	317
POL	381	477	927	399	1187	761	631	970	922	1101	1101	1402	578	0	319	291	774	1147	206	424	532	220	892	500
NZL	406	224	327	211	316	298	272	304	386	266	557	466	207	198	0	204	327	338	50	342	190	59	309	122
ZAF	281	212	350	192	293	303	342	319	369	288	344	496	257	217	186	0	308	303	54	237	231	56	323	124
JPN	299	245	437	234	358	326	330	336	371	391	364	500	251	268	159	196	0	760	116	344	530	125	624	308
CZE	348	406	801	361	1120	628	632	818	763	949	1210	1241	715	806	222	226	244	0	158	414	505	198	793	423
EST	49	60	96	45	153	126	66	81	101	123	153	157	68	119	23	23	31	88	0	73	85	56	129	112
IRL	389	395	436	367	489	443	412	511	817	448	632	557	280	310	281	226	198	308	39	0	219	84	399	168
KOR	239	200	691	206	363	312	377	338	408	541	359	1031	351	386	131	178	255	355	34	151	0	101	487	258
SVN	74	101	146	86	290	155	117	145	144	217	197	170	92	171	44	37	54	141	28	68	65	0	143	106
PRT	423	570	1076	443	917	736	837	829	886	1039	1016	1372	619	834	242	307	310	653	75	342	417	110	0	409
LVA	100	129	290	116	531	230	192	210	244	375	291	581	216	341	63	74	90	264	57	93	157	61	319	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	504	910	467	880	772	644	875	912	661	907	1102	459	588	306	567	546	99	434	343	105	554	249	58
BEL	433	0	689	544	923	689	614	870	764	678	1059	799	413	598	247	436	544	102	413	283	132	570	250	47
CAN	824	658	0	862	2114	1194	1363	1482	1663	1841	1409	3359	885	1216	376	1190	1146	183	467	745	191	1056	512	66
CHE	417	541	763	0	1005	598	581	698	733	733	841	923	372	553	218	403	497	92	371	290	117	492	248	50
DEU	594	862	1307	854	0	2111	1487	2352	1894	2335	2634	2889	1017	1809	372	1204	1678	263	607	599	312	1122	731	73
DFS	508	601	886	540	1232	0	980	1592	1371	1262	1678	1690	721	1164	384	811	1082	203	558	468	198	845	432	51
ESP	491	591	885	479	844	706	0	1270	1122	1315	1134	1593	714	962	368	854	905	149	430	525	170	861	402	58
FRA	604	856	1010	644	1243	878	969	0	1576	1537	2009	2429	837	1545	390	1139	1261	172	582	563	192	938	448	56
GBR	771	760	1688	726	1280	951	910	1060	0	1535	1723	2190	778	1201	396	914	1068	185	760	539	193	962	461	65
ITA	556	679	1623	671	1546	1010	982	1027	1324	0	1541	2443	871	1408	325	974	1237	216	482	638	249	1034	574	66
NLD	745	1158	1264	823	1928	1230	969	1288	1451	1334	0	2253	788	1398	381	929	1415	232	690	510	223	1012	494	92
USA	915	686	3407	854	1620	1058	1065	1337	2010	2038	1816	0	1135	1669	467	1718	1627	235	605	913	215	1325	707	68
HUN	320	332	781	312	682	521	545	562	623	739	595	1027	0	742	292	602	830	121	332	448	128	655	334	39
POL	381	477	927	399	1187	761	627	970	922	1100	1077	1402	573	0	291	772	1147	207	424	532	220	892	521	50
ZAF	281	212	350	192	293	303	340	319	369	288	343	496	246	217	0	305	303	54	237	232	56	323	137	20
JPN	299	245	437	234	358	326	330	336	371	391	362	500	245	268	196	0	759	115	342	531	125	624	326	50
CZE	348	406	801	361	1120	628	629	818	763	949	1200	1241	704	806	226	244	0	158	414	505	198	793	438	52
EST	49	60	96	45	153	126	66	81	101	123	151	157	68	119	23	31	88	0	73	85	56	129	118	17
IRL	389	395	436	367	489	443	411	511	814	448	629	557	272	310	226	198	308	39	0	220	84	399	182	43

KOR	239	200	691	206	363	312	376	338	408	541	354	1034	349	386	178	255	355	34	151	0	101	487	268	43
SVN	74	101	146	86	290	155	117	145	144	217	192	170	92	171	37	54	141	28	68	65	0	143	106	25
PRT	423	570	1076	443	917	736	834	829	886	1039	1009	1372	616	834	307	310	653	75	342	417	110	0	426	50
LVA	110	140	304	126	553	244	204	221	262	382	307	602	229	353	82	94	272	62	103	159	61	331	0	29
NZL	63	43	68	43	69	47	54	53	62	62	90	70	26	36	21	47	41	6	38	37	16	49	15	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	490	909	450	875	647	649	873	776	660	756	822	485	497	379	429	98	368	222	105	468	165	316	249
BEL	431	0	677	517	907	629	615	843	678	675	921	680	510	280	328	458	102	351	200	132	498	144	305	250
CAN	823	653	0	825	2106	1037	1365	1481	1484	1839	1293	2946	1112	375	895	1016	182	402	564	191	937	227	729	512
CHE	413	516	733	0	916	555	577	679	687	715	729	835	478	248	339	416	91	328	215	116	426	133	293	243
DEU	593	860	1306	798	0	1961	1496	2323	1732	2332	2520	2563	1672	445	966	1470	262	534	460	312	1006	223	798	731
DFS	472	562	855	499	1186	0	880	1355	1125	1236	1469	1294	1007	374	576	867	196	444	320	198	721	212	530	419
ESP	494	600	889	480	857	664	0	1283	1017	1320	1057	1426	868	335	683	801	148	363	394	171	766	219	564	405
FRA	604	850	1010	629	1227	820	990	0	1287	1535	1614	1728	1377	511	809	1073	170	466	408	192	807	215	644	447
GBR	685	695	1532	670	1220	847	807	929	0	1501	1450	1816	1055	383	663	886	173	569	387	192	817	221	578	444
ITA	556	679	1623	660	1545	992	989	1027	1308	0	1545	2369	1360	311	878	1183	215	458	511	249	971	236	777	574
NLD	662	1001	1193	722	1904	1143	906	1153	1249	1355	0	1681	1260	502	686	1243	230	556	371	227	870	212	597	485
USA	745	646	3136	775	1538	957	963	1046	1789	2023	1414	0	1476	379	1178	1368	225	479	669	215	1117	258	865	685
POL	326	413	869	335	1091	682	540	868	828	1060	995	1281	0	241	648	1011	194	340	433	218	790	188	605	495
NZL	403	222	325	208	315	267	274	303	318	266	461	338	154	0	212	248	49	277	119	59	241	100	157	139
JPN	260	217	397	215	330	295	288	300	323	372	324	442	245	135	0	590	103	239	373	122	486	164	438	286
CZE	296	350	725	296	1002	544	535	675	644	911	1094	1073	730	172	222	0	150	320	377	196	682	203	642	416
EST	49	60	96	45	153	123	66	81	98	123	149	154	110	23	31	83	0	66	76	56	121	46	109	118
IRL	343	356	395	330	457	382	361	432	587	433	538	482	258	238	174	251	39	0	138	84	327	125	228	174
KOR	165	155	535	161	292	233	272	267	287	439	268	768	329	89	198	268	31	100	0	100	362	128	323	220
SVN	74	101	146	86	290	155	118	145	144	217	197	170	171	44	54	140	28	68	65	0	143	54	125	106
PRT	364	493	932	378	828	624	716	709	742	977	859	1164	747	190	267	563	70	283	319	110	0	212	507	403
ZAF	158	132	212	111	182	187	192	189	197	207	186	263	160	92	124	155	21	119	88	36	202	0	171	104
HUN	239	247	658	243	536	402	409	431	462	649	454	801	484	116	199	546	61	195	249	91	485	151	0	299
LVA	110	140	304	124	553	243	208	220	258	382	306	591	338	73	90	262	62	103	134	61	313	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	504	910	467	879	772	644	752	912	661	909	1099	471	587	504	575	546	98	435	343	106	554
BEL	433	0	687	542	921	687	617	809	763	677	1058	794	420	597	289	436	544	102	412	283	132	569
CAN	824	658	0	862	2113	1194	1355	1326	1663	1841	1410	3338	899	1215	380	1197	1146	183	467	747	192	1055
CHE	417	541	763	0	1004	598	584	675	733	733	843	918	376	552	253	403	497	92	371	290	117	492
DEU	594	861	1307	854	0	2110	1496	2226	1893	2334	2636	2879	1025	1803	454	1205	1677	262	606	598	312	1120
DFS	508	601	886	540	1232	0	983	1428	1371	1262	1678	1687	735	1161	463	817	1082	202	557	469	197	844
ESP	495	602	889	483	859	716	0	1202	1129	1321	1147	1593	728	970	339	861	912	148	437	528	171	870
FRA	574	815	965	629	1180	853	962	0	1439	1514	1722	2009	815	1460	439	1004	1208	167	539	531	191	900
GBR	771	761	1688	726	1280	951	924	1028	0	1535	1726	2184	792	1200	491	919	1068	185	762	539	193	960
ITA	556	679	1623	671	1546	1010	989	1020	1324	0	1545	2438	872	1407	313	974	1237	216	482	639	248	1034
NLD	745	1159	1265	824	1929	1231	983	1185	1453	1338	0	2250	805	1396	626	935	1417	231	690	510	221	1013
USA	911	684	3374	848	1612	1053	1069	1157	2002	2030	1812	0	1161	1663	551	1734	1621	234	602	915	215	1322
HUN	332	341	795	316	689	530	564	565	639	742	608	1051	0	746	277	611	842	121	338	449	127	656
POL	381	477	927	399	1187	761	635	926	922	1099	1078	1398	577	0	319	773	1147	206	424	532	219	892
NZL	406	224	327	211	316	298	275	285	386	266	557	464	207	198	0	327	338	50	342	192	60	309
JPN	299	244	436	234	358	326	330	334	371	391	362	500	251	268	159	0	760	116	344	532	125	624
CZE	348	406	801	361	1120	628	637	791	763	949	1202	1235	715	806	222	245	0	158	414	505	195	792
EST	49	60	96	45	153	126	66	80	101	123	151	157	68	119	23	31	88	0	73	85	55	129
IRL	389	395	436	367	489	443	419	496	817	448	630	556	280	310	281	198	308	39	0	220	84	399
KOR	239	200	691	206	363	312	379	331	408	541	354	1032	351	386	131	255	355	34	151	0	101	487
SVN	74	100	146	85	291	154	118	143	144	216	189	170	91	170	45	54	139	28	68	64	0	143
PRT	423	570	1076	443	917	736	843	815	886	1039	1010	1364	619	834	242	309	653	75	342	417	111	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	504	910	467	879	772	650	875	912	661	907	1102	471	588	504	575	546	98	422	105	554
BEL	433	0	689	544	923	689	621	870	765	678	1060	799	420	598	289	437	544	102	401	131	570
CAN	824	658	0	862	2114	1194	1366	1482	1663	1841	1409	3359	899	1216	380	1197	1146	183	453	191	1055
CHE	417	541	763	0	1004	598	585	697	733	733	841	923	376	553	253	403	497	92	364	117	492
DEU	594	862	1307	854	0	2111	1500	2348	1894	2335	2634	2889	1026	1808	454	1206	1678	262	591	311	1121
DFS	508	601	886	540	1232	0	990	1591	1371	1262	1678	1690	735	1164	463	817	1082	202	534	197	845
ESP	495	602	889	483	859	716	0	1285	1135	1321	1149	1604	728	972	340	867	913	148	424	171	870
FRA	604	857	1010	644	1239	878	990	0	1577	1537	2006	2429	855	1545	520	1152	1261	171	553	191	938
GBR	771	759	1687	726	1278	950	921	1059	0	1535	1724	2190	792	1201	491	919	1068	185	725	193	962
ITA	556	679	1623	671	1546	1010	989	1027	1322	0	1541	2443	872	1407	313	974	1237	216	478	248	1034
NLD	745	1159	1264	823	1928	1230	983	1289	1450	1334	0	2253	805	1398	625	935	1415	231	654	221	1012
USA	915	686	3407	854	1620	1058	1075	1337	2010	2038	1816	0	1164	1668	552	1738	1627	235	579	215	1325
HUN	332	341	795	316	689	530	564	573	639	742	607	1053	0	747	277	611	842	121	327	128	656
POL	381	477	927	399	1187	761	635	970	922	1099	1077	1402	577	0	319	774	1147	206	413	220	892
NZL	406	224	327	211	316	298	276	304	386	266	557	466	207	198	0	327	338	50	328	59	309
JPN	299	244	436	234	358	326	330	336	371	391	362	500	251	268	159	0	760	116	330	125	624
CZE	348	406	801	361	1120	628	637	818	762	949	1200	1241	715	806	222	245	0	158	399	197	793
EST	49	60	96	45	153	126	66	81	101	123	151	157	68	119	23	31	88	0	72	56	129
IRL	387	394	435	365	487	442	416	504	793	448	621	551	278	310	277	198	307	39	0	84	388
SVN	74	100	146	86	289	154	118	144	144	216	190	170	92	171	44	54	140	28	68	0	143
PRT	423	571	1076	443	917	736	844	829	886	1039	1010	1372	620	834	242	309	653	75	342	110	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	496	910	467	879	772	652	748	912	661	890	1100	459	586	566	546	98	421	106	559
BEL	432	0	682	539	915	682	619	803	756	676	1014	777	409	592	423	541	102	398	132	571
CAN	824	657	0	862	2113	1194	1368	1321	1663	1841	1380	3351	885	1215	1181	1146	183	453	192	1062
CHE	417	538	763	0	1004	598	587	670	733	733	834	921	372	552	401	497	92	364	117	497
DEU	594	861	1307	854	0	2110	1503	2220	1893	2334	2611	2888	1016	1802	1200	1677	262	590	312	1127
DFS	508	599	886	540	1232	0	994	1424	1371	1262	1651	1676	721	1161	806	1082	202	534	197	852
ESP	496	609	891	486	865	721	0	1200	1137	1324	1137	1602	720	974	856	915	150	425	172	879
FRA	567	811	955	620	1173	851	960	0	1434	1513	1696	1999	806	1458	992	1207	167	526	191	904
GBR	771	758	1687	726	1278	950	927	1015	0	1535	1702	2183	778	1200	907	1068	185	722	193	966
ITA	556	679	1623	671	1546	1010	994	1019	1322	0	1541	2442	871	1407	972	1237	216	478	248	1036
NLD	722	1104	1220	803	1902	1210	963	1151	1414	1330	0	2148	782	1385	898	1406	230	649	221	1010
USA	911	681	3407	854	1619	1058	1076	1141	2009	2038	1612	0	1135	1666	1685	1625	235	577	215	1332
HUN	320	332	781	312	682	521	552	552	623	739	581	1027	0	741	601	830	121	322	127	657
POL	381	476	927	399	1187	761	638	925	922	1099	1070	1402	573	0	771	1147	206	413	219	897
JPN	297	243	435	232	357	325	330	329	368	390	357	497	245	267	0	757	115	326	125	628
CZE	348	405	801	361	1120	628	640	787	762	949	1185	1240	704	806	244	0	158	399	195	795
EST	49	60	96	45	153	126	68	80	101	123	150	157	68	119	31	88	0	72	55	129
IRL	387	394	435	365	487	442	418	490	790	448	613	551	271	310	198	307	39	0	84	390
SVN	74	100	146	85	291	154	119	143	144	216	189	170	91	170	54	139	28	68	0	143
PRT	425	574	1079	447	922	742	854	820	893	1041	1003	1378	621	839	308	657	75	343	111	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	637	451	751	635	558	758	700	595	859	719	445	373	187	106	486	71	303	358
CAN	637	0	750	1787	1098	1255	1289	1568	1691	1192	3163	997	437	503	163	921	134	727	771
CHE	450	657	0	802	508	494	590	631	642	652	778	392	303	196	95	402	67	285	328
DEU	722	1191	676	0	1657	1278	1814	1534	1931	2107	2326	1334	475	403	241	896	188	762	1090
DFS	583	883	453	1085	0	903	1420	1360	1064	1419	1670	874	531	291	155	715	146	535	693
ESP	555	824	390	723	674	0	1137	1036	1172	995	1473	790	387	356	142	750	106	561	629
FRA	784	951	527	1021	850	906	0	1431	1282	1477	1997	1039	525	365	151	786	118	642	962
GBR	722	1614	597	1088	948	823	1016	0	1356	1434	2174	896	716	346	162	822	136	585	744
ITA	618	1522	590	1351	903	894	936	1199	0	1305	2134	1053	409	450	199	881	163	727	920
NLD	935	1121	628	1641	1131	838	1069	1222	1195	0	1670	1193	567	329	177	833	163	584	833
USA	661	3293	696	1391	1057	941	1141	2007	1872	1349	0	1388	576	591	184	1134	162	878	1017

CZE	347	714	278	933	534	534	658	637	827	1057	1064	0	322	326	164	662	108	637	721
IRL	380	432	291	397	442	376	490	783	397	544	551	244	0	127	69	324	46	230	247
KOR	147	490	149	269	217	254	247	263	393	245	686	233	94	0	83	323	54	289	312
SVN	84	126	70	224	125	103	115	127	178	155	149	121	57	57	0	124	41	105	165
PRT	484	926	356	770	617	701	699	732	884	824	1160	544	279	288	95	0	83	501	561
EST	42	75	32	106	95	46	56	81	91	105	96	61	27	22	18	47	0	81	129
HUN	245	651	235	520	402	405	428	457	620	445	795	537	193	222	77	478	44	0	463
POL	280	597	227	698	465	388	576	581	713	623	801	487	195	219	135	515	66	369	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	732	302	608	696	611	909	710	407	267	344	193	529	369	565	130	82	260	212	437
CHE	502	0	882	247	576	704	704	789	892	398	291	324	215	729	334	554	118	80	259	202	427
DEU	701	746	0	802	1622	1542	2079	2170	2342	1269	776	427	446	1639	757	1283	310	223	677	278	1423
DFS	241	201	368	0	495	626	532	788	686	437	220	276	133	322	268	419	82	61	225	194	421
FRA	611	518	994	259	0	1021	1283	1229	1397	863	619	349	379	1010	591	971	190	137	551	225	1127
GBR	715	688	1103	352	777	0	1443	1586	2139	828	554	653	388	1266	628	1065	194	158	517	351	944
ITA	627	640	1387	365	915	1251	0	1416	2300	1080	748	407	507	1638	763	1244	245	189	684	248	1209
NLD	988	772	1689	503	952	1346	1253	0	1883	1155	549	558	362	1050	648	1045	223	196	513	448	1088
USA	640	824	1409	343	876	1997	1947	1493	0	1292	982	531	668	2534	897	1527	216	189	791	350	1345
CZE	317	283	907	231	583	595	839	1023	1009	0	491	271	370	866	527	733	194	129	555	197	893
JPN	178	184	291	107	261	280	332	281	389	199	0	176	352	708	369	585	116	83	375	146	545
IRL	351	325	370	206	340	717	390	533	513	205	133	0	126	330	210	371	78	52	181	235	264
KOR	145	161	292	78	266	286	435	262	770	263	196	92	0	534	336	392	100	70	310	113	420
CAN	550	666	1187	247	807	1360	1506	1070	2867	668	350	347	521	0	712	1066	190	148	628	221	957
PRT	362	294	658	197	551	563	767	627	956	434	224	182	293	736	0	580	139	101	415	164	646
ESP	568	454	717	275	782	872	933	898	1018	487	252	372	272	764	533	0	171	125	505	240	760
SVN	98	85	293	55	144	144	214	190	170	139	53	62	64	146	105	118	0	53	122	59	211
EST	50	39	131	26	70	91	110	133	121	74	29	31	31	89	63	59	28	0	96	37	174
HUN	209	208	470	148	383	411	573	390	724	471	174	149	241	603	405	363	89	55	0	126	540
NZL	179	178	235	127	190	294	224	413	305	146	112	199	88	226	141	207	44	19	97	0	165
POL	356	307	987	255	762	763	960	875	1207	655	222	212	321	836	627	481	167	103	446	127	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	152	90	105	35	153	256	133	17	15
CAN	158	0	102	139	37	76	456	145	13	23
DFS	67	90	0	110	47	95	163	128	22	34
GBR	103	143	106	0	43	76	175	115	16	34
ITA	35	35	46	41	0	33	47	47	10	16
NZL	155	77	74	78	30	0	150	104	17	19
USA	251	458	132	182	50	156	0	254	35	36
ZAF	137	145	111	113	48	100	261	0	26	25
NLD	13	8	16	13	7	14	35	21	0	5
CHE	13	21	33	32	17	17	36	25	4	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	152	90	105	35	153	256	126	17	22
CAN	158	0	102	139	37	76	456	134	13	28
DFS	67	90	0	110	47	95	163	119	22	44
GBR	103	143	106	0	43	76	175	110	16	41
ITA	35	35	46	41	0	33	47	47	10	23
NZL	155	77	74	78	30	0	150	95	17	25
USA	251	458	132	182	50	156	0	234	35	43
ZAF	131	136	105	109	48	92	243	0	26	37
NLD	13	8	16	13	7	14	35	21	0	9

CHE 20 27 43 40 24 23 44 37 7 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	152	90	105	35	153	126	17	256	26
CAN	158	0	102	139	37	76	134	13	456	32
DFS	67	90	0	110	47	95	119	22	163	47
GBR	103	143	106	0	43	76	110	16	175	44
ITA	35	35	46	41	0	33	47	10	47	26
NZL	155	77	74	78	30	0	95	17	150	29
ZAF	131	136	105	109	48	92	0	26	234	41
NLD	13	8	16	13	7	14	21	0	35	11
USA	251	458	132	182	50	156	243	35	0	47
CHE	23	29	46	43	26	27	40	8	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	152	87	104	35	256	132	5	26
CAN	158	0	102	139	37	456	145	5	32
DFS	64	89	0	108	47	163	127	11	47
GBR	102	143	104	0	43	175	115	10	44
ITA	35	35	46	41	0	47	47	5	26
USA	251	458	131	182	50	0	253	18	47
ZAF	136	145	110	113	48	260	0	11	41
NLD	2	3	10	8	4	16	9	0	6
CHE	23	29	46	43	26	48	40	6	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	152	90	105	35	153	256	133	17	26
CAN	158	0	102	139	37	76	456	145	13	32
DFS	67	90	0	110	47	95	163	128	22	47
GBR	103	143	106	0	43	76	175	115	16	44
ITA	35	35	46	41	0	33	47	47	10	26
NZL	155	77	74	78	30	0	150	104	17	29
USA	251	458	132	182	50	156	0	254	35	47
ZAF	137	145	111	113	48	100	261	0	26	41
NLD	13	8	16	13	7	14	35	21	0	11
CHE	23	29	46	43	26	27	48	40	8	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	152	85	105	35	153	256	133	17	26
CAN	158	0	91	139	37	76	456	145	13	32
DFS	59	76	0	106	44	88	152	121	20	46
GBR	103	143	99	0	43	76	175	115	16	44
ITA	35	35	41	41	0	33	47	47	10	26
NZL	155	77	66	78	30	0	150	104	17	29
USA	251	458	118	182	50	156	0	254	35	47
ZAF	137	145	101	113	48	100	261	0	26	41
NLD	13	8	14	13	7	14	35	21	0	11
CHE	23	29	45	43	26	27	48	40	8	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	152	90	105	35	153	256	133	17	26
CAN	158	0	102	139	37	76	456	145	13	32
DFS	67	90	0	110	47	95	163	128	22	47
GBR	103	143	106	0	43	76	175	115	16	44
ITA	35	35	46	41	0	33	47	47	10	26
NZL	155	77	74	78	30	0	150	104	17	29
USA	251	458	132	182	50	156	0	254	35	47
ZAF	137	145	111	113	48	100	261	0	26	41
NLD	13	8	16	13	7	14	35	21	0	11
CHE	23	29	46	43	26	27	48	40	8	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	ITA	ZAF	NLD	USA	CHE
AUS	0	152	82	35	105	17	256	26
CAN	158	0	91	37	120	13	456	32
DFS	57	76	0	44	91	20	152	46
ITA	35	35	41	0	44	10	47	26
ZAF	106	116	77	44	0	23	200	41
NLD	13	8	14	7	16	0	35	11
USA	251	458	118	50	197	35	0	47
CHE	23	29	45	26	40	8	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	152	87	104	35	256	132	17	26
CAN	158	0	102	139	37	456	145	13	32
DFS	65	90	0	108	47	163	127	22	47
GBR	102	143	104	0	43	175	115	16	44
ITA	35	35	46	41	0	47	47	10	26
USA	251	458	132	182	50	0	253	35	47
ZAF	136	145	110	113	48	260	0	26	41
NLD	13	8	16	13	7	35	21	0	11
CHE	23	29	46	43	26	48	40	8	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	152	90	105	35	153	256	133	17	26
CAN	158	0	102	139	37	76	456	145	13	32
DFS	67	90	0	110	47	95	163	128	22	47
GBR	103	143	106	0	43	76	175	115	16	44
ITA	35	35	46	41	0	33	47	47	10	26
NZL	155	77	74	78	30	0	150	104	17	29
USA	251	458	132	182	50	156	0	254	34	47
ZAF	137	145	111	113	48	100	261	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	152	82	105	35	153	256	133	17	26
CAN	158	0	85	139	37	76	456	145	13	32
DFS	57	74	0	97	44	81	145	116	20	46
GBR	103	143	95	0	43	76	175	115	16	44
ITA	35	35	41	41	0	33	47	47	10	26
NZL	155	77	61	78	30	0	150	104	17	29
USA	251	458	113	182	50	156	0	254	34	47
ZAF	137	145	99	113	48	100	261	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	152	90	105	35	153	256	133	17	26
CAN	158	0	102	139	37	76	456	145	13	32
DFS	67	90	0	110	47	95	163	128	22	47
GBR	103	143	106	0	43	76	175	115	16	44
ITA	35	35	46	41	0	33	47	47	10	26
NZL	155	77	74	78	30	0	150	104	17	29
USA	251	458	132	182	50	156	0	254	34	47
ZAF	137	145	111	113	48	100	261	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	152	88	104	35	256	133	18	26
CAN	158	0	102	139	37	453	145	14	32
DFS	66	90	0	108	47	163	128	29	47
GBR	102	143	104	0	43	175	115	21	44
ITA	35	35	46	41	0	47	47	10	26
USA	251	456	132	182	50	0	253	37	47
ZAF	137	145	111	113	48	260	0	31	41
NLD	14	9	23	18	7	37	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	152	90	105	35	153	256	133	18	26
CAN	158	0	102	139	37	76	456	145	14	32
DFS	67	90	0	110	46	95	163	128	29	47
GBR	103	143	106	0	43	76	175	115	21	44
ITA	35	35	45	41	0	33	46	47	10	26
NZL	155	77	74	78	30	0	150	104	19	29
USA	251	458	132	182	49	156	0	254	37	47
ZAF	137	145	111	113	48	100	261	0	31	41
NLD	14	9	23	18	7	16	37	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	152	90	105	35	153	256	133	18	26
CAN	158	0	102	139	37	76	456	145	14	32
DFS	67	90	0	110	46	95	163	128	29	47
GBR	103	143	106	0	43	76	175	115	21	44
ITA	35	35	45	41	0	33	46	47	10	26
NZL	155	77	74	78	30	0	150	104	19	29
USA	251	458	132	182	49	156	0	254	37	47
ZAF	137	145	111	113	48	100	261	0	31	41
NLD	14	9	23	18	7	16	37	26	0	12
CHE	23	29	46	43	26	27	48	40	9	0

AUS	0	152	87	104	35	256	125	17	26	19
CAN	158	0	102	139	37	456	134	13	32	12
DFS	65	90	0	108	47	163	118	22	47	18
GBR	102	143	104	0	43	175	110	16	44	12
ITA	35	35	46	41	0	47	47	10	26	3
USA	251	458	132	182	50	0	234	34	47	16
ZAF	130	136	104	109	48	243	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	19	11	17	11	1	14	12	1	4	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE
AUS	0	152	74	153	123	18	256	26
CAN	158	0	80	76	131	14	456	32
DFS	52	71	0	74	103	27	138	46
NZL	155	77	56	0	91	19	150	29
ZAF	126	130	87	84	0	31	229	41
NLD	14	9	21	16	26	0	37	12
USA	251	458	108	156	230	37	0	47
CHE	23	29	45	27	40	9	48	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE
AUS	0	152	90	35	35	153	256	17	22
CAN	158	0	102	37	37	76	456	13	28
DFS	67	90	0	32	47	95	163	22	44
GBR	40	42	30	0	12	35	37	4	3
ITA	35	35	46	13	0	33	47	10	23
NZL	155	77	74	39	30	0	150	17	25
USA	251	458	132	40	50	156	0	35	43
NLD	13	8	16	5	7	14	35	0	9
CHE	20	27	43	4	24	23	44	7	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE	ITA
AUS	0	152	87	105	153	256	17	22	35
CAN	158	0	96	139	76	453	13	28	37
DFS	65	88	0	100	87	156	22	44	46
GBR	103	143	101	0	73	175	16	41	43
NZL	155	77	68	75	0	150	17	25	33
USA	251	456	127	182	156	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

JER

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	102	139	37	456	13	28
DFS	53	90	0	108	47	163	22	44
GBR	81	143	104	0	43	175	16	41
ITA	31	35	46	41	0	47	10	23

USA	201	458	132	182	50	0	35	43
NLD	11	8	16	13	7	35	0	9
CHE	17	27	43	40	24	44	7	0

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   23   11   46   9   15   22   13   9   4   16
CAN   23   0   10  147   74   4   33  152   3   0   10
DEU   11  10   0   55   4   11  10   4   12   0   29
DFS   35 148   46   0   58  83   57  83   35   0  122
GBR    8  73   4   53   0   0   26  62   1   0   3
NOR   11   4  10   63   0   0   6   0   24   0  11
NZL   21  31  10   55  23   5   0  22   2   2   6
USA   13 145   4   78  58   0  21   0   2   0   4
NLD    9   3  11   34   1  23   2   2   0   0  12
CAM    4   0   0   0   0   0   2   0   0   0   0
LVA   15  10  23   84   3   9   6   4  11   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  NZL  USA  NLD  CAM  NOR  LVA
-----
AUS   0   23   11   46   9  22   13   9   4   8  15
CAN   23   0   10  147   74  33  152   3   0   1  10
DEU   11  10   0   55   4  10   4  12   0   5  27
DFS   35 148   46   0   58  55  83  33   0  48  103
GBR    8  73   4   53   0  26  62   1   0   0   3
NZL   21  31  10   53  23   0  22   2   2   3   5
USA   13 145   4   78  58  21   0   2   0   0   4
NLD    9   3  11   32   1   2   2   0   0  14  11
CAM    4   0   0   0   0   2   0   0   0   0   0
NOR    7   1   4  35   0   3   0  13   0   0   1
LVA   14  10  21  69   3   5   4  10   0   0   0

```

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   23   11   46   9   8  22   13   9   4  16
CAN   23   0   10  147   74   1  33  150   3   0  10
DEU   11  10   0   55   4   6  10   4  12   0  29
DFS   35 148   46   0   58  59  55  83  33   0  122
GBR    8  73   4   53   0   0  26  61   1   0   3
NOR    7   1   5  43   0   0   3   0  19   0   2
NZL   21  31  10   53  23   3   0  22   2   2   6
USA   13 144   4   78  57   0  21   0   2   0   4
NLD    9   3  11   32   1  18   2   2   0   0  12
CAM    4   0   0   0   0   0   2   0   0   0   0
LVA   15  10  23   84   3   1   6   4  11   0   0

```

RDC

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common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  USA  NZL  CAM  NOR  LVA
-----
AUS   0   23   2   46   9  13   9   4   8  16

```

CAN	23	0	0	147	74	152	3	0	3	10
DEU	2	0	0	15	0	0	0	0	2	1
DFS	35	148	13	0	58	83	32	0	59	122
GBR	8	73	0	53	0	62	1	0	0	3
USA	13	145	0	78	58	0	2	0	0	4
NLD	9	3	0	31	1	2	0	0	14	11
CAM	4	0	0	0	0	0	0	0	0	0
NOR	7	2	2	47	0	0	13	0	0	1
LVA	15	10	0	84	3	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	23	11	46	9	17	22	13	9	4	16
CAN	23	0	10	147	74	4	33	152	3	0	10
DEU	11	10	0	55	4	11	10	4	12	0	29
DFS	35	148	46	0	58	93	54	83	34	0	122
GBR	8	73	4	53	0	0	26	62	1	0	3
NOR	13	4	10	71	0	0	7	0	24	0	12
NZL	21	31	10	50	23	6	0	22	2	2	6
USA	13	145	4	78	58	0	21	0	2	0	4
NLD	9	3	11	33	1	23	2	2	0	0	12
CAM	4	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	NZL	USA	NLD	CAM	NOR	LVA
AUS	0	23	11	46	9	22	13	9	4	8	16
CAN	23	0	10	147	74	33	152	3	0	1	10
DEU	11	10	0	55	4	10	4	12	0	5	29
DFS	35	148	46	0	58	55	83	34	0	47	122
GBR	8	73	4	53	0	26	62	1	0	0	3
NZL	21	31	10	53	23	0	22	2	2	3	6
USA	13	145	4	78	58	21	0	2	0	0	4
NLD	9	3	11	33	1	2	2	0	0	14	12
CAM	4	0	0	0	0	2	0	0	0	0	0
NOR	7	1	4	34	0	3	0	13	0	0	1
LVA	15	10	23	84	3	6	4	11	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	23	11	46	9	17	22	13	9	4	16
CAN	23	0	10	147	74	4	33	152	3	0	10
DEU	11	10	0	55	4	11	10	4	12	0	29
DFS	35	148	46	0	58	96	57	83	35	0	122
GBR	8	73	4	53	0	0	26	62	1	0	3
NOR	13	4	10	73	0	0	7	0	24	0	12
NZL	21	31	10	55	23	6	0	22	2	2	6
USA	13	145	4	78	58	0	21	0	2	0	4
NLD	9	3	11	34	1	23	2	2	0	0	12
CAM	4	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	NOR	NLD	USA	CAM	LVA
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AUS	0	23	11	46	17	9	13	4	15
CAN	23	0	10	146	4	3	152	0	10
DEU	11	10	0	55	11	12	4	0	27
DFS	35	147	46	0	93	32	83	0	103
NOR	13	4	10	71	0	24	0	0	10
NLD	9	3	11	31	23	0	2	0	11
USA	13	145	4	78	0	2	0	0	4
CAM	4	0	0	0	0	0	0	0	0
LVA	14	10	21	69	8	10	4	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	23	8	46	9	17	13	9	4	16
CAN	23	0	8	147	74	4	152	3	0	10
DEU	8	8	0	46	4	10	4	12	0	16
DFS	35	148	40	0	58	93	83	33	0	122
GBR	8	73	4	53	0	0	62	1	0	3
NOR	13	4	9	71	0	0	0	24	0	12
USA	13	145	4	78	58	0	0	2	0	4
NLD	9	3	11	32	1	23	2	0	0	12
CAM	4	0	0	0	0	0	0	0	0	0
LVA	15	10	13	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	23	11	46	9	17	22	13	9	4	16
CAN	23	0	10	147	74	4	33	152	3	0	10
DEU	11	10	0	55	4	11	10	4	12	0	29
DFS	35	148	46	0	58	96	57	83	32	0	122
GBR	8	73	4	53	0	0	26	62	1	0	3
NOR	13	4	10	73	0	0	7	0	24	0	12
NZL	21	31	10	55	23	6	0	22	2	2	6
USA	13	145	4	78	58	0	21	0	2	0	4
NLD	9	3	11	31	1	23	2	2	0	0	12
CAM	4	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	NZL	USA	NLD	CAM	LVA
AUS	0	23	11	46	9	17	22	13	9	4	16
CAN	23	0	10	147	74	4	33	152	3	0	10
DEU	11	10	0	55	4	11	10	4	12	0	29
DFS	35	148	46	0	58	93	55	83	32	0	116
GBR	8	73	4	53	0	0	26	62	1	0	3
NOR	13	4	10	71	0	0	7	0	24	0	12
NZL	21	31	10	52	23	6	0	22	2	2	6
USA	13	145	4	78	58	0	21	0	2	0	4
NLD	9	3	11	31	1	23	2	2	0	0	12
CAM	4	0	0	0	0	0	2	0	0	0	0
LVA	15	10	23	80	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	NZL	USA	NLD	CAM	LVA

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-----
AUS  0  23  11  46  9  17  22  13  9  4  16
CAN  23  0  10 147  74  4  33 152  3  0  10
DEU  11  10  0  55  4  12  10  4  12  0  29
DFS  35 148  46  0  58  88  57  83  34  0 122
GBR   8  73  4  53  0  0  26  62  1  0  3
NOR  13  4  11  68  0  0  7  0  24  0  12
NZL  21  31  10  55  23  6  0  22  2  2  6
USA  13 145  4  78  58  0  21  0  2  0  4
NLD   9  3  11  33  1  23  2  2  0  0  12
CAM   4  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

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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  23  11  46  9  17  13  9  4  16
CAN  23  0  10 147  74  4 149  3  0  10
DEU  11  10  0  55  4  11  4  14  0  29
DFS  35 148  46  0  58  96  83  39  0 122
GBR   8  73  4  53  0  0  62  1  0  3
NOR  13  4  10  73  0  0  0  30  0  12
USA  13 144  4  78  58  0  0  2  0  4
NLD   9  3  13  38  1  29  2  0  0  12
CAM   4  0  0  0  0  0  0  0  0  0
LVA  15  10  23  84  3  10  4  11  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  NZL  USA  NLD  CAM  LVA
-----
AUS  0  23  11  46  9  17  22  13  9  4  15
CAN  23  0  10 147  74  4  33 152  3  0  10
DEU  11  10  0  55  4  12  10  4  14  0  27
DFS  35 148  46  0  58  95  55  83  38  0 103
GBR   8  73  4  53  0  0  26  62  1  0  3
NOR  13  4  11  73  0  0  7  0  30  0  11
NZL  21  31  10  53  23  6  0  22  3  2  5
USA  13 145  4  78  58  0  21  0  2  0  4
NLD   9  3  13  37  1  29  3  2  0  0  11
CAM   4  0  0  0  0  0  2  0  0  0  0
LVA  14  10  21  69  3  9  5  4  10  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  NZL
-----
AUS  0  23  11  46  9  17  13  9  4  16  3
CAN  23  0  10 147  74  4 150  3  0  10  2
DEU  11  10  0  55  4  11  4  12  0  29  3
DFS  35 148  46  0  58  90  83  34  0 122  7
GBR   8  73  4  53  0  0  61  1  0  3  3
NOR  13  4  10  68  0  0  0  24  0  12  1
USA  13 144  4  78  57  0  0  2  0  4  2
NLD   9  3  11  33  1  23  2  0  0  12  0
CAM   4  0  0  0  0  0  0  0  0  0  0
LVA  15  10  23  84  3  10  4  11  0  0  0
NZL   3  2  3  7  3  1  2  0  0  0  0
-----

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RDC

common bulls below diagonal

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common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  NOR  NZL  NLD  USA  CAM  LVA
-----
AUS   0   23   11   41   17   22   9   13   4   16
CAN  23    0   10  141    4   33   3  152   0   10
DEU  11   10    0   52   12   10   14   4   0   29
DFS  32  141   46    0   87   50   36   78   0  105
NOR  13    4   11   68    0    7   30   0   0   12
NZL  21   31   10   49    6    0    2   22   2    6
NLD   9    3   13   35   29    2    0    2   0   11
USA  13  145    4   74    0   21    2    0   0   4
CAM   4    0    0    0    0    2    0    0   0   0
LVA  15   10   23   72   10    6   10    4   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
-----
AUS   0   23   11   46    8   18   22   13    9    4
CAN  23    0   10  147   71    6   33  152    3    0
DEU  11   10    0   55    4   14   10    4   12    0
DFS  35  148   46    0   58  113   57   83   35    0
GBR   7   70    4   53    0    0   23   60    1    0
NOR  14    5   13   91    0    0    9    0   25    0
NZL  21   31   10   55   20    8    0   22    2    2
USA  13  145    4   78   56    0   21    0    2    0
NLD   9    3   11   34    1   24    2    2    0    0
CAM   4    0    0    0    0    0    2    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
-----
AUS   0   23   11   46    8   17   22   13    9    4
CAN  23    0   10  147   71    4   33  149    3    0
DEU  11   10    0   55    4   11   10    4   12    0
DFS  35  148   46    0   58   96   57   83   34    0
GBR   7   70    4   53    0    0   23   60    1    0
NOR  13    4   10   73    0    0    7    0   24    0
NZL  21   31   10   55   20    6    0   22    2    2
USA  13  144    4   78   56    0   21    0    2    0
NLD   9    3   11   33    1   23    2    2    0    0
CAM   4    0    0    0    0    0    2    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  USA  NLD  CAM
-----
AUS   0   23   11   46    8   17   13    9    4
CAN  23    0   10  147   71    4  152    3    0
DEU  11   10    0   55    4   11    4   12    0
DFS  35  148   46    0   58   96   83   35    0
GBR   7   70    4   53    0    0   60    1    0
NOR  13    4   10   73    0    0    0   24    0
USA  13  145    4   78   56    0    0    2    0
NLD   9    3   11   34    1   23    2    0    0
CAM   4    0    0    0    0    0    0    0    0
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