

## 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](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:

BEL (HOL)	Few bulls missing due to drop in daughters, changes in type of proofs caused by the program assigning them.
DEA (BSW)	Drops in info causing changes in reliabilities
JPN (HOL)	Changes in information caused by additional records and modification of pedigree.
NZL (ALL)	Changes in information caused by continuous DNA parentage testing
DFS (ALL)	Changes in type of proofs: Type of proof is based on information from production. When production information for foreign bulls become available such bulls might change type of proof for other traits as well. Drops in information.
SVN (ALL)	Small changes in information due changes in data base related to the pedigree completeness as well as phenotypic data improvement.
ESP (HOL)	Base change
ZAF (HOL,JER)	Reliabilities estimated with Jamrozik et al. method.

## INTERBULL CHANGES COMPARED TO THE PREVIOUS ROUTINE RUN

### Post-processing Windows:

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

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

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

The new weights are as follows:

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

More information can be read on [https://interbull.org/ib/rg\\_procedure](https://interbull.org/ib/rg_procedure)

#### DATA AND METHOD OF ANALYSIS

---

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 (August Routine Evaluation 2021).  
Number of records for stature by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		45	3830	742	240	
BEL			1605			
CAN	236	100	12053	773	871	
CHE	2809		3383	46		
CZE			4206			
DEA	3605					
DEU			19825		241	
DFS			12073	2028	6289	
ESP			4124			
EST			768			
FRA	379		17093			
FRM						
GBR	22	217	6163	440	316	
HUN			2791			
IRL			1774			
ISR						
ITA	2153		8769	101		
JPN			5891			
KOR			1396			
LTU						
LVA						
NLD	127		15003	47	52	
NOR					2414	
NZL			6455	3998	596	
POL			8873			
PRT			2103			
SVK						
SVN	323		579			
URY						
USA	877	700	33090	4287	258	
ZAF			851	547		
HRV						
CAM					36	
=====						
No. Records	10531	1062	172698	13009	11313	
Pub. Proofs	8443	904	138169	11309	12112	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	6.35								
CHE	0.95	12.39							
FRA	0.98	0.96	0.92						
ITA	0.96	0.95	0.95	14.15					
NLD	0.95	0.95	0.96	0.92	4.15				
USA	0.98	0.95	0.97	0.95	0.94	1.63			
DEA	0.97	0.98	0.97	0.96	0.96	0.96	11.29		
SVN	0.92	0.90	0.91	0.93	0.91	0.91	0.92	15.88	
GBR	0.96	0.93	0.96	0.94	0.93	0.96	0.91	0.90	0.68

-----									
-----									
BSW	cwi								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.19								
CHE	0.89	10.27							
FRA	0.87	0.89	0.94						
ITA	0.81	0.85	0.87	21.58					
NLD	0.91	0.81	0.87	0.71	4.55				
USA	0.89	0.90	0.92	0.85	0.81	0.91			
DEA	0.87	0.82	0.81	0.75	0.82	0.78	11.42		
SVN	0.88	0.87	0.85	0.85	0.81	0.87	0.89	22.66	
GBR	0.91	0.84	0.82	0.72	0.90	0.81	0.78	0.82	1.44

-----									
-----									
BSW	bde								
	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA
CAN	6.84								
CHE	0.84	10.35							
FRA	0.72	0.88	0.91						
ITA	0.78	0.91	0.91	17.93					
NLD	0.82	0.85	0.86	0.85	4.25				
DEA	0.81	0.90	0.92	0.90	0.83	11.20			
SVN	0.78	0.75	0.79	0.82	0.79	0.73	25.78		
GBR	0.86	0.89	0.81	0.85	0.90	0.87	0.85	1.70	
USA	0.72	0.75	0.86	0.78	0.86	0.79	0.78	0.86	0.84

-----									
-----									
BSW	ang								
	CAN	CHE	FRA	NLD	USA	GBR			
CAN	8.34								
CHE	0.70	11.02							
FRA	0.88	0.67	0.86						
NLD	0.80	0.68	0.70	3.79					
USA	0.89	0.67	0.78	0.77	1.09				
GBR	0.89	0.77	0.80	0.83	0.90	0.75			

-----									
-----									
BSW	ran								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.81								
CHE	0.94	10.64							
FRA	0.97	0.96	0.94						
ITA	0.94	0.93	0.94	23.00					
NLD	0.95	0.92	0.96	0.92	4.53				
USA	0.97	0.94	0.97	0.91	0.95	1.36			
DEA	0.96	0.94	0.95	0.95	0.92	0.97	11.87		
SVN	0.91	0.90	0.91	0.90	0.91	0.91	0.90	21.58	
GBR	0.96	0.94	0.97	0.94	0.97	0.96	0.92	0.93	1.81

BSW rwi									
	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN	ITA
CAN	6.84								
CHE	0.89	10.18							
FRA	0.96	0.87	0.98						
NLD	0.93	0.86	0.93	4.00					
USA	0.91	0.84	0.87	0.81	0.97				
DEA	0.93	0.89	0.93	0.80	0.90	13.33			
GBR	0.93	0.86	0.92	0.88	0.93	0.84	1.35		
SVN	0.91	0.82	0.94	0.87	0.83	0.90	0.86	26.75	
ITA	0.87	0.80	0.89	0.80	0.85	0.87	0.88	0.87	20.07

BSW rls									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.77								
CHE	0.92	13.07							
FRA	0.91	0.91	1.02						
ITA	0.91	0.85	0.93	23.84					
NLD	0.88	0.84	0.88	0.84	5.11				
USA	0.95	0.93	0.90	0.86	0.86	0.82			
DEA	0.92	0.92	0.93	0.89	0.82	0.91	12.26		
SVN	0.87	0.82	0.89	0.87	0.84	0.86	0.89	21.79	
GBR	0.84	0.87	0.91	0.82	0.86	0.83	0.88	0.82	1.29

BSW fan									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.87								
CHE	0.68	13.78							
FRA	0.78	0.73	1.12						
ITA	0.69	0.85	0.80	21.75					
NLD	0.74	0.68	0.84	0.70	5.15				
USA	0.82	0.72	0.85	0.85	0.81	0.86			
DEA	0.62	0.91	0.67	0.89	0.65	0.66	11.64		
SVN	0.67	0.84	0.70	0.85	0.66	0.70	0.94	24.74	
GBR	0.81	0.71	0.90	0.74	0.88	0.83	0.69	0.70	1.20

BSW hde									
	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA	
CAN	8.44								
CHE	0.87	12.59							
FRA	0.82	0.81	1.17						
ITA	0.79	0.83	0.85	21.83					
NLD	0.77	0.74	0.84	0.75	5.15				
DEA	0.78	0.87	0.84	0.92	0.77	12.22			
SVN	0.76	0.75	0.84	0.89	0.74	0.89	30.30		
USA	0.85	0.74	0.86	0.89	0.81	0.77	0.83	0.86	

BSW fua									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.02								
CHE	0.87	11.98							
FRA	0.89	0.87	0.89						
ITA	0.90	0.83	0.85	20.71					
NLD	0.90	0.85	0.90	0.84	4.60				
USA	0.94	0.86	0.87	0.93	0.87	1.31			
DEA	0.85	0.85	0.94	0.83	0.82	0.85	11.22		
SVN	0.76	0.75	0.84	0.85	0.77	0.76	0.90	21.30	
GBR	0.92	0.84	0.88	0.88	0.91	0.92	0.76	0.67	1.27

BSW ruh									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.53								
CHE	0.91	11.88							
FRA	0.85	0.84	0.93						
ITA	0.75	0.85	0.86	13.16					
NLD	0.77	0.85	0.87	0.86	4.24				
USA	0.84	0.84	0.88	0.87	0.87	1.09			
DEA	0.81	0.86	0.89	0.93	0.90	0.86	11.78		
SVN	0.82	0.84	0.80	0.86	0.89	0.83	0.90	19.28	
GBR	0.75	0.80	0.86	0.85	0.88	0.91	0.78	0.77	1.61

BSW ruw									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	
CAN	8.17								
CHE	0.91	11.91							
FRA	0.85	0.86	0.86						
ITA	0.79	0.88	0.79	13.46					
NLD	0.70	0.66	0.79	0.69	4.24				
USA	0.86	0.89	0.85	0.89	0.79	1.03			
DEA	0.85	0.91	0.75	0.95	0.55	0.90	12.29		
SVN	0.82	0.81	0.75	0.85	0.71	0.82	0.83	17.66	

BSW usu									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.49								
CHE	0.90	12.01							
FRA	0.83	0.91	0.90						
ITA	0.89	0.90	0.88	18.91					
NLD	0.83	0.83	0.89	0.82	4.13				
USA	0.84	0.89	0.87	0.87	0.90	1.01			
DEA	0.92	0.92	0.88	0.93	0.78	0.83	11.52		
SVN	0.85	0.83	0.72	0.83	0.69	0.73	0.85	23.57	
GBR	0.80	0.79	0.86	0.87	0.91	0.93	0.74	0.66	2.96

BSW ude									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.53								
CHE	0.96	12.04							
FRA	0.95	0.95	0.97						
ITA	0.94	0.96	0.95	20.62					
NLD	0.96	0.94	0.95	0.93	4.02				
USA	0.96	0.95	0.96	0.95	0.95	1.24			
DEA	0.93	0.97	0.92	0.97	0.93	0.93	12.04		
SVN	0.94	0.96	0.91	0.97	0.94	0.93	0.96	21.39	
GBR	0.96	0.94	0.96	0.94	0.96	0.96	0.91	0.92	1.91

BSW ftp									
	CAN	CHE	FRA	NLD	USA	DEA	SVN	GBR	ITA
CAN	7.36								
CHE	0.97	13.95							
FRA	0.97	0.95	0.93						
NLD	0.96	0.95	0.95	5.02					
USA	0.92	0.90	0.88	0.91	1.33				
DEA	0.95	0.99	0.95	0.95	0.90	11.12			
SVN	0.94	0.93	0.92	0.93	0.90	0.92	17.87		
GBR	0.96	0.93	0.89	0.94	0.95	0.91	0.93	1.29	
ITA	0.87	0.86	0.86	0.86	0.88	0.86	0.86	0.87	21.93

BSW ftl									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.40								
CHE	0.90	14.67							
FRA	0.95	0.95	0.95						
ITA	0.93	0.94	0.95	18.51					
NLD	0.92	0.96	0.92	0.92	4.99				
USA	0.94	0.96	0.95	0.93	0.96	1.76			
DEA	0.90	0.98	0.98	0.96	0.94	0.96	11.11		
SVN	0.90	0.92	0.90	0.93	0.94	0.91	0.93	17.99	
GBR	0.95	0.94	0.93	0.94	0.97	0.96	0.93	0.94	1.41

BSW rtp									
	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA	
CAN	6.64								
CHE	0.97	14.51							
FRA	0.97	0.97	0.93						
ITA	0.92	0.95	0.93	20.93					
NLD	0.97	0.96	0.97	0.93	4.62				
DEA	0.96	0.99	0.97	0.96	0.94	12.05			
SVN	0.94	0.93	0.92	0.94	0.95	0.92	17.36		
USA	0.92	0.89	0.91	0.90	0.94	0.89	0.90	1.33	

BSW ocs									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.56								
CHE	0.85	9.27							
FRA	0.78	0.86	0.95						
ITA	0.81	0.82	0.89	9.25					
NLD	0.74	0.76	0.80	0.74	3.56				
USA	0.85	0.77	0.84	0.83	0.82	0.53			
DEA	0.82	0.91	0.90	0.88	0.71	0.76	10.68		
SVN	0.70	0.73	0.76	0.74	0.72	0.74	0.78	20.79	
GBR	0.82	0.87	0.86	0.81	0.87	0.89	0.74	0.73	1.75

BSW ous									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.11								
CHE	0.89	13.78							
FRA	0.88	0.92	0.94						
ITA	0.82	0.89	0.90	10.45					
NLD	0.87	0.87	0.92	0.79	4.49				
USA	0.85	0.89	0.86	0.83	0.85	1.00			
DEA	0.86	0.96	0.91	0.90	0.85	0.89	12.42		
SVN	0.75	0.84	0.78	0.82	0.77	0.83	0.92	19.90	
GBR	0.82	0.85	0.76	0.81	0.77	0.87	0.77	0.74	1.43

BSW ofl									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.39								
CHE	0.86	11.59							
FRA	0.66	0.67	1.26						
ITA	0.67	0.70	0.85	17.83					
NLD	0.67	0.66	0.74	0.65	4.27				
USA	0.73	0.66	0.78	0.74	0.66	1.04			
DEA	0.69	0.85	0.68	0.81	0.62	0.63	11.31		
SVN	0.77	0.86	0.68	0.76	0.66	0.71	0.90	28.17	
GBR	0.74	0.77	0.82	0.68	0.73	0.72	0.68	0.65	1.72

BSW	ofr						
	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	6.95						
CHE	0.83	12.13					
DEA	0.84	0.90	11.58				
ITA	0.83	0.91	0.95	17.53			
SVN	0.78	0.81	0.79	0.85	21.97		
USA	0.81	0.85	0.91	0.86	0.79	1.63	
FRA	0.80	0.87	0.93	0.91	0.83	0.90	0.90

BSW	tpl						
	CAN	CHE	DEA	ITA	SVN	FRA	
CAN	6.65						
CHE	0.90	12.02					
DEA	0.91	0.91	11.73				
ITA	0.92	0.92	0.94	24.05			
SVN	0.89	0.90	0.90	0.88	23.08		
FRA	0.97	0.94	0.90	0.91	0.88	1.28	

BSW	oru						
	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	6.97						
CHE	0.75	16.19					
DEA	0.70	0.87	12.58				
ITA	0.91	0.76	0.75	17.69			
SVN	0.84	0.58	0.64	0.72	27.28		
USA	0.89	0.57	0.47	0.83	0.69	0.97	
FRA	0.90	0.88	0.84	0.89	0.72	0.85	1.11

BSW	rle						
	CHE	DEA	ITA	SVN	USA	FRA	
CHE	11.76						
DEA	0.96	12.39					
ITA	0.83	0.87	19.91				
SVN	0.81	0.82	0.82	26.26			
USA	0.54	0.51	0.78	0.72	0.97		
FRA	0.92	0.93	0.89	0.82	0.74	1.03	

BSW	thp						
	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	7.67						
CHE	0.82	11.28					
DEA	0.77	0.85	12.17				
ITA	0.88	0.91	0.84	29.93			
SVN	0.80	0.84	0.85	0.88	36.12		
USA	0.87	0.88	0.70	0.83	0.71	1.36	
FRA	0.89	0.85	0.87	0.85	0.83	0.80	1.02

BSW	hoq						
	CAN	CHE	DEA	ITA	SVN	FRA	
CAN	7.08						
CHE	0.92	12.03					
DEA	0.91	0.89	12.55				
ITA	0.92	0.83	0.86	19.94			
SVN	0.95	0.89	0.92	0.90	21.80		
FRA	0.91	0.84	0.89	0.88	0.91	1.03	



BSW ful					
	CHE	DEA	ITA	SVN	FRA
CHE	11.74				
DEA	0.91	12.36			
ITA	0.92	0.96	12.89		
SVN	0.78	0.87	0.85	20.81	
FRA	0.69	0.82	0.74	0.75	0.94

BSW udb					
	CHE	DEA	ITA	SVN	FRA
CHE	11.90				
DEA	0.97	13.33			
ITA	0.93	0.97	26.66		
SVN	0.82	0.86	0.81	25.85	
FRA	0.91	0.88	0.85	0.79	0.94

BSW tdi					
	CHE	DEA	ITA	SVN	FRA
CHE	15.81				
DEA	0.96	11.38			
ITA	0.94	0.95	20.96		
SVN	0.91	0.93	0.93	17.71	
FRA	0.96	0.96	0.91	0.91	0.92

BSW tth					
	CHE	DEA	ITA	SVN	FRA
CHE	14.41				
DEA	0.98	12.99			
ITA	0.93	0.94	23.15		
SVN	0.88	0.91	0.88	20.01	
FRA	0.93	0.93	0.95	0.88	0.87

GUE sta				
	CAN	GBR	USA	AUS
CAN	6.35			
GBR	0.97	1.23		
USA	0.98	0.96	2.81	
AUS	0.90	0.93	0.91	0.84

GUE cwi				
	CAN	GBR	USA	AUS
CAN	6.77			
GBR	0.92	1.73		
USA	0.86	0.86	1.55	
AUS	0.72	0.80	0.67	0.34

GUE bde				
	CAN	GBR	USA	AUS
CAN	6.15			
GBR	0.87	1.52		
USA	0.75	0.89	1.79	
AUS	0.80	0.78	0.71	0.45

GUE ang				
---------	--	--	--	--

---

	CAN	GBR	USA	AUS
CAN	7.94			
GBR	0.89	1.79		
USA	0.88	0.91	1.91	
AUS	0.65	0.76	0.68	0.39

---

GUE ran

---

	CAN	GBR	USA	AUS
CAN	6.36			
GBR	0.97	1.62		
USA	0.97	0.97	2.01	
AUS	0.91	0.94	0.91	0.76

---

GUE rwi

---

	CAN	GBR	USA	AUS
CAN	6.78			
GBR	0.93	1.50		
USA	0.92	0.92	1.74	
AUS	0.86	0.85	0.79	0.64

---

GUE rls

---

	CAN	GBR	USA	AUS
CAN	8.47			
GBR	0.82	1.83		
USA	0.93	0.80	0.92	
AUS	0.72	0.81	0.72	0.32

---

GUE rlr

---

	CAN	USA	AUS
CAN	7.19		
USA	0.85	0.90	
AUS	0.62	0.55	0.19

---

GUE fan

---

	CAN	GBR	USA	AUS
CAN	8.25			
GBR	0.79	1.71		
USA	0.84	0.76	0.88	
AUS	0.64	0.77	0.66	0.26

---

GUE fua

---

	CAN	GBR	USA	AUS
CAN	7.26			
GBR	0.94	1.68		
USA	0.92	0.91	1.84	
AUS	0.80	0.79	0.77	0.38

---

GUE ruh

---

	CAN	GBR	USA	AUS
CAN	6.81			
GBR	0.74	2.09		
USA	0.80	0.90	1.50	
AUS	0.77	0.78	0.77	0.36

GUE usu				
	CAN	GBR	USA	AUS
CAN	6.74			
GBR	0.80	1.77		
USA	0.80	0.87	1.36	
AUS	0.77	0.79	0.76	0.29

GUE ude				
	CAN	GBR	USA	AUS
CAN	6.10			
GBR	0.97	1.59		
USA	0.95	0.95	1.86	
AUS	0.90	0.91	0.90	0.53

GUE ftp				
	CAN	GBR	USA	AUS
CAN	5.80			
GBR	0.96	1.29		
USA	0.92	0.93	1.62	
AUS	0.92	0.92	0.87	0.40

GUE ftl				
	CAN	GBR	USA	AUS
CAN	4.65			
GBR	0.95	1.91		
USA	0.95	0.97	2.05	
AUS	0.94	0.94	0.93	0.94

GUE rtp				
	CAN	AUS	USA	
CAN	5.53			
AUS	0.90	0.35		
USA	0.93	0.90	1.62	

GUE ocs				
	CAN	GBR	USA	AUS
CAN	8.18			
GBR	0.83	2.16		
USA	0.79	0.87	0.90	
AUS	0.58	0.66	0.60	0.82

GUE ous				
	CAN	GBR	USA	AUS
CAN	7.91			
GBR	0.82	1.60		
USA	0.89	0.83	0.86	
AUS	0.70	0.81	0.71	1.07

GUE ofl				
	CAN	GBR	USA	AUS
CAN	7.58			
GBR	0.74	1.42		
USA	0.80	0.69	0.98	

AUS 0.44 0.53 0.48 0.59

HOL sta

Table with 23 columns (AUS, BEL, CAN, CHE, DEU, DFS, ESP, FRA, GBR, ITA, NLD, USA, HUN, POL, NZL, ZAF, JPN, CZE, EST, IRL, KOR, SVN, PRT) and 23 rows (AUS, BEL, CAN, CHE, DEU, DFS, ESP, FRA, GBR, ITA, NLD, USA, HUN, POL, NZL, ZAF, JPN, CZE, EST, IRL, KOR, SVN, PRT) showing numerical values.

HOL cwi

Table with 23 columns (AUS, BEL, CAN, CHE, DEU, DFS, ESP, FRA, GBR, ITA, NLD, USA, HUN, POL, NZL, ZAF, JPN, CZE, EST, IRL, KOR, SVN, PRT) and 23 rows (AUS, BEL, CAN, CHE, DEU, DFS, ESP, FRA, GBR, ITA, NLD, USA, HUN, POL, NZL, ZAF, JPN, CZE, EST, IRL, KOR, SVN, PRT) showing numerical values.

HOL bde

Table with 23 columns (AUS, BEL, CAN, CHE, DEU, DFS, ESP, FRA, GBR, ITA, NLD, USA, HUN, POL, NZL, ZAF, JPN, CZE, EST, IRL, KOR, PRT, SVN) and 6 rows (AUS, BEL, CAN, CHE, DEU, DFS, ESP) showing numerical values.

















CHE	0.74	11.81																			
DEU	0.74	0.89	13.38																		
DFS	0.76	0.89	0.95	12.18																	
FRA	0.74	0.92	0.94	0.95	1.00																
GBR	0.76	0.91	0.90	0.90	0.93	1.52															
ITA	0.74	0.90	0.95	0.95	0.96	0.90	6.61														
NLD	0.74	0.93	0.95	0.96	0.95	0.91	0.93	5.01													
USA	0.77	0.74	0.78	0.79	0.79	0.76	0.76	0.75	1.38												
CZE	0.75	0.86	0.96	0.95	0.92	0.89	0.94	0.93	0.76	13.80											
JPN	0.81	0.92	0.96	0.97	0.97	0.93	0.96	0.95	0.84	0.95	1.70										
IRL	0.74	0.87	0.80	0.85	0.87	0.93	0.82	0.85	0.74	0.78	0.86	1.01									
KOR	0.74	0.75	0.84	0.86	0.86	0.81	0.84	0.79	0.74	0.85	0.87	0.74	2.48								
CAN	0.75	0.92	0.96	0.94	0.95	0.95	0.94	0.95	0.80	0.94	0.98	0.88	0.84	6.09							
PRT	0.73	0.84	0.86	0.86	0.88	0.87	0.84	0.86	0.73	0.83	0.87	0.80	0.83	0.88	1.90						
ESP	0.75	0.87	0.93	0.93	0.95	0.93	0.92	0.92	0.75	0.92	0.94	0.83	0.87	0.95	0.88	1.04					
SVN	0.75	0.85	0.90	0.91	0.87	0.79	0.88	0.91	0.74	0.90	0.89	0.75	0.77	0.85	0.76	0.85	21.83				
EST	0.75	0.83	0.88	0.87	0.87	0.77	0.85	0.90	0.81	0.85	0.87	0.74	0.75	0.83	0.75	0.78	0.86	16.45			
HUN	0.74	0.87	0.93	0.92	0.93	0.87	0.94	0.90	0.75	0.95	0.93	0.76	0.85	0.92	0.83	0.91	0.84	0.82	0.99		
NZL	0.72	0.89	0.88	0.89	0.90	0.89	0.90	0.85	0.71	0.84	0.90	0.84	0.73	0.89	0.81	0.83	0.82	0.80	0.83	0.15	
POL	0.75	0.85	0.92	0.89	0.90	0.89	0.91	0.87	0.75	0.92	0.92	0.80	0.79	0.91	0.85	0.88	0.84	0.78	0.91	0.81	11.42

-----  
JER sta

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.54									
CAN	0.89	6.76								
DFS	0.90	0.96	11.75							
GBR	0.91	0.96	0.94	1.08						
ITA	0.89	0.94	0.92	0.94	1.35					
NZL	0.87	0.84	0.85	0.91	0.84	0.36				
USA	0.90	0.97	0.95	0.96	0.93	0.88	1.70			
ZAF	0.87	0.86	0.85	0.92	0.86	0.89	0.86	8.87		
NLD	0.89	0.95	0.97	0.94	0.92	0.85	0.93	0.87	4.77	
CHE	0.90	0.95	0.96	0.95	0.93	0.85	0.94	0.88	0.97	11.57

-----  
JER cwi

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.29									
CAN	0.71	6.60								
DFS	0.76	0.84	15.68							
GBR	0.80	0.92	0.85	1.79						
ITA	0.66	0.80	0.71	0.73	1.45					
NZL	0.80	0.69	0.67	0.75	0.66	0.38				
USA	0.73	0.90	0.81	0.84	0.88	0.67	1.04			
ZAF	0.69	0.79	0.72	0.83	0.71	0.78	0.77	8.69		
NLD	0.74	0.91	0.89	0.90	0.71	0.71	0.84	0.81	4.44	
CHE	0.68	0.88	0.86	0.83	0.84	0.67	0.87	0.73	0.86	12.37

-----  
JER bde

	AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD	USA	CHE
AUS	0.33									
CAN	0.75	5.72								
DFS	0.78	0.85	13.63							
GBR	0.74	0.85	0.84	1.56						
ITA	0.71	0.74	0.76	0.83	1.47					
NZL	0.78	0.69	0.70	0.69	0.70	0.38				
ZAF	0.80	0.74	0.83	0.81	0.73	0.78	8.86			
NLD	0.71	0.82	0.83	0.90	0.87	0.70	0.79	4.65		
USA	0.70	0.71	0.74	0.77	0.90	0.69	0.72	0.87	1.04	
CHE	0.77	0.87	0.90	0.89	0.84	0.71	0.82	0.90	0.85	13.29

-----  
JER ang

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.34								
CAN	0.66	7.63							
DFS	0.70	0.81	13.29						
GBR	0.77	0.79	0.86	1.24					
ITA	0.65	0.82	0.80	0.85	1.34				
USA	0.71	0.83	0.87	0.84	0.77	1.04			
ZAF	0.62	0.63	0.68	0.81	0.70	0.68	8.77		
NLD	0.71	0.81	0.72	0.82	0.78	0.74	0.65	6.12	
CHE	0.63	0.80	0.71	0.72	0.73	0.73	0.65	0.75	9.80

-----  
 JER      ran  
 -----

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.36									
CAN	0.90	5.83								
DFS	0.91	0.96	11.61							
GBR	0.95	0.95	0.95	1.15						
ITA	0.90	0.96	0.94	0.94	1.23					
NZL	0.92	0.88	0.88	0.92	0.88	0.30				
USA	0.90	0.95	0.96	0.97	0.93	0.90	1.23			
ZAF	0.90	0.90	0.90	0.91	0.90	0.88	0.90	9.06		
NLD	0.91	0.96	0.96	0.96	0.94	0.89	0.95	0.92	4.78	
CHE	0.92	0.96	0.96	0.94	0.93	0.89	0.94	0.91	0.95	13.08

-----  
 JER      rwi  
 -----

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.32									
CAN	0.82	6.33								
DFS	0.81	0.91	12.13							
GBR	0.82	0.92	0.85	1.43						
ITA	0.80	0.85	0.82	0.86	1.61					
NZL	0.88	0.83	0.82	0.80	0.78	0.31				
USA	0.79	0.83	0.82	0.85	0.85	0.78	1.02			
ZAF	0.79	0.80	0.80	0.82	0.80	0.77	0.80	9.26		
NLD	0.85	0.94	0.91	0.88	0.80	0.86	0.81	0.81	5.05	
CHE	0.84	0.93	0.84	0.86	0.81	0.80	0.80	0.80	0.92	11.92

-----  
 JER      rls  
 -----

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.18									
CAN	0.67	6.16								
DFS	0.70	0.91	12.66							
GBR	0.75	0.85	0.78	1.74						
ITA	0.71	0.83	0.82	0.78	1.58					
NZL	0.67	0.66	0.67	0.75	0.68	0.13				
USA	0.70	0.95	0.91	0.88	0.82	0.70	0.96			
ZAF	0.73	0.68	0.70	0.79	0.73	0.87	0.75	11.96		
NLD	0.74	0.91	0.91	0.85	0.85	0.67	0.87	0.75	3.53	
CHE	0.78	0.92	0.86	0.83	0.81	0.69	0.86	0.74	0.90	9.53

-----  
 JER      rlr  
 -----

	AUS	CAN	DFS	ITA	ZAF	NLD	USA	CHE
AUS	0.21							
CAN	0.54	6.54						
DFS	0.55	0.75	13.57					
ITA	0.56	0.80	0.65	1.03				
ZAF	0.54	0.55	0.54	0.58	12.91			
NLD	0.57	0.86	0.88	0.73	0.63	4.58		
USA	0.53	0.75	0.65	0.81	0.55	0.74	0.96	
CHE	0.66	0.69	0.64	0.63	0.57	0.70	0.59	12.09

JER fan									
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.22								
CAN	0.63	6.10							
DFS	0.65	0.86	12.74						
GBR	0.72	0.78	0.73	1.49					
ITA	0.65	0.75	0.69	0.75	1.69				
USA	0.64	0.87	0.78	0.86	0.82	0.93			
ZAF	0.68	0.66	0.68	0.87	0.67	0.76	9.72		
NLD	0.68	0.75	0.78	0.86	0.73	0.78	0.71	3.88	
CHE	0.67	0.78	0.80	0.69	0.67	0.69	0.68	0.73	11.99

JER fua										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.38									
CAN	0.76	5.57								
DFS	0.75	0.86	12.80							
GBR	0.78	0.94	0.85	1.65						
ITA	0.70	0.86	0.78	0.87	1.42					
NZL	0.80	0.74	0.75	0.81	0.70	0.43				
USA	0.76	0.94	0.87	0.92	0.90	0.72	1.63			
ZAF	0.73	0.91	0.87	0.93	0.82	0.75	0.90	11.83		
NLD	0.77	0.92	0.89	0.92	0.83	0.82	0.87	0.86	4.74	
CHE	0.80	0.91	0.84	0.87	0.82	0.72	0.86	0.88	0.89	11.68

JER ruh										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.36									
CAN	0.74	6.89								
DFS	0.75	0.84	10.70							
GBR	0.82	0.80	0.83	1.31						
ITA	0.75	0.76	0.80	0.85	1.40					
NZL	0.72	0.72	0.76	0.76	0.80	0.43				
USA	0.77	0.84	0.89	0.91	0.83	0.74	1.26			
ZAF	0.83	0.74	0.80	0.88	0.81	0.78	0.85	9.25		
NLD	0.76	0.76	0.91	0.88	0.83	0.82	0.86	0.79	4.37	
CHE	0.80	0.91	0.85	0.83	0.79	0.77	0.84	0.79	0.83	13.11

JER usu										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.38									
CAN	0.76	6.38								
DFS	0.70	0.85	13.45							
GBR	0.81	0.87	0.84	1.84						
ITA	0.68	0.77	0.72	0.80	1.54					
NZL	0.59	0.59	0.59	0.64	0.64	0.42				
USA	0.73	0.84	0.87	0.84	0.79	0.60	0.99			
ZAF	0.77	0.80	0.73	0.81	0.65	0.59	0.78	10.16		
NLD	0.81	0.84	0.88	0.91	0.80	0.60	0.88	0.79	4.81	
CHE	0.75	0.90	0.86	0.79	0.78	0.61	0.84	0.76	0.86	9.90

JER ude									
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.35								
CAN	0.92	5.29							
DFS	0.91	0.94	12.20						
GBR	0.91	0.97	0.93	1.46					
ITA	0.92	0.94	0.93	0.93	1.34				
USA	0.90	0.96	0.95	0.94	0.95	1.82			

ZAF	0.89	0.90	0.91	0.92	0.90	0.90	10.49		
NLD	0.91	0.96	0.95	0.96	0.94	0.95	0.92	4.21	
CHE	0.94	0.95	0.94	0.93	0.95	0.94	0.90	0.96	10.03

-----  
 JER ftp  
 -----

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.46									
CAN	0.89	6.38								
DFS	0.88	0.93	12.80							
GBR	0.91	0.94	0.90	1.35						
ITA	0.86	0.87	0.86	0.86	1.78					
NZL	0.87	0.93	0.87	0.88	0.87	0.31				
USA	0.86	0.95	0.92	0.93	0.86	0.89	1.34			
ZAF	0.87	0.93	0.89	0.93	0.86	0.90	0.90	10.18		
NLD	0.93	0.97	0.94	0.94	0.86	0.90	0.90	0.90	5.60	
CHE	0.92	0.95	0.92	0.92	0.86	0.89	0.90	0.88	0.96	10.13

-----  
 JER ftl  
 -----

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.33								
CAN	0.91	5.61							
DFS	0.92	0.91	13.87						
GBR	0.92	0.93	0.94	1.45					
ITA	0.90	0.92	0.91	0.93	1.66				
USA	0.91	0.92	0.94	0.97	0.92	1.11			
ZAF	0.93	0.90	0.92	0.95	0.90	0.97	11.01		
NLD	0.93	0.93	0.97	0.97	0.91	0.95	0.93	4.68	
CHE	0.92	0.92	0.94	0.96	0.91	0.94	0.93	0.96	11.58

-----  
 JER rtp  
 -----

	AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE
AUS	0.32							
CAN	0.88	6.44						
DFS	0.89	0.95	13.07					
NZL	0.87	0.96	0.91	0.42				
ZAF	0.88	0.92	0.89	0.87	9.46			
NLD	0.90	0.97	0.96	0.93	0.89	4.95		
USA	0.88	0.91	0.94	0.87	0.88	0.94	1.40	
CHE	0.91	0.98	0.95	0.95	0.93	0.96	0.92	10.98

-----  
 JER ocs  
 -----

	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE
AUS	0.79								
CAN	0.54	6.38							
DFS	0.57	0.70	12.76						
GBR	0.64	0.84	0.83	2.66					
ITA	0.54	0.79	0.76	0.82	0.73				
NZL	0.62	0.57	0.47	0.56	0.55	0.32			
USA	0.64	0.78	0.76	0.86	0.79	0.59	0.88		
NLD	0.60	0.75	0.86	0.88	0.80	0.64	0.83	3.03	
CHE	0.61	0.90	0.77	0.90	0.81	0.56	0.81	0.83	8.18

-----  
 JER ous  
 -----

	AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE
AUS	0.79							
CAN	0.68	6.40						
DFS	0.60	0.84	12.85					
GBR	0.74	0.87	0.71	1.43				
NZL	0.82	0.75	0.69	0.74	0.46			

USA	0.66	0.89	0.76	0.85	0.71	1.04		
NLD	0.66	0.87	0.89	0.77	0.78	0.87	4.64	
CHE	0.73	0.91	0.80	0.87	0.78	0.87	0.92	11.03

-----  
RDC ofl  
-----

	AUS	CAN	DFS	GBR	ITA	USA	NLD	CHE
AUS	6.32							
CAN	0.52	6.04						
DFS	0.40	0.80	13.66					
GBR	0.58	0.72	0.65	1.33				
ITA	0.43	0.73	0.62	0.72	1.09			
USA	0.65	0.82	0.64	0.76	0.71	1.63		
NLD	0.42	0.69	0.65	0.73	0.67	0.67	4.55	
CHE	0.50	0.88	0.70	0.72	0.69	0.74	0.69	10.68

-----  
RDC sta  
-----

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.64									
CAN	0.88	6.24								
DEU	0.90	0.97	13.48							
DFS	0.87	0.97	0.97	8.62						
GBR	0.92	0.96	0.96	0.93	1.29					
NOR	0.89	0.94	0.95	0.98	0.93	13.38				
NZL	0.89	0.89	0.86	0.90	0.92	0.92	0.49			
USA	0.90	0.97	0.96	0.94	0.97	0.92	0.89	2.35		
NLD	0.88	0.95	0.97	0.97	0.94	0.96	0.84	0.93	4.67	
CAM	0.92	0.91	0.91	0.92	0.92	0.92	0.91	0.91	0.91	5.52

-----  
RDC cwi  
-----

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR
AUS	0.41									
CAN	0.74	7.31								
DEU	0.71	0.88	11.33							
DFS	0.78	0.82	0.89	13.70						
GBR	0.83	0.88	0.89	0.87	1.59					
NZL	0.80	0.69	0.72	0.69	0.81	0.35				
USA	0.68	0.85	0.81	0.83	0.84	0.72	1.28			
NLD	0.73	0.92	0.92	0.89	0.91	0.70	0.82	4.65		
CAM	0.78	0.79	0.79	0.79	0.79	0.77	0.79	0.79	6.66	
NOR	0.80	0.80	0.80	0.84	0.82	0.80	0.82	0.87	0.79	15.10

-----  
RDC bde  
-----

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.49									
CAN	0.81	6.08								
DEU	0.78	0.87	9.81							
DFS	0.79	0.83	0.92	11.84						
GBR	0.78	0.86	0.92	0.89	1.56					
NOR	0.81	0.81	0.80	0.90	0.83	14.88				
NZL	0.76	0.70	0.72	0.74	0.74	0.80	0.35			
USA	0.72	0.76	0.89	0.83	0.89	0.83	0.73	1.28		
NLD	0.70	0.83	0.90	0.85	0.91	0.83	0.69	0.90	4.14	
CAM	0.83	0.82	0.84	0.84	0.84	0.83	0.86	0.84	0.84	4.71

-----  
RDC ang  
-----

	AUS	CAN	DEU	DFS	GBR	USA	NLD	CAM	NOR
AUS	0.47								
CAN	0.65	6.76							
DEU	0.64	0.78	12.64						



DFS	0.70	0.77	0.79	9.12						
GBR	0.76	0.82	0.74	0.83	1.38					
USA	0.69	0.86	0.81	0.83	0.85	1.20				
NLD	0.73	0.81	0.62	0.75	0.83	0.75	4.69			
CAM	0.80	0.76	0.78	0.78	0.77	0.78	0.79	6.96		
NOR	0.75	0.75	0.77	0.66	0.76	0.78	0.69	0.77	13.46	

-----  
RDC      ran  
-----

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.42									
CAN	0.91	6.02								
DEU	0.92	0.97	8.91							
DFS	0.91	0.94	0.95	10.03						
GBR	0.93	0.97	0.97	0.95	1.53					
NOR	0.92	0.93	0.91	0.90	0.94	12.18				
NZL	0.92	0.91	0.89	0.88	0.92	0.92	0.28			
USA	0.91	0.98	0.96	0.94	0.97	0.94	0.91	1.69		
NLD	0.91	0.97	0.98	0.96	0.97	0.94	0.89	0.96	5.83	
CAM	0.93	0.94	0.93	0.94	0.94	0.94	0.93	0.94	0.94	5.60

-----  
RDC      rwi  
-----

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR
AUS	0.45									
CAN	0.85	5.90								
DEU	0.82	0.94	9.61							
DFS	0.80	0.93	0.93	10.48						
GBR	0.85	0.92	0.90	0.88	1.41					
NZL	0.83	0.90	0.83	0.88	0.91	0.34				
USA	0.79	0.91	0.85	0.88	0.94	0.88	1.41			
NLD	0.84	0.94	0.95	0.92	0.89	0.85	0.81	6.07		
CAM	0.86	0.88	0.87	0.88	0.87	0.89	0.88	0.88	6.56	
NOR	0.86	0.89	0.87	0.95	0.88	0.89	0.88	0.90	0.88	13.94

-----  
RDC      rls  
-----

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.23									
CAN	0.69	6.51								
DEU	0.74	0.94	9.29							
DFS	0.72	0.96	0.94	9.31						
GBR	0.80	0.77	0.86	0.79	1.61					
NOR	0.76	0.88	0.88	0.96	0.81	13.41				
NZL	0.70	0.67	0.68	0.67	0.72	0.74	0.13			
USA	0.71	0.93	0.93	0.94	0.82	0.86	0.67	0.91		
NLD	0.74	0.92	0.92	0.89	0.86	0.81	0.66	0.90	5.23	
CAM	0.82	0.79	0.79	0.78	0.79	0.79	0.76	0.79	0.79	6.45

-----  
RDC      rlr  
-----

	AUS	CAN	DEU	DFS	NOR	NLD	USA	CAM
AUS	0.18							
CAN	0.59	6.60						
DEU	0.61	0.87	10.25					
DFS	0.57	0.83	0.90	10.91				
NOR	0.63	0.75	0.84	0.88	15.37			
NLD	0.58	0.87	0.91	0.88	0.86	4.72		
USA	0.55	0.72	0.77	0.68	0.72	0.80	0.91	
CAM	0.76	0.73	0.72	0.71	0.71	0.71	0.71	6.79

-----  
RDC      fan  
-----

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
--	-----	-----	-----	-----	-----	-----	-----	-----	-----

AUS	0.29									
CAN	0.66	6.39								
DEU	0.71	0.81	14.07							
DFS	0.65	0.71	0.80	9.35						
GBR	0.75	0.79	0.91	0.72	1.62					
NOR	0.70	0.73	0.84	0.64	0.77	14.36				
USA	0.68	0.85	0.84	0.73	0.84	0.77	1.06			
NLD	0.69	0.75	0.89	0.77	0.88	0.68	0.80	4.85		
CAM	0.80	0.80	0.77	0.77	0.77	0.77	0.79	0.79	7.78	

RDC fua

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.38									
CAN	0.77	5.60								
DEU	0.75	0.91	12.46							
DFS	0.73	0.81	0.82	11.72						
GBR	0.77	0.89	0.95	0.87	1.54					
NOR	0.74	0.81	0.74	0.86	0.81	12.98				
NZL	0.76	0.80	0.81	0.69	0.78	0.72	0.37			
USA	0.75	0.93	0.89	0.84	0.92	0.80	0.84	1.50		
NLD	0.77	0.92	0.93	0.88	0.92	0.85	0.84	0.88	4.14	
CAM	0.81	0.82	0.81	0.81	0.80	0.81	0.79	0.81	0.81	6.55

RDC ruh

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.47									
CAN	0.78	5.76								
DEU	0.81	0.87	14.90							
DFS	0.77	0.87	0.89	10.76						
GBR	0.80	0.76	0.85	0.86	1.44					
NOR	0.77	0.83	0.86	0.88	0.82	12.81				
NZL	0.84	0.73	0.82	0.77	0.92	0.77	0.34			
USA	0.77	0.85	0.89	0.91	0.89	0.83	0.84	1.36		
NLD	0.75	0.75	0.91	0.91	0.88	0.90	0.83	0.85	4.17	
CAM	0.84	0.82	0.82	0.83	0.84	0.82	0.85	0.82	0.82	6.09

RDC usu

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.35									
CAN	0.75	5.60								
DEU	0.72	0.90	12.63							
DFS	0.68	0.75	0.77	13.04						
GBR	0.80	0.81	0.75	0.78	1.86					
NOR	0.70	0.73	0.69	0.78	0.77	13.71				
NZL	0.69	0.73	0.63	0.59	0.72	0.69	0.34			
USA	0.78	0.82	0.76	0.83	0.89	0.78	0.71	1.22		
NLD	0.78	0.83	0.80	0.89	0.92	0.82	0.58	0.90	4.57	
CAM	0.81	0.77	0.76	0.76	0.78	0.76	0.78	0.78	0.77	6.00

RDC ude

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	
AUS	0.54									
CAN	0.90	5.52								
DEU	0.91	0.97	12.42							
DFS	0.90	0.96	0.94	10.65						
GBR	0.91	0.96	0.96	0.94	1.83					
NOR	0.92	0.93	0.93	0.91	0.94	11.97				
USA	0.89	0.97	0.96	0.96	0.96	0.94	1.31			
NLD	0.91	0.97	0.97	0.95	0.97	0.96	0.96	4.16		
CAM	0.93	0.94	0.93	0.94	0.94	0.93	0.93	0.94	4.47	

RDC ftp										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	0.53									
CAN	0.92	5.57								
DEU	0.93	0.97	13.09							
DFS	0.89	0.94	0.92	11.92						
GBR	0.92	0.93	0.95	0.89	1.51					
NOR	0.89	0.90	0.89	0.88	0.92	11.88				
NZL	0.92	0.89	0.90	0.87	0.89	0.89	0.27			
USA	0.87	0.93	0.92	0.92	0.93	0.92	0.87	1.45		
NLD	0.93	0.98	0.97	0.95	0.94	0.88	0.91	0.90	4.70	
CAM	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.84

RDC ftl										
	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	
AUS	0.53									
CAN	0.93	4.95								
DEU	0.94	0.94	13.90							
DFS	0.92	0.91	0.98	10.57						
GBR	0.95	0.93	0.98	0.93	1.41					
NOR	0.92	0.93	0.94	0.93	0.94	12.85				
USA	0.94	0.93	0.96	0.93	0.97	0.94	1.65			
NLD	0.93	0.93	0.98	0.97	0.94	0.94	0.95	5.25		
CAM	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	7.36	

RDC rtp										
	AUS	CAN	DEU	DFS	NOR	NZL	NLD	USA	CAM	
AUS	0.39									
CAN	0.89	6.25								
DEU	0.89	0.96	14.24							
DFS	0.89	0.93	0.96	12.26						
NOR	0.91	0.91	0.90	0.89	13.77					
NZL	0.92	0.95	0.93	0.88	0.89	0.35				
NLD	0.91	0.98	0.97	0.96	0.90	0.94	5.46			
USA	0.89	0.92	0.95	0.93	0.93	0.89	0.96	1.45		
CAM	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.29	

RDC ocs										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	1.13									
CAN	0.61	5.26								
DEU	0.61	0.82	20.49							
DFS	0.66	0.69	0.81	10.46						
GBR	0.68	0.80	0.92	0.80	1.60					
NOR	0.62	0.76	0.76	0.76	0.82	11.80				
NZL	0.73	0.57	0.63	0.49	0.68	0.69	0.28			
USA	0.64	0.82	0.89	0.79	0.89	0.82	0.72	0.57		
NLD	0.62	0.75	0.88	0.84	0.88	0.74	0.66	0.86	2.96	
CAM	0.74	0.81	0.81	0.81	0.81	0.81	0.74	0.82	0.82	6.16

RDC ous										
	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	1.46									
CAN	0.72	5.42								
DEU	0.75	0.88	17.28							
DFS	0.63	0.80	0.82	10.81						
GBR	0.83	0.83	0.84	0.73	1.56					
NOR	0.65	0.81	0.82	0.82	0.86	11.37				
NZL	0.83	0.82	0.79	0.71	0.80	0.75	0.37			

USA	0.74	0.89	0.87	0.87	0.87	0.86	0.87	1.00		
NLD	0.69	0.87	0.91	0.88	0.77	0.82	0.81	0.86	3.95	
CAM	0.79	0.86	0.85	0.85	0.86	0.85	0.84	0.87	0.87	6.37

-----

RDC ofl

-----

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0.63								
CAN	0.43	5.68							
DEU	0.41	0.83	16.19						
DFS	0.38	0.80	0.79	13.52					
GBR	0.51	0.74	0.74	0.68	1.40				
NOR	0.51	0.72	0.75	0.62	0.75	14.97			
USA	0.53	0.73	0.74	0.65	0.70	0.75	1.32		
NLD	0.43	0.69	0.75	0.65	0.74	0.69	0.68	6.44	
CAM	0.72	0.75	0.75	0.75	0.76	0.75	0.77	0.75	6.96

-----

^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	128	75	128	41	150	113	30	17
CHE	112	0	156	470	66	267	519	65	15
FRA	66	116	0	175	55	90	177	48	14
ITA	111	408	137	0	88	209	567	84	16
NLD	33	63	44	70	0	56	81	32	11
USA	141	236	62	152	42	0	222	31	17
DEA	94	426	130	483	71	177	0	82	13
SVN	27	63	46	82	31	26	76	0	8
GBR	14	13	13	14	9	15	11	6	0

-----

BSW

-----

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	120	44	128	34	150	111	29	17
CHE	105	0	93	415	61	238	456	62	15
FRA	39	65	0	102	36	54	115	39	10
ITA	111	354	78	0	80	209	531	82	16
NLD	29	60	31	66	0	42	75	32	11
USA	141	203	36	152	33	0	204	30	17
DEA	93	367	81	446	69	152	0	80	12
SVN	26	60	38	80	31	25	75	0	8
GBR	14	13	9	14	9	15	11	6	0

-----

BSW

-----

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA
CAN	0	128	75	128	34	113	22	17	150
CHE	112	0	156	470	65	519	50	15	267
FRA	66	116	0	175	51	177	35	14	90
ITA	111	408	137	0	80	567	65	16	209
NLD	29	63	41	66	0	76	24	11	42
DEA	94	426	130	483	70	0	62	13	222
SVN	20	47	35	62	24	58	0	6	22
GBR	14	13	13	14	9	11	4	0	17
USA	141	236	62	152	33	177	19	15	0

-----

BSW

-----

common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	NLD	USA	GBR
CAN	0	127	75	22	149	17
CHE	112	0	152	41	265	15
FRA	66	112	0	33	90	14
NLD	19	42	28	0	27	8
USA	140	236	62	22	0	17
GBR	14	13	13	6	15	0

-----

BSW

-----

common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	128	75	128	41	150	113	30	17
CHE	112	0	156	470	66	267	519	65	15
FRA	66	116	0	175	55	90	177	48	14
ITA	111	408	137	0	88	209	567	84	16
NLD	33	63	44	70	0	56	81	32	11
USA	141	236	62	152	42	0	222	31	17
DEA	94	426	130	483	71	177	0	82	13
SVN	27	63	46	82	31	26	76	0	8
GBR	14	13	13	14	9	15	11	6	0

-----

BSW

-----

common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN	ITA
CAN	0	128	44	41	150	113	17	22	124
CHE	112	0	93	66	267	519	15	50	463
FRA	39	65	0	36	54	115	10	35	102
NLD	33	63	31	0	56	81	11	24	86
USA	141	236	36	42	0	222	17	22	195
DEA	94	426	81	71	177	0	13	62	561
GBR	14	13	9	9	15	11	0	6	16
SVN	20	47	35	24	19	58	4	0	65
ITA	108	402	78	69	138	475	14	62	0

-----

BSW

-----

common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	128	75	128	41	150	113	30	17
CHE	112	0	156	470	66	267	519	65	15
FRA	66	116	0	175	55	90	177	48	14
ITA	111	408	137	0	88	209	567	84	16
NLD	33	63	44	70	0	56	81	32	11
USA	141	236	62	152	42	0	222	31	17
DEA	94	426	130	483	71	177	0	82	13
SVN	27	63	46	82	31	26	76	0	8
GBR	14	13	13	14	9	15	11	6	0

-----

BSW

-----

common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	128	75	128	33	150	113	30	17
CHE	112	0	156	470	64	267	519	65	15

FRA	66	116	0	175	51	90	177	48	14
ITA	111	408	137	0	79	209	567	84	16
NLD	28	62	41	65	0	41	75	32	11
USA	141	236	62	152	31	0	222	31	17
DEA	94	426	130	483	69	177	0	82	13
SVN	27	63	46	82	31	26	76	0	8
GBR	14	13	13	14	9	15	11	6	0

BSW

-----

common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	0	128	75	124	33	113	30	150
CHE	112	0	156	464	64	519	65	267
FRA	66	116	0	174	51	177	48	90
ITA	108	403	137	0	78	561	84	195
NLD	28	62	41	64	0	75	32	41
DEA	94	426	130	475	69	0	82	222
SVN	27	63	46	82	31	76	0	31
USA	141	236	62	138	31	177	26	0

-----

BSW

-----

common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	128	44	85	33	150	80	23	17
CHE	112	0	93	299	65	266	325	51	15
FRA	39	65	0	94	35	54	105	36	10
ITA	76	247	71	0	59	111	284	59	13
NLD	28	63	30	54	0	41	63	24	11
USA	141	236	36	79	32	0	125	23	17
DEA	68	260	74	249	58	88	0	62	10
SVN	21	48	36	57	24	20	58	0	6
GBR	14	13	9	11	9	15	9	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	128	75	128	34	150	113	30	17
CHE	112	0	156	470	65	267	519	65	15
FRA	66	116	0	175	51	90	177	48	14
ITA	111	408	137	0	80	209	567	84	16
NLD	29	63	41	66	0	42	76	32	11
USA	141	236	62	152	33	0	222	31	17
DEA	94	426	130	483	70	177	0	83	13
SVN	27	63	46	82	31	26	77	0	8
GBR	14	13	13	14	9	15	11	6	0

-----

BSW

-----

common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN
CAN	0	128	75	128	34	150	113	30
CHE	112	0	156	470	65	267	519	65
FRA	66	116	0	175	51	90	177	48
ITA	111	408	137	0	80	209	567	84
NLD	29	63	41	66	0	42	76	32
USA	141	236	62	152	33	0	222	31
DEA	94	426	130	483	70	177	0	83
SVN	27	63	46	82	31	26	77	0

```

-----
BSW
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN CHE FRA ITA NLD USA DEA SVN GBR
-----
CAN   0 128  75 128  41 150 113  23  17
CHE 112   0 156 470  66 267 519  51  15
FRA  66 116   0 175  55  90 177  36  14
ITA 111 408 137   0  88 209 567  66  16
NLD  33  63  44  70   0  56  81  24  11
USA 141 236  62 152  42   0 222  23  17
DEA  94 426 130 483  71 177   0  64  13
SVN  21  48  36  63  24  20  60   0   6
GBR  14  13  13  14   9  15  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   0 128  75 128  41 148 113  30  17
CHE 112   0 156 470  66 267 519  65  15
FRA  66 116   0 175  55  90 177  48  14
ITA 111 408 137   0  88 209 567  84  16
NLD  33  63  44  70   0  56  81  32  11
USA 140 236  62 152  42   0 222  31  17
DEA  94 426 130 483  71 177   0  83  13
SVN  27  63  46  82  31  26  77   0   8
GBR  14  13  13  14   9  15  11   6   0
-----

```

```

-----
BSW
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN CHE FRA NLD USA DEA SVN GBR ITA
-----
CAN   0 128  75  41 150 102  29  17 116
CHE 112   0 156  66 267 487  63  15 428
FRA  66 116   0  55  90 167  47  14 162
NLD  33  63  44   0  56  75  32  11  78
USA 141 236  62  42   0 197  30  17 165
DEA  86 395 122  69 149   0  81  12 473
SVN  26  61  45  31  25  76   0   8  81
GBR  14  13  13   9  15  11   6   0  16
ITA 101 371 125  65 119 410  79  14   0
-----

```

```

-----
BSW
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN CHE FRA ITA NLD USA DEA SVN GBR
-----
CAN   0 128  75 128  41 150 113  29  17
CHE 112   0 156 470  66 267 519  64  15
FRA  66 116   0 175  55  90 177  47  14
ITA 111 408 137   0  88 207 567  83  16
NLD  33  63  44  70   0  56  81  32  11
USA 141 236  62 151  42   0 222  30  17
DEA  94 426 130 483  71 177   0  82  13
SVN  26  62  45  81  31  25  76   0   8
GBR  14  13  13  14   9  15  11   6   0
-----

```

```

-----
BSW
-----
common bulls below diagonal
common three quarter sib group above diagonal

```

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA
CAN	0	128	75	85	29	80	29	150
CHE	112	0	153	299	61	325	63	266
FRA	66	113	0	114	48	125	47	90
ITA	76	247	85	0	58	284	69	111
NLD	25	61	39	54	0	62	31	36
DEA	68	260	85	249	58	0	74	125
SVN	26	61	45	68	31	67	0	29
USA	141	236	62	79	28	88	25	0

BSW

-----

common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	120	65	128	41	150	80	22	17
CHE	105	0	118	414	61	238	320	50	15
FRA	60	88	0	141	45	75	114	35	14
ITA	111	352	113	0	86	206	320	65	16
NLD	33	60	39	70	0	56	63	24	11
USA	141	203	55	152	42	0	125	22	17
DEA	68	256	82	284	58	88	0	60	10
SVN	20	47	35	62	24	19	56	0	6
GBR	14	13	13	14	9	15	9	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	120	65	128	41	149	113	23	17
CHE	105	0	118	415	61	238	464	51	15
FRA	60	88	0	141	45	75	146	36	14
ITA	111	354	113	0	88	209	560	66	16
NLD	33	60	39	70	0	56	81	24	11
USA	140	203	55	152	42	0	220	23	17
DEA	93	377	108	479	71	173	0	64	13
SVN	21	48	36	63	24	20	60	0	6
GBR	14	13	13	14	9	15	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	120	65	124	41	150	113	23	17
CHE	105	0	118	414	61	238	464	51	15
FRA	60	88	0	140	45	75	146	36	14
ITA	108	353	113	0	86	195	555	66	16
NLD	33	60	39	69	0	56	81	24	11
USA	141	203	55	138	42	0	220	23	17
DEA	93	377	108	472	71	173	0	63	13
SVN	21	48	36	63	24	20	59	0	6
GBR	14	13	13	14	9	15	11	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	119	112	86	22	151	45
CHE	104	0	458	299	50	237	93
DEA	94	374	0	325	62	216	115
ITA	77	246	274	0	58	111	94
SVN	20	47	58	56	0	22	35
USA	141	203	172	79	19	0	54
FRA	40	65	81	71	35	36	0

BSW

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

CAN	0	126	114	129	30	76
CHE	111	0	519	470	64	156
DEA	94	426	0	565	82	177
ITA	112	408	482	0	83	175
SVN	27	63	76	82	0	48
FRA	67	116	130	137	46	0

BSW

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

CAN	0	119	90	86	22	151	45
CHE	104	0	355	299	50	237	93
DEA	78	287	0	291	61	153	107
ITA	77	246	256	0	58	111	94
SVN	20	47	57	56	0	22	35
USA	141	203	112	79	19	0	54
FRA	40	65	76	71	35	36	0

BSW

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

CHE	0	501	299	50	266	154
DEA	411	0	324	62	207	173
ITA	247	273	0	58	111	114
SVN	47	58	56	0	22	35
USA	236	161	79	19	0	89
FRA	115	128	85	35	62	0

BSW

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

CAN	0	76	64	67	21	83	33
CHE	65	0	355	299	47	237	93
DEA	52	287	0	291	57	153	107
ITA	60	246	256	0	52	111	94
SVN	19	45	53	51	0	22	34
USA	74	203	112	79	19	0	54
FRA	28	65	76	71	34	36	0

BSW

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

CAN	0	126	114	125	29	76
-----	---	-----	-----	-----	----	----

CHE	111	0	519	464	62	156
DEA	94	426	0	559	81	177
ITA	109	403	474	0	81	174
SVN	26	61	75	80	0	47
FRA	67	116	130	137	45	0

-----  
BSW

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	518	467	50	153
DEA	425	0	565	64	176
ITA	405	482	0	65	173
SVN	48	60	63	0	36
FRA	115	129	137	36	0

-----  
BSW

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	291	274	49	106
DEA	245	0	282	62	124
ITA	231	249	0	59	113
SVN	47	58	57	0	36
FRA	78	84	85	36	0

-----  
BSW

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	518	461	63	153
DEA	425	0	559	82	176
ITA	400	474	0	82	172
SVN	62	76	81	0	47
FRA	115	129	137	45	0

-----  
BSW

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	324	297	63	89
DEA	259	0	283	74	103
ITA	245	249	0	69	93
SVN	62	67	68	0	39
FRA	64	73	70	38	0

-----  
GUE

-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	22	63	19
GBR	19	0	74	11
USA	52	73	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	22	63	19
GBR	19	0	74	11
USA	52	73	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	22	63	19
GBR	19	0	74	11
USA	52	73	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	22	63	19
GBR	19	0	74	11
USA	52	73	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	22	63	19
GBR	19	0	74	11
USA	52	73	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	22	63	19
GBR	19	0	74	11
USA	52	73	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	22	63	19
GBR	19	0	74	11
USA	52	73	0	22
AUS	19	9	19	0

GUE

-----

common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	USA	AUS
CAN	0	35	19

USA	33	0	6
AUS	19	4	0

-----  
GUE  
-----

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

CAN	0	22	63	19
GBR	19	0	74	11
USA	52	73	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	22	63	19
GBR	19	0	74	11
USA	52	73	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	22	63	19
GBR	19	0	74	11
USA	52	73	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	22	63	19
GBR	19	0	74	11
USA	52	73	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	22	61	18
GBR	19	0	74	11
USA	51	73	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	22	63	19
GBR	19	0	74	11
USA	52	73	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	22	63	19
GBR	19	0	74	11
USA	52	73	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	63
AUS	19	0	22
USA	52	19	0

GUE  
-----  
common bulls below diagonal  
common three quarter sib group above diagonal

	CAN	GBR	USA	AUS
CAN	0	12	63	19
GBR	9	0	33	9
USA	52	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	20	61	18
GBR	17	0	72	10
USA	51	71	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	20	63	19
GBR	17	0	72	10
USA	52	71	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
AUS	0	479	857	457	766	749	614	792	866	676	875	1044	461	546	492	305	549	527	88	412	309	123	476
BEL	412	0	625	510	801	649	569	740	704	664	997	738	405	548	279	247	415	512	86	393	253	152	494
CAN	777	596	0	848	1746	1128	1268	1282	1503	1712	1284	3022	884	1080	369	375	1132	1043	140	433	648	188	848
CHE	393	507	690	0	905	599	558	597	702	720	821	915	382	532	251	221	396	501	77	352	259	125	443
DEU	421	679	707	620	0	1889	1296	1939	1602	2131	2199	2471	951	1520	409	355	1095	1483	197	530	502	285	875



















	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	CZE	IRL	KOR	SVN	PRT	EST	HUN	POL
BEL	0	573	412	641	595	517	624	640	537	793	658	412	353	159	103	412	53	287	323
CAN	575	0	703	1436	1032	1161	1077	1408	1478	1066	2826	893	403	407	142	721	91	712	678
CHE	415	582	0	675	482	464	476	584	586	609	739	378	279	162	83	348	53	279	300
DEU	571	644	476	0	1448	1099	1433	1263	1555	1702	1944	1149	405	316	191	662	131	699	886
DFS	548	812	418	807	0	863	1217	1302	975	1337	1610	842	505	251	148	635	93	522	646
ESP	517	720	354	521	623	0	947	967	1052	916	1370	737	366	300	129	620	83	536	570
FRA	612	669	390	536	578	667	0	1225	1030	1221	1767	907	452	285	125	598	85	588	804
GBR	667	1445	543	708	893	762	720	0	1196	1302	2002	834	671	293	146	688	95	566	658
ITA	554	1288	530	855	816	769	613	1046	0	1147	1876	937	369	371	176	683	114	703	791
NLD	868	977	576	1065	1050	759	718	1090	1036	0	1542	1106	531	268	161	689	116	567	735
USA	606	2889	634	799	995	835	807	1830	1580	1198	0	1265	532	486	164	899	114	862	918
CZE	319	614	264	718	506	484	493	582	709	970	931	0	303	277	145	561	80	617	656
IRL	362	405	269	313	422	358	378	736	367	510	513	235	0	104	62	290	37	221	223
KOR	124	386	123	168	189	207	169	218	320	189	560	198	80	0	69	245	37	251	267
SVN	82	110	63	175	120	96	85	118	156	139	130	110	51	47	0	102	32	103	145
PRT	410	708	298	495	534	567	485	604	665	674	894	461	252	218	80	0	60	411	459
EST	32	43	23	59	44	34	33	47	57	68	56	43	22	16	13	38	0	68	99
HUN	233	641	223	427	384	380	355	443	601	425	781	516	190	193	76	404	38	0	449
POL	248	511	205	440	418	333	401	494	590	516	697	421	180	189	116	422	50	352	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	470	630	302	477	642	555	851	656	380	247	325	166	472	298	527	118	67	247	203	390
CHE	472	0	753	261	437	665	650	758	870	385	260	301	182	670	274	529	99	65	251	192	390
DEU	556	538	0	770	1225	1267	1695	1754	1953	1084	679	359	357	1285	533	1105	245	160	618	242	1147
DFS	241	205	321	0	424	625	530	788	686	437	220	276	132	322	263	416	85	60	225	199	419
FRA	450	362	491	173	0	816	1004	960	1168	713	535	277	285	801	411	766	141	104	492	183	898
GBR	666	636	711	352	531	0	1281	1450	1967	767	503	609	335	1105	492	997	170	117	499	328	828
ITA	565	581	884	363	572	1095	0	1258	2037	961	685	367	428	1426	561	1121	206	140	664	221	1033
NLD	930	723	1093	503	607	1211	1097	0	1753	1066	497	522	300	922	501	966	196	147	495	409	962
USA	593	765	801	343	582	1820	1657	1342	0	1172	903	487	564	2197	660	1424	186	143	775	328	1202
CZE	294	270	690	231	411	541	719	935	879	0	456	253	322	763	425	681	169	106	536	183	807
JPN	156	158	201	107	186	242	278	233	326	169	0	157	299	642	281	552	102	72	356	132	498
IRL	335	303	289	206	250	670	360	499	475	196	117	0	102	295	178	351	71	42	173	223	232
KOR	125	136	187	77	177	243	361	205	644	229	161	77	0	437	256	335	81	54	275	102	362
CAN	498	591	630	247	539	1190	1274	925	2464	569	292	319	417	0	510	972	159	105	613	202	820
PRT	295	234	396	193	361	433	542	474	686	350	168	156	222	515	0	451	109	75	322	140	508
ESP	534	420	514	273	545	815	812	823	914	436	218	355	224	663	399	0	149	101	482	223	686
SVN	90	73	229	58	96	130	182	169	144	127	49	57	52	121	86	110	0	46	116	52	190
EST	42	29	76	25	43	56	75	92	81	61	22	25	25	57	52	46	25	0	85	33	134
HUN	199	196	379	148	310	398	555	372	710	451	160	146	212	592	328	341	86	53	0	120	517
NZL	172	173	192	129	141	273	202	375	287	136	99	187	80	207	119	193	40	16	95	0	151
POL	313	276	637	254	509	650	790	746	1051	567	185	192	278	702	493	412	153	75	421	118	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	145	86	98	44	150	246	130	17	13
CAN	150	0	86	125	48	75	413	138	13	19
DFS	62	73	0	96	56	88	144	118	21	31
GBR	96	128	91	0	51	76	156	106	15	31
ITA	43	46	55	51	0	36	64	57	14	16
NZL	152	77	67	77	32	0	149	102	16	16
USA	240	412	110	163	68	157	0	246	32	32
ZAF	134	138	101	104	57	99	253	0	26	22
NLD	13	8	15	12	11	13	33	21	0	4
CHE	11	17	30	28	17	14	32	22	3	0

JER

```

common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  GBR  ITA  NZL  USA  ZAF  NLD  CHE
-----
AUS   0  145  86  98  44  150  246  123  17  21
CAN  150   0  86  125  48  75  413  127  13  25
DFS   62  73   0  96  56  88  144  109  21  42
GBR   96 128  91   0  51  76  156  101  15  39
ITA   43  46  55  51   0  36  64  57  14  24
NZL  152  77  67  77  32   0  149  93  16  23
USA  240 412 110 163 68 157  0 226 32 40
ZAF  128 129  95 100 57  91 235  0 26 35
NLD   13   8  15  12  11  13  33  21  0  8
CHE   18  23  40  36  24  20  40  34  6  0
-----

```

```

JER
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  GBR  ITA  NZL  ZAF  NLD  USA  CHE
-----
AUS   0  145  86  98  44  150  123  17  246  25
CAN  150   0  86  125  48  75  127  13  413  29
DFS   62  73   0  96  56  88  109  21  144  45
GBR   96 128  91   0  51  76  101  15  156  42
ITA   43  46  55  51   0  36  57  14  64  27
NZL  152  77  67  77  32   0  93  16  149  27
ZAF  128 129  95 100 57  91   0  26  226  39
NLD   13   8  15  12  11  13  21  0  32  10
USA  240 412 110 163 68 157 235 33  0  44
CHE   21  25  43  39  26  24  37  7  44  0
-----

```

```

JER
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  GBR  ITA  USA  ZAF  NLD  CHE
-----
AUS   0  145  82  97  44  246  129  5  25
CAN  150   0  85  125  48  413  138  5  29
DFS   59  72   0  93  56  143  116  10  45
GBR   95 128  88   0  51  156  106  9  42
ITA   43  46  55  51   0  64  57  5  27
USA  240 412 109 163 68  0  245  15  44
ZAF  133 138  99 104 57 252  0  11  39
NLD   2   3   9  7  4  14  9  0  5
CHE   21  25  43  39  26  44  37  5  0
-----

```

```

JER
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  GBR  ITA  NZL  USA  ZAF  NLD  CHE
-----
AUS   0  145  86  98  44  150  246  130  17  25
CAN  150   0  86  125  48  75  413  138  13  29
DFS   62  73   0  96  56  88  144  118  21  45
GBR   96 128  91   0  51  76  156  106  15  42
ITA   43  46  55  51   0  36  64  57  14  27
NZL  152  77  67  77  32   0  149  102  16  27
USA  240 412 110 163 68 157  0 246 32 44
ZAF  134 138 101 104 57  99 253  0 26 39
NLD   13   8  15  12  11  13  33  21  0  10
CHE   21  25  43  39  26  24  44  37  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	145	82	98	44	150	246	130	17	25
CAN	150	0	78	125	48	75	413	138	13	29
DFS	55	62	0	94	52	82	136	113	19	44
GBR	96	128	86	0	51	76	156	106	15	42
ITA	43	46	49	51	0	36	64	57	14	27
NZL	152	77	60	77	32	0	149	102	16	27
USA	240	412	100	163	68	157	0	246	32	44
ZAF	134	138	93	104	57	99	253	0	26	39
NLD	13	8	13	12	11	13	33	21	0	10
CHE	21	25	42	39	26	24	44	37	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	145	86	98	44	150	246	130	17	25
CAN	150	0	86	125	48	75	413	138	13	29
DFS	62	73	0	96	56	88	144	118	21	45
GBR	96	128	91	0	51	76	156	106	15	42
ITA	43	46	55	51	0	36	64	57	14	27
NZL	152	77	67	77	32	0	149	102	16	27
USA	240	412	110	163	68	157	0	246	32	44
ZAF	134	138	101	104	57	99	253	0	26	39
NLD	13	8	15	12	11	13	33	21	0	10
CHE	21	25	43	39	26	24	44	37	7	0

JER

-----

common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	ITA	ZAF	NLD	USA	CHE
AUS	0	145	79	44	102	17	246	25
CAN	150	0	78	48	113	13	413	29
DFS	53	62	0	52	83	19	136	44
ITA	43	46	49	0	51	14	64	27
ZAF	103	109	69	49	0	23	192	39
NLD	13	8	13	11	16	0	32	10
USA	240	412	100	68	189	33	0	44
CHE	21	25	42	26	37	7	44	0

JER

-----

common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0	145	83	97	44	246	129	17	25
CAN	150	0	86	125	48	413	138	13	29
DFS	60	73	0	94	56	144	117	21	45
GBR	95	128	89	0	51	156	106	15	42
ITA	43	46	55	51	0	64	57	14	27
USA	240	412	110	163	68	0	245	32	44
ZAF	133	138	100	104	57	252	0	26	39
NLD	13	8	15	12	11	33	21	0	10
CHE	21	25	43	39	26	44	37	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	145	86	98	44	150	246	130	17	25
CAN	150	0	86	125	48	75	413	138	13	29



DFS	62	73	0	96	56	88	144	118	21	45
GBR	96	128	91	0	51	76	156	106	15	42
ITA	43	46	55	51	0	36	64	57	14	27
NZL	152	77	67	77	32	0	149	102	16	27
USA	240	412	110	163	68	157	0	246	32	44
ZAF	134	138	101	104	57	99	253	0	26	39
NLD	13	8	15	12	11	13	33	21	0	10
CHE	21	25	43	39	26	24	44	37	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	145	79	98	44	150	246	130	17	25
CAN	150	0	72	125	48	75	413	138	13	29
DFS	53	60	0	85	52	75	129	108	19	44
GBR	96	128	82	0	51	76	156	106	15	42
ITA	43	46	49	51	0	36	64	57	14	27
NZL	152	77	55	77	32	0	149	102	16	27
USA	240	412	95	163	68	157	0	246	32	44
ZAF	134	138	91	104	57	99	253	0	26	39
NLD	13	8	13	12	11	13	33	21	0	10
CHE	21	25	42	39	26	24	44	37	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	145	86	98	44	150	246	130	17	25
CAN	150	0	86	125	48	75	413	138	13	29
DFS	62	73	0	96	56	88	144	118	21	45
GBR	96	128	91	0	51	76	156	106	15	42
ITA	43	46	55	51	0	36	64	57	14	27
NZL	152	77	67	77	32	0	149	102	16	27
USA	240	412	110	163	68	157	0	246	32	44
ZAF	134	138	101	104	57	99	253	0	26	39
NLD	13	8	15	12	11	13	33	21	0	10
CHE	21	25	43	39	26	24	44	37	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	145	84	97	44	246	130	17	25
CAN	150	0	86	124	48	410	138	13	29
DFS	61	73	0	94	56	144	118	21	45
GBR	95	127	89	0	51	156	106	15	42
ITA	43	46	55	51	0	64	57	14	27
USA	240	410	110	163	68	0	245	32	44
ZAF	134	138	101	104	57	252	0	26	39
NLD	13	8	15	12	11	33	21	0	10
CHE	21	25	43	39	26	44	37	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	145	86	98	44	150	246	130	17	25
CAN	150	0	86	125	48	75	413	138	13	29
DFS	62	73	0	96	56	88	144	118	21	45
GBR	96	128	91	0	51	76	156	106	15	42

ITA	43	46	55	51	0	36	64	57	14	27
NZL	152	77	67	77	32	0	149	102	16	27
USA	240	412	110	163	68	157	0	246	32	44
ZAF	134	138	101	104	57	99	253	0	26	39
NLD	13	8	15	12	11	13	33	21	0	10
CHE	21	25	43	39	26	24	44	37	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	145	83	97	44	246	122	17	25
CAN	150	0	86	125	48	413	127	13	29
DFS	60	73	0	94	56	144	108	21	45
GBR	95	128	89	0	51	156	101	15	42
ITA	43	46	55	51	0	64	57	14	27
USA	240	412	110	163	68	0	225	32	44
ZAF	127	129	94	100	57	234	0	26	39
NLD	13	8	15	12	11	33	21	0	10
CHE	21	25	43	39	26	44	37	7	0

JER

-----  
common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE
AUS	0	145	71	150	120	17	246	25
CAN	150	0	67	75	124	13	413	29
DFS	48	57	0	68	95	19	122	44
NZL	152	77	50	0	88	16	149	27
ZAF	123	123	79	82	0	26	221	39
NLD	13	8	13	13	21	0	32	10
USA	240	412	90	157	222	33	0	44
CHE	21	25	42	24	37	7	44	0

JER

-----  
common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE
AUS	0	145	86	35	44	150	246	17	21
CAN	150	0	86	38	48	75	413	13	25
DFS	62	73	0	32	56	88	144	21	42
GBR	40	43	30	0	14	37	37	4	3
ITA	43	46	55	15	0	36	64	14	24
NZL	152	77	67	41	32	0	149	16	23
USA	240	412	110	40	68	157	0	32	40
NLD	13	8	15	5	11	13	33	0	8
CHE	18	23	40	4	24	20	40	6	0

JER

-----  
common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE
AUS	0	145	83	98	150	246	17	21
CAN	150	0	80	124	75	410	13	25
DFS	60	71	0	86	80	137	21	42
GBR	96	127	86	0	73	156	15	39
NZL	152	77	61	74	0	149	16	23
USA	240	410	105	163	157	0	32	40
NLD	13	8	15	12	13	33	0	8
CHE	18	23	40	36	20	40	6	0

JER

```

-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  GBR  ITA  USA  NLD  CHE
-----
AUS   0  124  72  83  40  212  15  19
CAN  129   0  86  124  48  413  13  25
DFS   50  73   0  94  56  144  21  42
GBR   81  127  89   0  51  156  15  39
ITA   38  46  55  51   0  64  14  24
USA  201  412  110  163  68   0  32  40
NLD   11   8  15  12  11  33   0   8
CHE   16  23  40  36  24  40   6   0
-----

```

JER

JER

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   9  41   9  12  21  13   8   2
CAN  23   0   7  133  62   4  33  140  3   0
DEU   9   7   0  30   1   8   4   1   8   0
DFS  30  134  20   0  44  76  56  74  30  0
GBR   8  62   1  42   0   0  25  50  1   0
NOR   8   4   7  55   0   0   7   0  19  0
NZL  20  31   4  53  22   6   0  21   2   3
USA  13  134  1  70  46   0  20   0  2   0
NLD   8   3   8  29   1  19   2   2   0   0
CAM   2   0   0   0   0   0   3   0   0   0
-----

```

RDC

```

-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NZL  USA  NLD  CAM  NOR
-----
AUS   0  23   9  41   9  21  13   8   2   4
CAN  23   0   7  133  62  33  140  3   0   1
DEU   9   7   0  30   1   4   1   8   0   3
DFS  30  134  20   0  44  54  74  28  0  34
GBR   8  62   1  42   0  25  50  1   0   0
NZL  20  31   4  51  22   0  21   2   3   2
USA  13  134  1  70  46  20   0  2   0   0
NLD   8   3   8  27   1  2   2   0   0   9
CAM   2   0   0   0   0   3   0   0   0   0
NOR   3   1   2  21   0  2   0   9   0   0
-----

```

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   9  41   9  4  21  13   8   2
CAN  23   0   7  133  62  1  33  138  3   0
DEU   9   7   0  30   1  3   4   1   8   0
DFS  30  134  20   0  44  50  54  74  28  0
GBR   8  62   1  42   0  0  25  49  1   0
NOR   3   1   2  33   0  0  3   0  14  0
NZL  20  31   4  51  22  3  0  21  2   3
USA  13  133  1  70  45  0  20  0  2   0
NLD   8   3   8  27   1  14  2  2  0  0
CAM   2   0   0   0   0  0  3  0  0  0
-----

```

RDC

-----

common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	USA	NLD	CAM	NOR
AUS	0	23	9	41	9	13	8	2	5
CAN	23	0	7	133	62	140	3	0	1
DEU	9	7	0	30	1	1	8	0	3
DFS	30	134	20	0	44	74	27	0	48
GBR	8	62	1	42	0	50	1	0	0
USA	13	134	1	70	46	0	2	0	0
NLD	8	3	8	26	1	2	0	0	10
CAM	2	0	0	0	0	0	0	0	0
NOR	4	1	2	33	0	0	10	0	0

-----

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	9	41	9	12	21	13	8	2
CAN	23	0	7	133	62	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	134	20	0	44	85	53	74	29	0
GBR	8	62	1	42	0	0	25	50	1	0
NOR	8	4	8	62	0	0	7	0	19	0
NZL	20	31	4	48	22	6	0	21	2	3
USA	13	134	1	70	46	0	20	0	2	0
NLD	8	3	8	28	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

-----

RDC

-----

common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR
AUS	0	23	9	41	9	21	13	8	2	4
CAN	23	0	7	133	62	33	140	3	0	1
DEU	9	7	0	30	1	4	1	8	0	3
DFS	30	134	20	0	44	54	74	29	0	34
GBR	8	62	1	42	0	25	50	1	0	0
NZL	20	31	4	51	22	0	21	2	3	2
USA	13	134	1	70	46	20	0	2	0	0
NLD	8	3	8	28	1	2	2	0	0	9
CAM	2	0	0	0	0	3	0	0	0	0
NOR	3	1	2	21	0	2	0	9	0	0

-----

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	9	41	9	12	21	13	8	2
CAN	23	0	7	133	62	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	134	20	0	44	88	56	74	30	0
GBR	8	62	1	42	0	0	25	50	1	0
NOR	8	4	8	64	0	0	7	0	19	0
NZL	20	31	4	53	22	6	0	21	2	3
USA	13	134	1	70	46	0	20	0	2	0
NLD	8	3	8	29	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

-----

RDC

```

-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  NOR  NLD  USA  CAM
-----
AUS   0  23   9  41  12   8  13   2
CAN  23   0   7 132   4   3 140   0
DEU   9   7   0  30   9   8   1   0
DFS  30 133  20   0  85  27  74   0
NOR   8   4   8  62   0  19   0   0
NLD   8   3   8  26  19   0   2   0
USA  13 134   1  70   0   2   0   0
CAM   2   0   0   0   0   0   0   0
-----

```

```

RDC
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  NOR  USA  NLD  CAM
-----
AUS   0  23   6  41   9  12  13   8   2
CAN  23   0   5 133  62   4 140   3   0
DEU   6   5   0  22   1   7   1   8   0
DFS  30 134  15   0  44  85  74  28   0
GBR   8  62   1  42   0   0  50   1   0
NOR   8   4   6  62   0   0   0  19   0
USA  13 134   1  70  46   0   0   2   0
NLD   8   3   8  27   1  19   2   0   0
CAM   2   0   0   0   0   0   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
-----
AUS   0  23   9  41   9  12  21  13   8   2
CAN  23   0   7 133  62   4  33 140   3   0
DEU   9   7   0  30   1   9   4   1   8   0
DFS  30 134  20   0  44  88  56  74  28   0
GBR   8  62   1  42   0   0  25  50   1   0
NOR   8   4   8  64   0   0   7   0  19   0
NZL  20  31   4  53  22   6   0  21   2   3
USA  13 134   1  70  46   0  20   0   2   0
NLD   8   3   8  27   1  19   2   2   0   0
CAM   2   0   0   0   0   0   3   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
-----
AUS   0  23   9  41   9  12  21  13   8   2
CAN  23   0   7 133  62   4  33 140   3   0
DEU   9   7   0  30   1   9   4   1   8   0
DFS  30 134  20   0  44  85  54  74  28   0
GBR   8  62   1  42   0   0  25  50   1   0
NOR   8   4   8  62   0   0   7   0  19   0
NZL  20  31   4  50  22   6   0  21   2   3
USA  13 134   1  70  46   0  20   0   2   0
NLD   8   3   8  27   1  19   2   2   0   0
CAM   2   0   0   0   0   0   3   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
-----

```

AUS	0	23	9	41	9	12	21	13	8	2
CAN	23	0	7	133	62	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	134	20	0	44	78	56	74	30	0
GBR	8	62	1	42	0	0	25	50	1	0
NOR	8	4	8	57	0	0	7	0	19	0
NZL	20	31	4	53	22	6	0	21	2	3
USA	13	134	1	70	46	0	20	0	2	0
NLD	8	3	8	29	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal  
 common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0	23	9	41	9	12	13	8	2
CAN	23	0	7	133	62	4	137	3	0
DEU	9	7	0	30	1	9	1	8	0
DFS	30	134	20	0	44	88	74	30	0
GBR	8	62	1	42	0	0	50	1	0
NOR	8	4	8	64	0	0	0	19	0
USA	13	133	1	70	46	0	0	2	0
NLD	8	3	8	29	1	19	2	0	0
CAM	2	0	0	0	0	0	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
AUS	0	23	9	41	9	12	21	13	8	2
CAN	23	0	7	133	62	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	134	20	0	44	85	54	74	29	0
GBR	8	62	1	42	0	0	25	50	1	0
NOR	8	4	8	62	0	0	7	0	19	0
NZL	20	31	4	51	22	6	0	21	2	3
USA	13	134	1	70	46	0	20	0	2	0
NLD	8	3	8	28	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal  
 common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0	23	9	41	9	12	13	8	2
CAN	23	0	7	133	62	4	138	3	0
DEU	9	7	0	30	1	9	1	8	0
DFS	30	134	20	0	44	82	74	30	0
GBR	8	62	1	42	0	0	49	1	0
NOR	8	4	8	59	0	0	0	19	0
USA	13	133	1	70	45	0	0	2	0
NLD	8	3	8	29	1	19	2	0	0
CAM	2	0	0	0	0	0	0	0	0

RDC

common bulls below diagonal  
 common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	NOR	NZL	NLD	USA	CAM
AUS	0	23	9	36	12	21	8	13	2
CAN	23	0	7	127	4	33	3	140	0

DEU	9	7	0	27	9	4	8	1	0
DFS	27	127	20	0	77	49	27	69	0
NOR	8	4	8	57	0	7	19	0	0
NZL	20	31	4	47	6	0	1	21	3
NLD	8	3	8	26	19	1	0	2	0
USA	13	134	1	66	0	20	2	0	0
CAM	2	0	0	0	0	3	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
AUS	0	23	9	41	8	12	21	13	8	2
CAN	23	0	7	133	59	4	33	140	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	134	20	0	44	93	56	74	30	0
GBR	7	59	1	42	0	0	22	48	1	0
NOR	8	4	8	69	0	0	7	0	19	0
NZL	20	31	4	53	19	6	0	21	2	3
USA	13	134	1	70	44	0	20	0	2	0
NLD	8	3	8	29	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	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
AUS	0	23	9	41	8	12	21	13	8	2
CAN	23	0	7	133	59	4	33	137	3	0
DEU	9	7	0	30	1	9	4	1	8	0
DFS	30	134	20	0	44	88	56	74	30	0
GBR	7	59	1	42	0	0	22	48	1	0
NOR	8	4	8	64	0	0	7	0	19	0
NZL	20	31	4	53	19	6	0	21	2	3
USA	13	133	1	70	44	0	20	0	2	0
NLD	8	3	8	29	1	19	2	2	0	0
CAM	2	0	0	0	0	0	3	0	0	0

RDC

common bulls below diagonal  
common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM
AUS	0	23	9	41	8	12	13	8	2
CAN	23	0	7	133	59	4	140	3	0
DEU	9	7	0	31	1	9	1	8	0
DFS	30	134	21	0	44	88	74	30	0
GBR	7	59	1	42	0	0	48	1	0
NOR	8	4	8	64	0	0	0	19	0
USA	13	134	1	70	44	0	0	2	0
NLD	8	3	8	29	1	19	2	0	0
CAM	2	0	0	0	0	0	0	0	0

RDC

RDC

SIM

SIM

SIM

SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM

-----  
SIM