

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 (HOL,RDC) Drop in information due to data clean up and pedigree editing.
Some bulls not longer qualified due to loss of herds.

BEL (HOL) Drop in daughters, herds, EDC and reliabilities due to corrections in pedigree.

CHE (ALL) Change in number of herds, EDC and reliabilities due to manual data edits and hYS assignment.

DEU (HOL) Overall base change. From this routine run onwards cow base is adjusted with each routine run, four months (birth month) forwards.

DFS (HOL,JER,RDC) Drop in EDC mostly cause by rounding effect.

ESP (HOL) Base changed. Drop in information due to new checks in data editing.

IRL (HOL) Drop in information and reliabilities due to pedigree clean up.

JPN (HOL) Changes in EDC due to pedigree editing.

LVA (HOL,RDC) Implementation of a new recording system that caused decrease in information and led to some bulls changing from official to unofficial.

NLD (ALL) Drop in information due to pedigree corrections.

POL (HOL) The Polish Federation of Cattle Breeders and Milk Producers replaced the milk recording system SYMLEK by the FEDINFO system.
Due to this change, a marginal number of animals have been assigned to a native breed instead of Holstein-Friesian.
These bulls were removed from the evaluation.
Drop in information due to data editing.

USA (HOL) Some bulls changed type of proofs to better reflect their status and some of them no longer qualified and have been removed.
Some bulls drops in daughters due to parentage verification.

USA (BSW,GUE,JER,RDC) Drop in information due to pedigree corrections and herd-year edits.

INTERBULL CHANGES COMPARED TO THE PREVIOUS ROUTINE RUN

In 2020 new post-processing windows\200\231 correlations for all breeds and traits have been applied: the upper bounds have been set to 0.99 as these were judged to have very little effect on evaluations while the lower values have been reduced to the 10th percentile. This reduction would provide post-processed correlations to be closer to the real estimated ones. The previously lower value adopted (based on the 25th percentile) had been found too high causing estimated and post-processed correlations to differ significantly from each other. It is a recommendation from the Interbull Technical Committee to review such windows every 5 years. The weight assigned to the magnitude of the changes tested by each country has also been revised. The new weight will allow post-processed correlations to take more in consideration the value of the new estimated ones even when no changes are applied by the countries. More information can be read on https://interbull.org/ib/rg_procedure

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

DATA AND METHOD OF ANALYSIS

Data were national genetic evaluations of AI sampled bulls with at least 10 daughters or 10 EDC (for clinical mastitis and maternal calving traits at least 50 daughters or 50 EDC, and for direct calving traits at least 50 calvings or 50 EDC) in at

least 10 herds. Table 1 presents the amount of data included in this Interbull evaluation for all breeds.

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

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

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

SCIENTIFIC LITERATURE

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

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

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

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

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

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

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

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

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

NEXT ROUTINE INTERNATIONAL EVALUATION

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

NEXT TEST INTERNATIONAL EVALUATION

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

PUBLICATION OF INTERBULL ROUTINE RUN

Results were distributed by the Interbull Centre to designated representatives in each country. The international evaluation file comprised international proofs expressed on the base and unit of each country included

in the analysis. Such records readily provide more information on bull performance in various countries, thereby minimizing the need to resort to conversions.

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

PUBLICATION OF INTERBULL TEST RUN

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

^LTable 1. National evaluation data considered in the Interbull evaluation for conformation traits (August Routine Evaluation 2024).
 Number of records for stature by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		50	4025	772	266	
BEL			1747			
CAN	253	104	12908	859	916	
CHE	2998		3185	54		
CZE			4535			
DEA	3823					
DEU			21758		282	
DFS			12473	2128	6488	
ESP			4580			
EST			938			
FRA	451		18202			
FRM						
GBR	25	232	6594	470	354	
HUN			2817			
IRL			1950			
ISR						
ITA	2288		8521	74		
JPN			6415			
KOR			1685			
LTU						
LVA			1448		619	
NLD	146		15693	55	62	
NOR					2555	
NZL			7088	4293	603	
POL			9461			
PRT			2587			
SVK						
SVN	263		642			
URY						
USA	950	736	34467	4597	280	
ZAF			853	563		
HRV						
CAM					40	
=====						
No. Records	11197	1122	184572	13865	12465	
Pub. Proofs	8892	952	141401	12022	13041	0

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

 BSW sta

 CAN CHE FRA ITA NLD USA DEA SVN GBR

CAN	6.25									
CHE	0.95	12.52								
FRA	0.98	0.97	0.94							
ITA	0.96	0.96	0.95	13.77						
NLD	0.95	0.95	0.97	0.91	4.32					
USA	0.98	0.95	0.97	0.95	0.94	1.63				
DEA	0.96	0.97	0.98	0.95	0.96	0.96	11.20			
SVN	0.93	0.91	0.91	0.93	0.90	0.90	0.91	17.01		
GBR	0.96	0.92	0.96	0.93	0.93	0.96	0.90	0.90	0.87	

BSW cwi

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR	
CAN	7.80									
CHE	0.91	10.20								
FRA	0.87	0.91	0.83							
ITA	0.80	0.85	0.85	21.17						
NLD	0.92	0.85	0.88	0.71	4.82					
USA	0.89	0.90	0.91	0.86	0.83	0.89				
DEA	0.86	0.82	0.87	0.73	0.77	0.80	11.35			
SVN	0.89	0.91	0.91	0.81	0.86	0.85	0.90	24.75		
GBR	0.91	0.84	0.81	0.70	0.90	0.80	0.83	0.81	1.46	

BSW bde

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	GBR	USA	
CAN	7.13									
CHE	0.84	10.34								
FRA	0.73	0.87	0.91							
ITA	0.79	0.92	0.90	17.76						
NLD	0.82	0.85	0.84	0.85	4.67					
DEA	0.79	0.89	0.91	0.87	0.80	11.04				
SVN	0.78	0.73	0.79	0.80	0.78	0.71	25.12			
GBR	0.87	0.88	0.78	0.83	0.89	0.86	0.83	1.73		
USA	0.73	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	8.75									
CHE	0.69	11.04								
FRA	0.87	0.67	0.84							
NLD	0.79	0.68	0.66	3.80						
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	6.91									
CHE	0.94	10.70								
FRA	0.97	0.96	0.91							
ITA	0.94	0.93	0.93	23.20						
NLD	0.95	0.92	0.96	0.92	4.68					
USA	0.97	0.94	0.96	0.91	0.94	1.35				
DEA	0.97	0.94	0.96	0.94	0.92	0.97	11.78			
SVN	0.91	0.88	0.89	0.89	0.90	0.90	0.88	22.58		
GBR	0.96	0.93	0.97	0.93	0.96	0.96	0.91	0.92	1.89	

BSW rwi

	CAN	CHE	FRA	NLD	USA	DEA	GBR	SVN	ITA	
CAN	7.10									
CHE	0.89	10.32								

FRA	0.95	0.87	0.97						
NLD	0.94	0.85	0.93	4.07					
USA	0.91	0.86	0.86	0.80	0.98				
DEA	0.90	0.88	0.92	0.78	0.89	13.23			
GBR	0.92	0.84	0.90	0.88	0.92	0.81	1.20		
SVN	0.89	0.79	0.93	0.86	0.81	0.89	0.86	25.70	
ITA	0.87	0.79	0.90	0.79	0.86	0.87	0.87	0.90	19.19

BSW rls

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.72								
CHE	0.92	13.10							
FRA	0.91	0.93	0.97						
ITA	0.91	0.86	0.92	23.69					
NLD	0.88	0.85	0.88	0.83	5.07				
USA	0.95	0.93	0.90	0.87	0.85	0.79			
DEA	0.91	0.91	0.93	0.89	0.80	0.89	12.14		
SVN	0.85	0.77	0.86	0.82	0.80	0.82	0.86	22.42	
GBR	0.85	0.86	0.90	0.83	0.86	0.83	0.87	0.80	1.50

BSW fan

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.59								
CHE	0.68	14.22							
FRA	0.74	0.73	1.04						
ITA	0.69	0.84	0.80	21.31					
NLD	0.72	0.66	0.80	0.68	5.09				
USA	0.81	0.72	0.80	0.85	0.80	0.85			
DEA	0.61	0.89	0.67	0.89	0.62	0.65	11.51		
SVN	0.70	0.75	0.71	0.78	0.67	0.70	0.81	24.85	
GBR	0.80	0.72	0.84	0.72	0.87	0.82	0.67	0.76	1.24

BSW hde

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA	
CAN	8.12								
CHE	0.86	12.64							
FRA	0.79	0.82	1.07						
ITA	0.79	0.83	0.82	20.92					
NLD	0.74	0.73	0.80	0.72	5.09				
DEA	0.75	0.87	0.85	0.93	0.77	11.92			
SVN	0.80	0.84	0.85	0.88	0.74	0.90	31.80		
USA	0.84	0.73	0.80	0.89	0.80	0.80	0.82	0.85	

BSW fua

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.73								
CHE	0.86	12.38							
FRA	0.89	0.88	0.83						
ITA	0.88	0.85	0.85	19.68					
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	0.85	0.90	0.82	0.77	0.83	11.07		
SVN	0.72	0.73	0.78	0.81	0.77	0.72	0.89	21.87	
GBR	0.91	0.83	0.87	0.87	0.90	0.91	0.71	0.60	1.45

BSW ruh

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.63								
CHE	0.91	12.18							

FRA	0.85	0.82	0.89						
ITA	0.75	0.84	0.86	12.90					
NLD	0.76	0.81	0.87	0.83	4.32				
USA	0.82	0.79	0.88	0.84	0.88	1.07			
DEA	0.83	0.84	0.91	0.92	0.84	0.81	11.66		
SVN	0.80	0.80	0.81	0.86	0.88	0.83	0.87	21.02	
GBR	0.73	0.79	0.86	0.81	0.87	0.91	0.75	0.79	1.77

BSW	ruw								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	
CAN	8.70								
CHE	0.92	12.08							
FRA	0.84	0.88	0.83						
ITA	0.78	0.88	0.80	13.26					
NLD	0.69	0.66	0.80	0.68	4.32				
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	12.06		
SVN	0.84	0.85	0.80	0.81	0.67	0.83	0.82	21.21	

BSW	usu								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.05								
CHE	0.91	12.08							
FRA	0.83	0.91	0.88						
ITA	0.88	0.91	0.88	19.06					
NLD	0.81	0.83	0.89	0.81	4.26				
USA	0.83	0.89	0.86	0.86	0.90	0.99			
DEA	0.92	0.93	0.90	0.93	0.78	0.84	11.37		
SVN	0.81	0.81	0.69	0.75	0.66	0.71	0.81	20.54	
GBR	0.79	0.79	0.85	0.84	0.91	0.92	0.72	0.62	2.73

BSW	ude								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.73								
CHE	0.96	12.21							
FRA	0.96	0.96	0.97						
ITA	0.95	0.96	0.97	19.83					
NLD	0.95	0.94	0.95	0.93	4.31				
USA	0.96	0.95	0.96	0.95	0.94	1.23			
DEA	0.93	0.97	0.94	0.97	0.94	0.92	12.15		
SVN	0.92	0.95	0.92	0.96	0.95	0.92	0.96	22.92	
GBR	0.96	0.94	0.96	0.94	0.96	0.96	0.90	0.94	2.12

BSW	ftp								
	CAN	CHE	FRA	NLD	USA	DEA	SVN	GBR	ITA
CAN	7.39								
CHE	0.97	14.00							
FRA	0.97	0.96	0.90						
NLD	0.97	0.95	0.96	5.09					
USA	0.92	0.91	0.88	0.91	1.31				
DEA	0.95	0.98	0.95	0.96	0.90	11.01			
SVN	0.93	0.93	0.93	0.96	0.91	0.95	18.36		
GBR	0.95	0.93	0.89	0.93	0.94	0.93	0.93	1.39	
ITA	0.87	0.86	0.86	0.86	0.87	0.86	0.87	0.87	21.05

BSW	ftl								
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	6.60								
CHE	0.90	14.70							

FRA	0.95	0.95	0.97						
ITA	0.93	0.94	0.95	18.13					
NLD	0.92	0.96	0.92	0.92	5.00				
USA	0.93	0.96	0.95	0.93	0.95	1.75			
DEA	0.90	0.98	0.97	0.96	0.94	0.96	11.05		
SVN	0.90	0.91	0.90	0.90	0.92	0.90	0.91	18.64	
GBR	0.95	0.94	0.93	0.94	0.97	0.96	0.92	0.92	1.58

BSW rtp

	CAN	CHE	FRA	ITA	NLD	DEA	SVN	USA	
CAN	6.77								
CHE	0.98	14.55							
FRA	0.97	0.98	0.89						
ITA	0.92	0.95	0.94	20.01					
NLD	0.96	0.95	0.96	0.92	4.63				
DEA	0.97	0.99	0.98	0.96	0.94	11.90			
SVN	0.94	0.93	0.94	0.93	0.95	0.93	18.33		
USA	0.91	0.87	0.90	0.89	0.94	0.87	0.89	1.31	

BSW ocs

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	7.84								
CHE	0.80	9.40							
FRA	0.74	0.83	0.97						
ITA	0.77	0.81	0.87	8.96					
NLD	0.72	0.69	0.77	0.69	3.89				
USA	0.79	0.73	0.81	0.81	0.82	0.52			
DEA	0.81	0.90	0.87	0.88	0.59	0.71	10.38		
SVN	0.59	0.64	0.65	0.63	0.61	0.62	0.73	19.79	
GBR	0.74	0.82	0.84	0.78	0.86	0.85	0.68	0.68	1.71

BSW ous

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.10								
CHE	0.85	13.95							
FRA	0.89	0.87	0.95						
ITA	0.81	0.88	0.85	10.15					
NLD	0.88	0.84	0.89	0.78	5.06				
USA	0.89	0.81	0.83	0.79	0.86	0.80			
DEA	0.85	0.94	0.84	0.91	0.78	0.79	12.34		
SVN	0.75	0.83	0.71	0.80	0.77	0.72	0.90	19.68	
GBR	0.76	0.82	0.74	0.80	0.77	0.86	0.74	0.72	1.64

BSW ofl

	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	8.29								
CHE	0.82	11.80							
FRA	0.63	0.63	1.67						
ITA	0.60	0.71	0.84	17.78					
NLD	0.65	0.65	0.74	0.63	4.56				
USA	0.59	0.62	0.66	0.67	0.66	0.83			
DEA	0.68	0.84	0.64	0.81	0.58	0.57	11.03		
SVN	0.73	0.85	0.62	0.71	0.63	0.65	0.88	26.67	
GBR	0.66	0.75	0.81	0.66	0.73	0.72	0.65	0.62	1.45

BSW ofr

	CAN	CHE	DEA	ITA	SVN	USA	FRA		
CAN	7.32								
CHE	0.80	12.00							

DEA	0.81	0.90	11.36				
ITA	0.77	0.91	0.93	16.82			
SVN	0.73	0.78	0.79	0.81	23.07		
USA	0.75	0.83	0.90	0.86	0.74	1.63	
FRA	0.73	0.90	0.91	0.90	0.78	0.87	0.86

BSW tpl

	CAN	CHE	DEA	ITA	SVN	FRA	
CAN	7.51						
CHE	0.88	12.26					
DEA	0.89	0.90	11.80				
ITA	0.91	0.91	0.91	23.63			
SVN	0.88	0.86	0.84	0.86	24.68		
FRA	0.96	0.92	0.92	0.90	0.86	1.26	

BSW oru

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	7.43						
CHE	0.76	16.63					
DEA	0.72	0.87	12.44				
ITA	0.92	0.76	0.77	17.45			
SVN	0.83	0.58	0.70	0.78	26.81		
USA	0.88	0.58	0.49	0.82	0.67	0.98	
FRA	0.83	0.87	0.80	0.78	0.67	0.83	1.25

BSW rle

	CHE	DEA	ITA	SVN	USA	FRA	
CHE	11.79						
DEA	0.94	12.20					
ITA	0.81	0.85	19.16				
SVN	0.77	0.76	0.82	24.60			
USA	0.55	0.51	0.76	0.68	0.98		
FRA	0.93	0.94	0.86	0.77	0.73	1.04	

BSW thp

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	7.25						
CHE	0.83	11.40					
DEA	0.78	0.83	11.96				
ITA	0.88	0.91	0.85	28.82			
SVN	0.77	0.84	0.85	0.87	35.23		
USA	0.88	0.87	0.71	0.82	0.73	1.35	
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	12.20					
DEA	0.92	0.89	12.50				
ITA	0.91	0.84	0.85	19.46			
SVN	0.94	0.88	0.91	0.91	21.91		
FRA	0.91	0.85	0.87	0.87	0.89	1.00	

BSW ful

	CHE	DEA	ITA	SVN	FRA	
CHE	11.87					
DEA	0.91	12.12				

ITA	0.92	0.95	12.79		
SVN	0.82	0.90	0.84	21.35	
FRA	0.75	0.85	0.78	0.76	0.87

BSW udb

	CHE	DEA	ITA	SVN	FRA
CHE	12.42				
DEA	0.96	13.29			
ITA	0.93	0.95	26.28		
SVN	0.84	0.86	0.86	24.27	
FRA	0.91	0.88	0.86	0.81	0.90

BSW tdi

	CHE	DEA	ITA	SVN	FRA
CHE	15.88				
DEA	0.96	11.27			
ITA	0.94	0.95	20.48		
SVN	0.90	0.93	0.91	18.93	
FRA	0.97	0.98	0.91	0.91	0.86

BSW tth

	CHE	DEA	ITA	SVN	FRA
CHE	14.50				
DEA	0.98	12.87			
ITA	0.94	0.95	23.20		
SVN	0.88	0.87	0.88	21.01	
FRA	0.93	0.95	0.95	0.87	0.88

GUE sta

	CAN	GBR	USA	AUS
CAN	6.57			
GBR	0.97	1.24		
USA	0.98	0.96	2.76	
AUS	0.90	0.92	0.91	0.87

GUE cwi

	CAN	GBR	USA	AUS
CAN	6.86			
GBR	0.92	1.84		
USA	0.85	0.85	1.51	
AUS	0.72	0.80	0.65	0.33

GUE bde

	CAN	GBR	USA	AUS
CAN	6.36			
GBR	0.87	1.56		
USA	0.75	0.88	1.75	
AUS	0.80	0.77	0.69	0.44

GUE ang

	CAN	GBR	USA	AUS
CAN	7.83			
GBR	0.89	1.67		
USA	0.87	0.91	1.86	
AUS	0.66	0.76	0.67	0.38

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

GUE rwi				
	CAN	GBR	USA	AUS
CAN	7.19			
GBR	0.93	1.60		
USA	0.92	0.92	1.70	
AUS	0.84	0.83	0.77	0.65

GUE rls				
	CAN	GBR	USA	AUS
CAN	8.30			
GBR	0.82	1.88		
USA	0.93	0.81	0.89	
AUS	0.70	0.78	0.70	0.31

GUE rlr				
	CAN	USA	AUS	
CAN	7.12			
USA	0.84	0.92		
AUS	0.59	0.54	0.19	

GUE fan				
	CAN	GBR	USA	AUS
CAN	8.85			
GBR	0.79	1.76		
USA	0.84	0.75	0.86	
AUS	0.62	0.76	0.64	0.26

GUE fua				
	CAN	GBR	USA	AUS
CAN	7.30			
GBR	0.94	1.41		
USA	0.92	0.92	1.81	
AUS	0.78	0.78	0.76	0.37

GUE ruh				
	CAN	GBR	USA	AUS
CAN	6.91			
GBR	0.72	1.96		
USA	0.80	0.91	1.44	
AUS	0.75	0.76	0.75	0.37

GUE usu				
	CAN	GBR	USA	AUS
CAN	6.90			
GBR	0.79	1.59		

USA	0.79	0.87	1.34	
AUS	0.74	0.78	0.74	0.30

GUE ude

	CAN	GBR	USA	AUS
CAN	6.30			
GBR	0.97	1.41		
USA	0.95	0.95	1.83	
AUS	0.89	0.89	0.88	0.51

GUE ftp

	CAN	GBR	USA	AUS
CAN	5.81			
GBR	0.95	1.30		
USA	0.92	0.92	1.60	
AUS	0.92	0.91	0.86	0.40

GUE ftl

	CAN	GBR	USA	AUS
CAN	4.69			
GBR	0.94	1.95		
USA	0.94	0.97	2.00	
AUS	0.93	0.94	0.93	0.91

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	0.76	2.18		
USA	0.73	0.86	0.86	
AUS	0.59	0.64	0.57	0.79

GUE ous

	CAN	GBR	USA	AUS
CAN	8.13			
GBR	0.77	1.54		
USA	0.87	0.83	0.81	
AUS	0.69	0.82	0.73	1.06

GUE ofl

	CAN	GBR	USA	AUS
CAN	7.49			
GBR	0.66	1.63		
USA	0.64	0.68	0.83	
AUS	0.41	0.55	0.52	0.59

HOL sta

AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT	LVA
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

HOL_ous																					
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	JPN	CZE	EST	IRL	SVN	PRT
AUS	1.29																				
BEL	0.66	1.28																			
CAN	0.69	0.81	6.12																		
CHE	0.79	0.84	0.92	11.69																	
DEU	0.74	0.79	0.89	0.92	13.55																
DFS	0.66	0.83	0.88	0.89	0.86	13.22															
ESP	0.74	0.68	0.75	0.87	0.83	0.75	0.72														
FRA	0.66	0.80	0.88	0.93	0.91	0.89	0.81	0.95													
GBR	0.83	0.68	0.77	0.86	0.82	0.70	0.87	0.74	1.44												
ITA	0.68	0.79	0.84	0.93	0.87	0.87	0.84	0.90	0.81	1.17											
NLD	0.69	0.81	0.89	0.94	0.90	0.86	0.80	0.91	0.77	0.84	4.76										
USA	0.74	0.73	0.87	0.90	0.84	0.76	0.85	0.79	0.87	0.85	0.85	1.16									
HUN	0.70	0.78	0.80	0.86	0.85	0.79	0.79	0.78	0.76	0.76	0.74	0.75	1.16								
POL	0.70	0.79	0.73	0.80	0.79	0.74	0.71	0.75	0.79	0.77	0.75	0.75	0.72	11.19							
NZL	0.81	0.68	0.80	0.88	0.79	0.68	0.78	0.77	0.84	0.73	0.82	0.87	0.74	0.72	0.42						
JPN	0.75	0.81	0.87	0.93	0.88	0.80	0.78	0.84	0.84	0.87	0.85	0.88	0.79	0.84	0.82	0.74					
CZE	0.68	0.86	0.87	0.91	0.92	0.90	0.78	0.90	0.74	0.85	0.86	0.79	0.88	0.76	0.75	0.84	12.78				
EST	0.69	0.83	0.86	0.89	0.85	0.92	0.78	0.89	0.75	0.86	0.84	0.75	0.79	0.71	0.75	0.77	0.88	16.06			
IRL	0.81	0.66	0.67	0.79	0.74	0.66	0.81	0.67	0.95	0.76	0.70	0.82	0.69	0.72	0.81	0.77	0.68	0.70	0.93		
SVN	0.68	0.79	0.69	0.72	0.74	0.69	0.69	0.69	0.70	0.70	0.69	0.69	0.69	0.84	0.68	0.73	0.72	0.72	0.69	15.51	
PRT	0.67	0.68	0.74	0.76	0.73	0.68	0.75	0.70	0.79	0.73	0.75	0.77	0.68	0.71	0.74	0.77	0.71	0.69	0.74	0.69	0.43

HOL_of1																					
	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	JPN	CZE	EST	IRL	SVN	PRT	
AUS	0.76																				
BEL	0.64	1.70																			
CAN	0.35	0.62	4.73																		
CHE	0.58	0.76	0.81	11.40																	
DEU	0.38	0.75	0.71	0.78	11.63																
DFS	0.35	0.64	0.80	0.77	0.81	13.03															
ESP	0.42	0.69	0.73	0.76	0.70	0.81	0.76														
FRA	0.55	0.80	0.67	0.77	0.76	0.61	0.75	0.96													
GBR	0.51	0.73	0.66	0.79	0.73	0.72	0.78	0.84	1.57												
ITA	0.50	0.72	0.59	0.71	0.71	0.59	0.72	0.79	0.67	1.58											
NLD	0.44	0.82	0.66	0.72	0.76	0.65	0.65	0.81	0.73	0.67	5.07										
USA	0.51	0.70	0.60	0.79	0.74	0.69	0.74	0.70	0.73	0.78	0.68	1.46									
HUN	0.59	0.77	0.56	0.63	0.69	0.57	0.57	0.76	0.64	0.71	0.69	0.70	1.19								
POL	0.50	0.69	0.56	0.68	0.68	0.57	0.59	0.66	0.57	0.73	0.57	0.79	0.73	13.68							
JPN	0.45	0.64	0.65	0.79	0.77	0.73	0.69	0.58	0.59	0.72	0.59	0.85	0.60	0.77	0.54						
CZE	0.48	0.75	0.61	0.73	0.78	0.63	0.65	0.68	0.64	0.78	0.62	0.83	0.80	0.85	0.79	17.38					
EST	0.46	0.62	0.58	0.60	0.64	0.58	0.58	0.66	0.58	0.58	0.73	0.58	0.68	0.59	0.59	0.68	20.17				
IRL	0.58	0.72	0.61	0.79	0.67	0.66	0.69	0.69	0.79	0.67	0.63	0.67	0.66	0.62	0.69	0.63	0.43	1.35			
SVN	0.45	0.79	0.57	0.66	0.68	0.62	0.57	0.71	0.57	0.67	0.66	0.70	0.84	0.77	0.71	0.75	0.70	0.62	22.61		
PRT	0.35	0.57	0.56	0.57	0.58	0.56	0.60	0.68	0.60	0.66	0.63	0.60	0.64	0.57	0.57	0.60	0.70	0.46	0.64	0.19	

HOL_loc																				
	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	CZE	IRL	KOR	SVN	PRT	EST	HUN	POL	
BEL	1.79																			
CAN	0.85	6.71																		
CHE	0.56	0.60	12.45																	
DEU	0.66	0.74	0.69	11.45																
DFS	0.88	0.91	0.51	0.69	13.19															
ESP	0.62	0.74	0.67	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	0.88	0.82	0.65	0.79	0.85	1.52												
ITA	0.60	0.69	0.63	0.74	0.60	0.77	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	0.74	0.68	1.53									
CZE	0.51	0.61	0.54	0.62	0.61	0.64	0.61	0.66	0.69	0.50	0.62	20.34								
IRL	0.57	0.56	0.52	0.63	0.51	0.63	0.68	0.72	0.62	0.62	0.55	0.51	1.65							
KOR	0.56	0.56	0.51	0.51	0.52	0.57	0.61	0.51	0.52	0.51	0.51	0.51	0.51	9.90						

SVN	0.74	0.71	0.57	0.76	0.72	0.70	0.82	0.66	0.69	0.67	0.68	0.66	0.53	0.54	27.31						
PRT	0.50	0.50	0.53	0.59	0.50	0.60	0.54	0.60	0.59	0.52	0.50	0.63	0.50	0.51	0.67	1.93					
EST	0.53	0.52	0.53	0.53	0.53	0.52	0.55	0.52	0.51	0.53	0.51	0.53	0.53	0.67	0.69	0.53	22.44				
HUN	0.68	0.69	0.51	0.67	0.73	0.62	0.75	0.68	0.64	0.65	0.66	0.82	0.51	0.58	0.79	0.55	0.62	1.18			
POL	0.54	0.64	0.53	0.70	0.57	0.60	0.68	0.59	0.70	0.54	0.76	0.77	0.54	0.51	0.77	0.55	0.53	0.71	15.86		

HOL bcs

	BEL	CHE	DEU	DFS	FRA	GBR	ITA	NLD	USA	CZE	JPN	IRL	KOR	CAN	PRT	ESP	SVN	EST	HUN	NZL	POL	
BEL	0.97																					
CHE	0.71	11.72																				
DEU	0.71	0.90	14.11																			
DFS	0.74	0.89	0.95	12.18																		
FRA	0.71	0.93	0.95	0.95	0.95																	
GBR	0.75	0.91	0.90	0.90	0.92	1.61																
ITA	0.71	0.91	0.95	0.95	0.96	0.90	6.58															
NLD	0.71	0.94	0.96	0.95	0.95	0.91	0.93	5.02														
USA	0.76	0.71	0.81	0.80	0.81	0.75	0.78	0.76	1.35													
CZE	0.72	0.87	0.96	0.95	0.92	0.89	0.94	0.93	0.77	13.83												
JPN	0.79	0.93	0.97	0.97	0.97	0.92	0.96	0.95	0.84	0.95	1.68											
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	2.34									
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	5.88								
PRT	0.71	0.85	0.87	0.86	0.89	0.87	0.85	0.86	0.71	0.84	0.87	0.79	0.83	0.89	1.76							
ESP	0.73	0.87	0.92	0.92	0.94	0.93	0.92	0.91	0.75	0.91	0.93	0.82	0.85	0.94	0.88	1.02						
SVN	0.72	0.88	0.92	0.91	0.88	0.81	0.89	0.91	0.72	0.91	0.89	0.73	0.79	0.85	0.75	0.84	20.76					
EST	0.72	0.83	0.91	0.87	0.88	0.78	0.88	0.91	0.81	0.88	0.89	0.72	0.76	0.88	0.76	0.79	0.86	16.65				
HUN	0.72	0.87	0.94	0.92	0.92	0.87	0.94	0.90	0.75	0.95	0.93	0.76	0.85	0.93	0.85	0.91	0.87	0.83	0.99			
NZL	0.71	0.90	0.91	0.91	0.92	0.91	0.91	0.88	0.72	0.88	0.92	0.87	0.81	0.91	0.85	0.86	0.84	0.82	0.89	0.16		
POL	0.72	0.86	0.91	0.89	0.89	0.89	0.90	0.87	0.75	0.91	0.92	0.79	0.80	0.91	0.85	0.87	0.83	0.80	0.91	0.85	11.13	

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	11.73							
GBR	0.91	0.96	0.94	1.17						
ITA	0.87	0.95	0.93	0.95	1.65					
NZL	0.87	0.84	0.85	0.90	0.87	0.36				
USA	0.90	0.97	0.95	0.96	0.94	0.89	1.65			
ZAF	0.87	0.85	0.84	0.92	0.87	0.89	0.86	8.68		
NLD	0.88	0.96	0.97	0.94	0.92	0.85	0.94	0.86	5.22	
CHE	0.89	0.96	0.96	0.95	0.93	0.85	0.94	0.87	0.97	11.58

JER cwi

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.29									
CAN	0.74	6.64								
DFS	0.71	0.80	15.57							
GBR	0.81	0.91	0.84	1.84						
ITA	0.65	0.77	0.69	0.73	1.69					
NZL	0.81	0.73	0.66	0.75	0.66	0.37				
USA	0.74	0.89	0.80	0.85	0.90	0.67	1.00			
ZAF	0.68	0.77	0.73	0.80	0.73	0.75	0.76	8.44		
NLD	0.73	0.91	0.89	0.90	0.72	0.69	0.84	0.80	4.51	
CHE	0.67	0.85	0.86	0.82	0.81	0.68	0.84	0.71	0.87	12.42

JER bde

	AUS	CAN	DFS	GBR	ITA	NZL	ZAF	NLD	USA	CHE
AUS	0.33									
CAN	0.78	5.64								
DFS	0.76	0.85	13.75							

GBR	0.75	0.86	0.85	1.54						
ITA	0.70	0.74	0.78	0.85	1.58					
NZL	0.78	0.69	0.70	0.69	0.70	0.37				
ZAF	0.79	0.72	0.82	0.80	0.71	0.74	8.62			
NLD	0.70	0.83	0.83	0.89	0.87	0.70	0.78	4.66		
USA	0.69	0.70	0.73	0.76	0.91	0.69	0.71	0.86	1.00	
CHE	0.74	0.87	0.92	0.89	0.83	0.71	0.79	0.89	0.82	13.74

 JER ang

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0.33									
CAN	0.67	7.54								
DFS	0.71	0.82	13.18							
GBR	0.80	0.84	0.86	1.36						
ITA	0.73	0.85	0.81	0.85	1.63					
USA	0.70	0.83	0.84	0.83	0.79	1.00				
ZAF	0.62	0.63	0.65	0.80	0.82	0.67	8.58			
NLD	0.72	0.82	0.74	0.82	0.80	0.73	0.65	5.82		
CHE	0.63	0.78	0.71	0.71	0.74	0.72	0.65	0.74	9.79	

 JER ran

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.36									
CAN	0.88	5.76								
DFS	0.89	0.96	11.50							
GBR	0.94	0.95	0.96	1.27						
ITA	0.88	0.95	0.94	0.95	1.64					
NZL	0.90	0.88	0.88	0.92	0.89	0.30				
USA	0.89	0.95	0.96	0.97	0.94	0.91	1.23			
ZAF	0.88	0.88	0.88	0.89	0.88	0.88	0.88	8.89		
NLD	0.90	0.96	0.95	0.96	0.94	0.89	0.95	0.91	4.99	
CHE	0.91	0.96	0.95	0.95	0.94	0.90	0.94	0.89	0.94	12.97

 JER rwi

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.32									
CAN	0.80	6.26								
DFS	0.81	0.91	12.05							
GBR	0.80	0.92	0.86	1.37						
ITA	0.77	0.85	0.81	0.85	1.49					
NZL	0.88	0.82	0.82	0.80	0.80	0.30				
USA	0.77	0.81	0.81	0.84	0.87	0.78	0.98			
ZAF	0.77	0.78	0.79	0.80	0.78	0.77	0.78	9.06		
NLD	0.84	0.94	0.91	0.87	0.79	0.84	0.80	0.79	5.12	
CHE	0.82	0.92	0.83	0.86	0.79	0.80	0.79	0.78	0.91	13.23

 JER rls

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.18									
CAN	0.67	6.25								
DFS	0.67	0.90	12.56							
GBR	0.71	0.84	0.75	1.67						
ITA	0.67	0.86	0.81	0.80	1.94					
NZL	0.66	0.66	0.67	0.68	0.68	0.12				
USA	0.66	0.94	0.87	0.87	0.85	0.66	0.87			
ZAF	0.71	0.68	0.67	0.74	0.68	0.83	0.70	11.85		
NLD	0.71	0.91	0.90	0.85	0.85	0.67	0.86	0.73	3.63	
CHE	0.74	0.92	0.86	0.81	0.80	0.68	0.85	0.71	0.90	9.72

 JER rlr

	AUS	CAN	DFS	ITA	ZAF	NLD	USA	CHE
AUS	0.22							
CAN	0.52	6.42						
DFS	0.53	0.79	13.79					
ITA	0.56	0.82	0.71	1.40				
ZAF	0.51	0.52	0.52	0.55	12.14			
NLD	0.58	0.86	0.89	0.74	0.61	5.69		
USA	0.50	0.71	0.63	0.84	0.52	0.74	0.87	
CHE	0.63	0.67	0.62	0.61	0.55	0.70	0.57	13.13

JER	fan									
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	
AUS	0.22									
CAN	0.61	6.58								
DFS	0.62	0.87	12.79							
GBR	0.70	0.79	0.77	1.51						
ITA	0.62	0.74	0.68	0.70	1.55					
USA	0.62	0.88	0.82	0.85	0.79	0.86				
ZAF	0.65	0.65	0.66	0.81	0.65	0.74	9.50			
NLD	0.67	0.73	0.77	0.85	0.70	0.76	0.70	3.92		
CHE	0.65	0.82	0.82	0.71	0.69	0.75	0.66	0.71	12.02	

JER	fua									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.37									
CAN	0.72	5.76								
DFS	0.69	0.85	12.73							
GBR	0.74	0.94	0.86	1.68						
ITA	0.67	0.86	0.74	0.87	1.55					
NZL	0.80	0.71	0.73	0.80	0.69	0.42				
USA	0.73	0.94	0.86	0.92	0.90	0.71	1.46			
ZAF	0.69	0.90	0.87	0.92	0.78	0.74	0.89	11.83		
NLD	0.73	0.90	0.87	0.92	0.85	0.80	0.88	0.84	5.01	
CHE	0.77	0.92	0.85	0.87	0.80	0.71	0.87	0.88	0.89	12.24

JER	ruh									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.35									
CAN	0.72	6.78								
DFS	0.73	0.83	10.70							
GBR	0.79	0.79	0.83	1.39						
ITA	0.72	0.72	0.79	0.83	1.36					
NZL	0.71	0.71	0.76	0.76	0.81	0.41				
USA	0.77	0.83	0.90	0.90	0.83	0.74	1.23			
ZAF	0.82	0.70	0.77	0.86	0.84	0.77	0.83	9.13		
NLD	0.74	0.75	0.91	0.87	0.81	0.81	0.87	0.76	4.13	
CHE	0.78	0.91	0.84	0.82	0.71	0.76	0.84	0.74	0.82	12.67

JER	usu									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.38									
CAN	0.73	6.36								
DFS	0.71	0.84	13.47							
GBR	0.78	0.85	0.85	1.74						
ITA	0.65	0.76	0.75	0.83	1.66					
NZL	0.58	0.59	0.59	0.62	0.63	0.40				
USA	0.74	0.81	0.89	0.84	0.82	0.60	0.97			
ZAF	0.75	0.76	0.71	0.79	0.65	0.59	0.75	9.90		
NLD	0.81	0.81	0.87	0.91	0.79	0.61	0.88	0.78	4.64	
CHE	0.76	0.90	0.86	0.81	0.79	0.61	0.83	0.77	0.85	11.21

JER ude									
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0.35								
CAN	0.91	5.58							
DFS	0.88	0.93	12.19						
GBR	0.89	0.97	0.93	1.44					
ITA	0.91	0.95	0.94	0.94	1.73				
USA	0.88	0.95	0.95	0.94	0.96	1.76			
ZAF	0.87	0.89	0.89	0.89	0.88	0.88	10.29		
NLD	0.89	0.96	0.96	0.96	0.95	0.95	0.91	4.96	
CHE	0.93	0.95	0.93	0.92	0.95	0.95	0.89	0.96	10.11

JER ftp										
	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0.46									
CAN	0.89	6.26								
DFS	0.88	0.91	12.73							
GBR	0.90	0.94	0.88	1.35						
ITA	0.87	0.87	0.86	0.87	1.66					
NZL	0.87	0.92	0.87	0.88	0.87	0.31				
USA	0.86	0.95	0.91	0.94	0.86	0.88	1.31			
ZAF	0.87	0.93	0.87	0.92	0.87	0.90	0.90	10.06		
NLD	0.92	0.97	0.94	0.93	0.86	0.90	0.90	0.90	5.78	
CHE	0.92	0.95	0.93	0.91	0.87	0.89	0.90	0.88	0.96	10.05

JER ftl										
	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	NZL
AUS	0.33									
CAN	0.91	5.59								
DFS	0.92	0.91	13.89							
GBR	0.91	0.93	0.94	1.47						
ITA	0.90	0.92	0.91	0.93	1.79					
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	10.75			
NLD	0.92	0.93	0.96	0.97	0.91	0.95	0.93	4.36		
CHE	0.91	0.92	0.94	0.96	0.90	0.94	0.92	0.96	11.55	
NZL	0.92	0.95	0.92	0.94	0.91	0.93	0.93	0.93	0.93	0.52

JER rtp								
	AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE
AUS	0.32							
CAN	0.87	6.30						
DFS	0.87	0.94	13.08					
NZL	0.87	0.95	0.90	0.42				
ZAF	0.87	0.90	0.87	0.87	9.20			
NLD	0.89	0.96	0.95	0.92	0.87	5.44		
USA	0.87	0.93	0.95	0.87	0.86	0.94	1.33	
CHE	0.89	0.97	0.94	0.93	0.92	0.96	0.92	11.43

JER ocs									
	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE
AUS	0.77								
CAN	0.54	5.20							
DFS	0.50	0.62	12.48						
GBR	0.63	0.75	0.81	2.94					
ITA	0.48	0.70	0.72	0.79	1.31				
NZL	0.62	0.58	0.47	0.56	0.55	0.30			
USA	0.62	0.79	0.67	0.84	0.78	0.58	0.87		

NLD	0.56	0.71	0.86	0.87	0.80	0.63	0.81	3.80		
CHE	0.56	0.83	0.73	0.88	0.79	0.54	0.74	0.82	8.08	

 JER ous

	AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE	ITA
AUS	0.78								
CAN	0.67	6.31							
DFS	0.67	0.82	12.83						
GBR	0.73	0.81	0.70	1.47					
NZL	0.81	0.72	0.68	0.75	0.44				
USA	0.68	0.89	0.82	0.85	0.71	0.98			
NLD	0.70	0.88	0.87	0.78	0.80	0.86	5.28		
CHE	0.76	0.87	0.79	0.84	0.77	0.85	0.92	10.67	
ITA	0.69	0.83	0.88	0.78	0.71	0.85	0.84	0.86	1.71

 JER ofl

	AUS	CAN	DFS	GBR	ITA	USA	NLD	CHE
AUS	6.32							
CAN	0.47	4.98						
DFS	0.37	0.72	13.61					
GBR	0.63	0.62	0.63	1.31				
ITA	0.46	0.59	0.67	0.65	1.87			
USA	0.61	0.64	0.62	0.64	0.73	1.39		
NLD	0.45	0.66	0.64	0.72	0.68	0.66	5.63	
CHE	0.55	0.83	0.70	0.70	0.70	0.79	0.72	11.00

 RDC sta

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.68										
CAN	0.88	6.32									
DEU	0.88	0.97	13.18								
DFS	0.86	0.96	0.97	8.65							
GBR	0.92	0.96	0.96	0.93	1.31						
NOR	0.87	0.93	0.94	0.97	0.92	13.61					
NZL	0.90	0.89	0.86	0.89	0.92	0.92	0.50				
USA	0.89	0.97	0.96	0.94	0.97	0.91	0.89	2.28			
NLD	0.87	0.96	0.97	0.97	0.94	0.96	0.84	0.93	4.87		
CAM	0.92	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	6.08	
LVA	0.85	0.85	0.86	0.91	0.84	0.89	0.86	0.84	0.86	0.90	0.66

 RDC cwi

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR	LVA
AUS	0.40										
CAN	0.72	6.79									
DEU	0.72	0.88	11.61								
DFS	0.76	0.82	0.89	13.68							
GBR	0.83	0.87	0.90	0.88	1.61						
NZL	0.78	0.68	0.70	0.68	0.80	0.35					
USA	0.66	0.84	0.81	0.83	0.83	0.71	1.26				
NLD	0.72	0.92	0.92	0.89	0.91	0.69	0.82	5.40			
CAM	0.76	0.79	0.79	0.79	0.79	0.78	0.79	0.79	6.89		
NOR	0.83	0.79	0.81	0.89	0.82	0.82	0.82	0.87	0.79	14.46	
LVA	0.68	0.69	0.67	0.66	0.66	0.70	0.65	0.69	0.79	0.79	0.30

 RDC bde

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.50										
CAN	0.80	6.00									
DEU	0.76	0.87	10.03								

DFS	0.79	0.83	0.92	11.88							
GBR	0.78	0.86	0.92	0.90	1.59						
NOR	0.76	0.80	0.82	0.89	0.83	15.38					
NZL	0.77	0.70	0.73	0.73	0.75	0.82	0.35				
USA	0.70	0.76	0.89	0.84	0.89	0.82	0.73	1.27			
NLD	0.70	0.83	0.90	0.85	0.91	0.90	0.69	0.90	4.87		
CAM	0.85	0.82	0.84	0.83	0.83	0.83	0.84	0.83	0.83	5.89	
LVA	0.73	0.77	0.80	0.82	0.79	0.84	0.75	0.69	0.75	0.82	0.34

RDC ang

	AUS	CAN	DEU	DFS	GBR	USA	NLD	CAM	NOR	LVA
AUS	0.45									
CAN	0.66	6.82								
DEU	0.64	0.61	6.94							
DFS	0.71	0.73	0.68	9.06						
GBR	0.77	0.81	0.62	0.83	1.35					
USA	0.69	0.86	0.61	0.80	0.86	1.18				
NLD	0.73	0.82	0.61	0.74	0.82	0.74	5.56			
CAM	0.83	0.77	0.79	0.79	0.79	0.79	0.79	7.40		
NOR	0.71	0.75	0.79	0.63	0.77	0.78	0.77	0.77	16.06	
LVA	0.66	0.63	0.63	0.62	0.63	0.62	0.64	0.77	0.77	0.30

RDC ran

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.45										
CAN	0.90	5.68									
DEU	0.91	0.97	9.03								
DFS	0.90	0.95	0.95	10.02							
GBR	0.92	0.97	0.97	0.95	1.57						
NOR	0.90	0.94	0.90	0.91	0.93	12.10					
NZL	0.92	0.90	0.89	0.88	0.92	0.93	0.28				
USA	0.89	0.98	0.96	0.94	0.97	0.93	0.90	1.61			
NLD	0.90	0.97	0.98	0.96	0.97	0.94	0.89	0.96	5.63		
CAM	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	5.56	
LVA	0.89	0.92	0.92	0.90	0.91	0.89	0.89	0.90	0.91	0.92	0.42

RDC rwi

	AUS	CAN	DEU	DFS	GBR	NZL	USA	NLD	CAM	NOR	LVA
AUS	0.48										
CAN	0.84	6.42									
DEU	0.79	0.94	9.83								
DFS	0.80	0.93	0.92	10.49							
GBR	0.84	0.92	0.89	0.88	1.46						
NZL	0.82	0.89	0.81	0.87	0.90	0.33					
USA	0.77	0.90	0.85	0.89	0.93	0.87	1.39				
NLD	0.83	0.94	0.96	0.92	0.88	0.82	0.81	6.25			
CAM	0.86	0.87	0.86	0.88	0.87	0.88	0.87	0.87	6.74		
NOR	0.82	0.87	0.85	0.94	0.87	0.88	0.87	0.89	0.87	13.87	
LVA	0.79	0.82	0.82	0.85	0.78	0.80	0.77	0.82	0.86	0.86	0.41

RDC rls

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.23										
CAN	0.70	6.49									
DEU	0.71	0.94	9.13								
DFS	0.68	0.97	0.94	9.28							
GBR	0.78	0.77	0.85	0.77	1.53						
NOR	0.71	0.87	0.85	0.93	0.79	11.80					
NZL	0.67	0.67	0.68	0.67	0.69	0.73	0.12				
USA	0.68	0.92	0.93	0.93	0.82	0.83	0.67	0.89			
NLD	0.71	0.92	0.93	0.88	0.86	0.80	0.66	0.90	5.38		

CAN	0.75	5.79									
DEU	0.72	0.90	12.26								
DFS	0.66	0.75	0.79	13.03							
GBR	0.80	0.79	0.75	0.79	1.87						
NOR	0.65	0.71	0.66	0.72	0.76	12.16					
NZL	0.64	0.71	0.61	0.59	0.66	0.68	0.32				
USA	0.77	0.82	0.75	0.85	0.88	0.78	0.69	1.18			
NLD	0.78	0.81	0.79	0.89	0.92	0.75	0.58	0.91	4.52		
CAM	0.83	0.77	0.76	0.76	0.78	0.76	0.76	0.77	0.78	5.85	
LVA	0.63	0.64	0.62	0.60	0.73	0.67	0.67	0.67	0.67	0.76	0.32

RDC ude

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA
AUS	0.56									
CAN	0.88	5.63								
DEU	0.89	0.97	12.69							
DFS	0.88	0.96	0.94	10.67						
GBR	0.89	0.96	0.96	0.93	1.78					
NOR	0.89	0.91	0.90	0.88	0.92	14.23				
USA	0.87	0.96	0.95	0.95	0.96	0.92	1.28			
NLD	0.88	0.97	0.97	0.95	0.97	0.89	0.96	4.36		
CAM	0.91	0.92	0.93	0.92	0.92	0.92	0.92	0.92	4.54	
LVA	0.89	0.89	0.88	0.91	0.88	0.89	0.88	0.88	0.92	0.42

RDC ftp

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM	LVA
AUS	0.54										
CAN	0.92	6.06									
DEU	0.93	0.97	12.79								
DFS	0.89	0.95	0.93	11.92							
GBR	0.91	0.93	0.94	0.89	1.48						
NOR	0.88	0.91	0.89	0.93	0.91	14.19					
NZL	0.91	0.90	0.90	0.87	0.89	0.89	0.26				
USA	0.86	0.92	0.91	0.92	0.93	0.91	0.87	1.40			
NLD	0.92	0.98	0.97	0.95	0.94	0.89	0.91	0.90	4.54		
CAM	0.90	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.59	
LVA	0.88	0.87	0.87	0.87	0.87	0.89	0.88	0.86	0.87	0.91	0.39

RDC ft1

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA	NZL
AUS	0.58										
CAN	0.93	5.07									
DEU	0.93	0.94	13.87								
DFS	0.92	0.90	0.97	10.59							
GBR	0.94	0.93	0.97	0.93	1.44						
NOR	0.91	0.92	0.92	0.94	0.93	12.55					
USA	0.94	0.93	0.95	0.93	0.97	0.93	1.64				
NLD	0.92	0.93	0.98	0.97	0.97	0.95	0.95	5.23			
CAM	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	7.28		
LVA	0.90	0.91	0.90	0.90	0.90	0.94	0.89	0.90	0.93	0.47	
NZL	0.94	0.94	0.93	0.92	0.93	0.93	0.93	0.93	0.93	0.90	0.41

RDC rtp

	AUS	CAN	DEU	DFS	NOR	NZL	NLD	USA	CAM	LVA
AUS	0.39									
CAN	0.88	5.99								
DEU	0.89	0.96	13.83							
DFS	0.87	0.93	0.96	12.28						
NOR	0.88	0.90	0.89	0.87	13.14					
NZL	0.91	0.95	0.92	0.88	0.89	0.35				
NLD	0.90	0.97	0.98	0.96	0.88	0.93	5.39			

USA	0.88	0.91	0.95	0.91	0.91	0.89	0.96	1.40		
CAM	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.91	6.11	
LVA	0.89	0.89	0.89	0.88	0.88	0.89	0.91	0.87	0.91	0.38

RDC ocs

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	1.10									
CAN	0.64	4.73								
DEU	0.53	0.74	20.57							
DFS	0.59	0.60	0.71	10.51						
GBR	0.65	0.73	0.87	0.74	1.61					
NOR	0.52	0.69	0.69	0.69	0.75	16.33				
NZL	0.72	0.56	0.62	0.52	0.65	0.63	0.27			
USA	0.62	0.76	0.82	0.72	0.87	0.75	0.71	0.56		
NLD	0.59	0.71	0.86	0.82	0.88	0.74	0.65	0.86	3.53	
CAM	0.73	0.75	0.75	0.76	0.76	0.75	0.73	0.78	0.78	6.29

RDC ous

	AUS	CAN	DEU	DFS	GBR	NOR	NZL	USA	NLD	CAM
AUS	1.48									
CAN	0.71	5.32								
DEU	0.75	0.87	17.07							
DFS	0.68	0.78	0.81	10.78						
GBR	0.83	0.79	0.82	0.71	1.59					
NOR	0.72	0.80	0.80	0.79	0.82	13.05				
NZL	0.83	0.82	0.78	0.73	0.81	0.75	0.36			
USA	0.75	0.88	0.84	0.85	0.86	0.82	0.87	0.96		
NLD	0.71	0.88	0.90	0.85	0.77	0.80	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	6.61

RDC ofl

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	
AUS	0.66									
CAN	0.37	4.41								
DEU	0.42	0.73	16.47							
DFS	0.38	0.80	0.82	13.86						
GBR	0.54	0.67	0.73	0.66	1.43					
NOR	0.46	0.70	0.70	0.58	0.76	13.00				
USA	0.58	0.60	0.74	0.64	0.69	0.75	1.30			
NLD	0.47	0.67	0.76	0.65	0.73	0.76	0.68	7.05		
CAM	0.56	0.75	0.75	0.75	0.75	0.75	0.75	0.75	6.90	

^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	141	86	139	42	158	123	26	20
CHE	123	0	184	510	72	282	557	62	18
FRA	79	145	0	213	64	104	211	41	14
ITA	120	452	176	0	97	221	618	77	19
NLD	34	69	53	77	0	63	88	28	12
USA	148	251	79	162	50	0	236	27	20
DEA	103	461	166	533	77	190	0	72	15
SVN	24	59	42	71	28	23	67	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  133  52  139  35  158  121  26  20
CHE  116    0  116  455  67  253  494  62  18
FRA   47   86    0  128  45   65  140  41  10
ITA  120  398  105    0  89  221  582  78  19
NLD   30   66  41   73    0  49   82  28  12
USA  148  218  46  162  41    0  218  27  20
DEA  102  402  107  496  75  165    0  73  14
SVN   24   59  42   72  28  23   68    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  141  86  139  35  123  23  20  158
CHE  123    0  184  510  71  557  48  18  282
FRA   79  145    0  213  58  211  37  14  104
ITA  120  452  176    0  89  618  67  19  221
NLD   30   69  50   73    0  83  27  12  49
DEA  103  461  166  533  76    0  60  15  236
SVN   21   46  38   61  27  56    0   6  22
GBR   17   16  13   17  10  13    4    0  20
USA  148  251  79  162  41  190  20  18   0
-----

```

```

BSW
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  CHE  FRA  NLD  USA  GBR
-----
CAN    0  140  85  24  157  20
CHE  123    0  178  49  280  18
FRA   78  141    0  41  103  14
NLD   21   50  37    0  34   9
USA  147  251  78  30    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  141  86  139  42  158  123  26  20
CHE  123    0  184  510  72  282  557  62  18
FRA   79  145    0  213  64  104  211  41  14
ITA  120  452  176    0  97  221  618  77  19
NLD   34   69  53   77    0  63   88  28  12
USA  148  251  79  162  50    0  236  27  20
DEA  103  461  166  533  77  190    0  72  15
SVN   24   59  42   71  28  23   67    0   6
GBR   17   16  13   17  10  18   13    4   0
-----

```

```

BSW
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  CHE  FRA  NLD  USA  DEA  GBR  SVN  ITA
-----
CAN    0  141  52  42  158  123  20  23  135
CHE  123    0  116  72  282  557  18  48  503
FRA   47   86    0  45   65  140  10  37  128
NLD   34   69  41    0  63   88  12  27  95
-----

```

USA	148	251	46	50	0	236	20	22	207
DEA	103	461	108	77	190	0	15	60	612
GBR	17	16	9	10	18	13	0	6	19
SVN	21	46	38	27	20	56	4	0	67
ITA	117	446	105	76	148	525	17	61	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal
CAN CHE FRA ITA NLD USA DEA SVN GBR

CAN	0	141	86	139	42	158	123	26	20
CHE	123	0	184	510	72	282	557	62	18
FRA	79	145	0	213	64	104	211	41	14
ITA	120	452	176	0	97	221	618	77	19
NLD	34	69	53	77	0	63	88	28	12
USA	148	251	79	162	50	0	236	27	20
DEA	103	461	166	533	77	190	0	72	15
SVN	24	59	42	71	28	23	67	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	141	86	139	34	158	123	26	20
CHE	123	0	184	510	70	282	557	62	18
FRA	79	145	0	213	58	104	211	41	14
ITA	120	452	176	0	88	221	618	77	19
NLD	29	68	50	72	0	48	82	28	12
USA	148	251	79	162	39	0	236	27	20
DEA	103	461	166	533	75	190	0	72	15
SVN	24	59	42	71	28	23	67	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	141	86	135	34	123	26	158
CHE	123	0	184	504	70	557	62	282
FRA	79	145	0	212	58	211	41	104
ITA	117	447	176	0	87	612	77	207
NLD	29	68	50	71	0	82	28	48
DEA	103	461	166	525	75	0	72	236
SVN	24	59	42	71	28	67	0	27
USA	148	251	79	148	39	190	23	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal
CAN CHE FRA ITA NLD USA DEA SVN GBR

CAN	0	141	52	96	34	158	91	26	20
CHE	123	0	116	339	71	281	364	62	18
FRA	47	86	0	120	43	65	130	41	10
ITA	85	291	98	0	65	123	336	72	16
NLD	29	69	39	58	0	47	69	28	12
USA	148	251	46	89	39	0	140	27	20
DEA	77	295	100	299	63	101	0	72	12
SVN	24	59	42	67	28	23	67	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  141  86  139  35  158  123  26  20
CHE  123   0  184  510  71  282  557  62  18
FRA   79  145   0  213  57  104  211  41  14
ITA  120  452  176   0  86  221  618  78  19
NLD   30   69  49   70   0  48   81  28  12
USA  148  251  79  162  40   0  236  27  20
DEA  103  461  166  533  74  190   0  73  15
SVN   24   59  42   72  28  23   68   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  141  86  139  35  158  123  26
CHE  123   0  184  510  71  282  557  62
FRA   79  145   0  213  57  104  211  41
ITA  120  452  176   0  86  221  618  78
NLD   30   69  49   70   0  48   81  28
USA  148  251  79  162  40   0  236  27
DEA  103  461  166  533  74  190   0  73
SVN   24   59  42   72  28  23   68   0
-----

```

```

BSW
-----
common bulls below diagonal
common three quarter sib group above diagonal
  CAN  CHE  FRA  ITA  NLD  USA  DEA  SVN  GBR
-----
CAN   0  141  86  139  42  158  123  26  20
CHE  123   0  184  510  72  282  557  62  18
FRA   79  145   0  213  63  104  211  41  14
ITA  120  452  176   0  94  221  618  78  19
NLD   34   69  52   74   0  62   86  28  12
USA  148  251  79  162  49   0  236  27  20
DEA  103  461  166  533  75  190   0  73  15
SVN   24   59  42   72  28  23   68   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  141  86  139  43  156  123  26  20
CHE  123   0  184  510  74  282  557  62  18
FRA   79  145   0  213  65  104  211  41  14
ITA  120  452  176   0  99  221  618  78  19
NLD   35   70  53   78   0  63   91  28  12
USA  147  251  79  162  50   0  236  27  20
DEA  103  461  166  533  80  190   0  73  15
SVN   24   59  42   72  28  23   68   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	141	86	43	158	112	26	20	127
CHE	123	0	184	74	282	525	62	18	468
FRA	79	145	0	65	104	198	41	14	196
NLD	35	70	53	0	63	85	28	12	89
USA	148	251	79	50	0	211	27	20	177
DEA	95	430	156	78	162	0	73	14	524
SVN	24	59	42	28	23	68	0	6	77
GBR	17	16	13	10	18	13	4	0	19
ITA	110	415	162	73	129	460	71	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	141	86	139	42	158	123	26	20
CHE	123	0	184	510	72	282	557	62	18
FRA	79	145	0	213	63	104	211	41	14
ITA	120	452	176	0	94	219	618	78	19
NLD	34	69	52	74	0	62	86	28	12
USA	148	251	79	161	49	0	236	27	20
DEA	103	461	166	533	75	190	0	73	15
SVN	24	59	42	72	28	23	68	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	141	86	96	31	91	26	158	
CHE	123	0	181	339	69	364	62	281	
FRA	79	142	0	144	56	151	41	104	
ITA	85	291	118	0	69	336	72	123	
NLD	27	68	48	62	0	73	28	43	
DEA	77	295	113	299	68	0	72	140	
SVN	24	59	42	67	28	67	0	27	
USA	148	251	79	89	36	101	23	0	

BSW

common bulls below diagonal									
common three quarter sib group above diagonal									
	CAN	CHE	FRA	ITA	NLD	USA	DEA	SVN	GBR
CAN	0	133	75	139	42	158	91	26	20
CHE	116	0	146	454	67	253	359	61	18
FRA	70	113	0	173	55	87	142	40	14
ITA	120	396	145	0	95	218	372	75	19
NLD	34	66	49	77	0	63	71	28	12
USA	148	218	66	162	50	0	140	27	20
DEA	77	291	110	334	65	101	0	70	12
SVN	24	58	41	69	28	23	65	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	133	75	139	42	157	123	26	20
CHE	116	0	146	455	67	253	502	61	18
FRA	70	113	0	174	54	87	177	41	14
ITA	120	398	145	0	94	221	611	77	19
NLD	34	66	48	74	0	62	86	28	12
USA	147	218	66	162	49	0	234	27	20

DEA	102	412	139	529	75	186	0	73	15
SVN	24	58	42	71	28	23	68	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  133  75  135  42  158  123  26  20
CHE  116   0  146  454  67  253  502  62  18
FRA   70  113   0  173  55   87  177  41  14
ITA  117  397  145   0  95  207  606  77  19
NLD   34   66  49   76   0   63   88  28  12
USA  148  218   66  148  50   0  234  27  20
DEA  102  412  139  522  77  186   0  72  15
SVN   24   59  42   71  28  23   67   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  132  122  97  25  159  53
CHE  115   0  496  339  62  252  116
DEA  103  409   0  376  71  230  140
ITA   86  290  324   0  70  123  120
SVN   24   59   66  65   0  27  40
USA  148  218  185  89  23   0  65
FRA   48   86  108  98  41  46   0

```

BSW

```

common bulls below diagonal
common three quarter sib group above diagonal
  CAN  CHE  DEA  ITA  SVN  USA  FRA
-----
CAN   0  139  124  140  26  87
CHE  122   0  557  510  61  184
DEA  103  461   0  616  72  210
ITA  121  452  532   0  77  211
SVN   24   59   68  72   0  41
FRA   80  145  166  175  42   0

```

BSW

```

common bulls below diagonal
common three quarter sib group above diagonal
  CAN  CHE  DEA  ITA  SVN  USA  FRA
-----
CAN   0  132  101  97  25  159  53
CHE  115   0  394  339  62  252  116
DEA   87  322   0  343  70  168  132
ITA   86  290  306   0  70  123  120
SVN   24   59   65  65   0  27  40
USA  148  218  125  89  23   0  65
FRA   48   86  102  98  41  46   0

```

BSW

```

common bulls below diagonal
common three quarter sib group above diagonal

```

	CHE	DEA	ITA	SVN	USA	FRA
CHE	0	539	339	48	281	182
DEA	446	0	375	59	221	205
ITA	291	323	0	60	123	144
SVN	46	55	55	0	22	36
USA	251	174	89	20	0	103
FRA	144	163	118	37	79	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	USA	FRA
CAN	0	89	74	78	24	91	41
CHE	76	0	394	339	58	252	116
DEA	61	322	0	343	67	168	132
ITA	69	290	306	0	63	123	120
SVN	23	55	62	59	0	25	40
USA	81	218	125	89	21	0	65
FRA	36	86	102	98	41	46	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CAN	CHE	DEA	ITA	SVN	FRA
CAN	0	139	124	136	26	87
CHE	122	0	557	504	61	184
DEA	103	461	0	610	71	210
ITA	118	447	524	0	76	210
SVN	24	59	67	71	0	41
FRA	80	145	166	175	42	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	556	507	61	180
DEA	460	0	616	72	208
ITA	449	532	0	77	208
SVN	59	68	72	0	41
FRA	142	165	174	42	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	330	314	61	129
DEA	280	0	334	71	150
ITA	275	299	0	72	141
SVN	59	67	67	0	41
FRA	101	112	116	42	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal

	CHE	DEA	ITA	SVN	FRA
CHE	0	556	501	60	180
DEA	460	0	610	72	208
ITA	444	524	0	76	207

```
SVN  58  68  71  0  41
FRA 142 165 174 42  0
```

BSW

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

```
-----
CHE   0  363  337  61  111
DEA 294   0  335  71  128
ITA 289 299   0  72  118
SVN  59  67  67   0  41
FRA  84  99  96  42   0
```

GUE

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

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

GUE

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

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

GUE

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

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

GUE

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

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

GUE

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

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

GUE

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

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

GUE

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

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

GUE

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

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

GUE

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

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

GUE

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

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

GUE

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

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

GUE

common bulls below diagonal

common three quarter sib group above diagonal
CAN GBR USA AUS

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

GUE

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

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

GUE

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

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

GUE

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

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

GUE

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

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

GUE

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

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

GUE

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

CAN	0	23	64	19
-----	---	----	----	----

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  505  750  302  617  709  624  924  724  419  275  351  207  543  379  575  133  86  261  216  450
CHE  508    0  905  247  587  720  718  808  911  405  298  329  226  753  343  560  122  84  259  206  440
DEU  722  768    0  802 1644 1566 2128 2221 2378 1293  788  436  468 1682  777 1318  329 236  677  288 1467
DFS  241  201  368    0  495  625  531  788  686  437  220  276  133  322  270  419  82  61  225  195  421
FRA  622  532 1022  259    0 1034 1305 1246 1406  877  627  352  387 1025  599  993  196 141  552  230 1150
GBR  730  706 1128  352  795    0 1481 1605 2180  850  569  665  410 1307  646 1086  202 169  517  360  970
ITA  640  656 1438  365  938 1295    0 1450 2378 1116  765  418  533 1699  786 1288  260 206  682  259 1255
NLD 1005  790 1756  504  975 1379 1298    0 1923 1177  566  569  384 1088  666 1069  234 207  513  467 1118
USA  658  846 1451  343  892 2046 2036 1546    0 1327 1000  544  704 2621  918 1567  226 210  791  361 1388
CZE  324  288  928  231  594  614  872 1046 1043    0  505  281  385  892  540  752  201  140  556  202  923
JPN  182  190  300  107  267  293  345  296  407  210    0  181  367  726  378  598  121  92  377  153  558
IRL  357  329  380  206  342  729  399  542  526  215  136    0  130  341  217  378  84  54  183  242  275
KOR  154  169  309  78  270  303  453  277  801  273  206  95    0  570  351  417  105  74  319  118  438
CAN  565  693 1232  247  831 1406 1572 1119 2962  692  365  357  550    0  727 1105  202 165  628  231  994
PRT  371  300  675  197  559  571  787  642  973  443  228  184  303  749    0  601  146  108  416  171  663
ESP  576  460  741  275  804  890  972  925 1062  505  261  377  291  804  549  0  183 133  509  245  802
SVN  102  87  314  55  148  148  227  198  178  143  54  65  66  157  110  126  0  58  123  61  223
EST  53  42  141  26  72  98  123  140  139  78  32  31  33  104  67  61  31  0  98  40  188
HUN  210  208  470  148  384  411  574  392  724  472  175  152  244  603  406  364  90  55  0  130  542
NZL  181  181  242  127  193  301  230  430  315  148  115  202  92  233  145  210  44  20  99  0  172
POL  364  322 1032  255  786  791 1009  902 1252  680  232  221  330  870  640  519  178  114  447  131  0
-----

```

JER

```

-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  GBR  ITA  NZL  USA  ZAF  NLD  CHE
-----
AUS    0  157  92  106  35  154  260  136  18  17
CAN  163    0  104  141  37  78  469  149  15  25
DFS   69  92    0  112  47  97  165  130  23  34
GBR  104  145  108    0  43  77  177  116  18  35
ITA   35  35  46  41    0  33  47  47  10  16
NZL  156  79  76  79  30    0  151  105  18  20
USA  255  472  134  184  50  157    0  259  38  39
ZAF  140  149  113  114  48  101  266  0  28  26
NLD  14  10  17  15  7  15  38  23  0  4
CHE   15  23  33  33  17  18  39  25  3  0
-----

```

JER

```

-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  GBR  ITA  NZL  USA  ZAF  NLD  CHE
-----
AUS    0  157  92  106  35  154  260  129  18  24
CAN  163    0  104  141  37  78  469  138  15  30
DFS   69  92    0  112  47  97  165  121  23  44
GBR  104  145  108    0  43  77  177  111  18  42
ITA   35  35  46  41    0  33  47  47  10  23
NZL  156  79  76  79  30    0  151  96  18  26
USA  255  472  134  184  50  157    0  239  38  46
ZAF  134  140  107  110  48  93  248  0  28  38
NLD  14  10  17  15  7  15  38  23  0  8
CHE   22  29  43  41  24  24  47  37  6  0
-----

```

JER

```

-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DFS  GBR  ITA  NZL  ZAF  NLD  USA  CHE
-----
AUS    0  157  92  106  35  154  129  18  260  28
-----

```

CAN	163	0	104	141	37	78	138	15	469	34
DFS	69	92	0	112	47	97	121	23	165	47
GBR	104	145	108	0	43	77	111	18	177	45
ITA	35	35	46	41	0	33	47	10	47	26
NZL	156	79	76	79	30	0	96	18	151	30
ZAF	134	140	107	110	48	93	0	28	239	42
NLD	14	10	17	15	7	15	23	0	38	10
USA	255	472	134	184	50	157	248	38	0	50
CHE	25	31	46	44	26	28	40	7	51	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0	157	89	105	35	260	135	6	28
CAN	163	0	104	141	37	469	149	7	34
DFS	67	92	0	110	47	165	129	12	47
GBR	103	145	106	0	43	177	116	12	45
ITA	35	35	46	41	0	47	47	5	26
USA	255	472	134	184	50	0	258	21	50
ZAF	139	149	112	114	48	265	0	13	42
NLD	3	5	11	10	4	19	11	0	5
CHE	25	31	46	44	26	51	40	5	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	157	92	106	35	154	260	136	18	28
CAN	163	0	104	141	37	78	469	149	15	34
DFS	69	92	0	112	47	97	165	130	23	47
GBR	104	145	108	0	43	77	177	116	18	45
ITA	35	35	46	41	0	33	47	47	10	26
NZL	156	79	76	79	30	0	151	105	18	30
USA	255	472	134	184	50	157	0	259	38	50
ZAF	140	149	113	114	48	101	266	0	28	42
NLD	14	10	17	15	7	15	38	23	0	10
CHE	25	31	46	44	26	28	51	40	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	157	87	106	35	154	260	136	18	28
CAN	163	0	93	141	37	78	469	149	15	34
DFS	61	78	0	108	44	90	154	123	21	46
GBR	104	145	101	0	43	77	177	116	18	45
ITA	35	35	41	41	0	33	47	47	10	26
NZL	156	79	68	79	30	0	151	105	18	30
USA	255	472	120	184	50	157	0	259	38	50
ZAF	140	149	103	114	48	101	266	0	28	42
NLD	14	10	15	15	7	15	38	23	0	10
CHE	25	31	45	44	26	28	51	40	7	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	157	92	106	35	154	260	136	18	28
CAN	163	0	104	141	37	78	469	149	15	34
DFS	69	92	0	112	47	97	165	130	23	47

GBR	104	145	108	0	43	77	177	116	18	45
ITA	35	35	46	41	0	33	47	47	10	26
NZL	156	79	76	79	30	0	151	105	18	30
USA	255	472	134	184	50	157	0	259	38	50
ZAF	140	149	113	114	48	101	266	0	28	42
NLD	14	10	17	15	7	15	38	23	0	10
CHE	25	31	46	44	26	28	51	40	7	0

JER

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

AUS	0	157	84	35	107	18	260	28
CAN	163	0	93	37	124	15	469	34
DFS	59	78	0	44	93	21	154	46
ITA	35	35	41	0	44	10	47	26
ZAF	109	120	79	44	0	25	204	42
NLD	14	10	15	7	18	0	38	10
USA	255	472	120	50	202	38	0	50
CHE	25	31	45	26	40	7	51	0

JER

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

AUS	0	157	89	105	35	260	135	18	28
CAN	163	0	104	141	37	469	149	15	34
DFS	67	92	0	110	47	165	129	23	47
GBR	103	145	106	0	43	177	116	18	45
ITA	35	35	46	41	0	47	47	10	26
USA	255	472	134	184	50	0	258	38	50
ZAF	139	149	112	114	48	265	0	28	42
NLD	14	10	17	15	7	38	23	0	10
CHE	25	31	46	44	26	51	40	7	0

JER

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

AUS	0	157	92	106	35	154	260	136	17	28
CAN	163	0	104	141	37	78	469	149	13	34
DFS	69	92	0	112	47	97	165	130	22	47
GBR	104	145	108	0	43	77	177	116	16	45
ITA	35	35	46	41	0	33	47	47	10	26
NZL	156	79	76	79	30	0	151	105	17	30
USA	255	472	134	184	50	157	0	259	34	50
ZAF	140	149	113	114	48	101	266	0	26	42
NLD	13	8	16	13	7	14	34	21	0	10
CHE	25	31	46	44	26	28	51	40	7	0

JER

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

AUS	0	157	84	106	35	154	260	136	17	28
CAN	163	0	87	141	37	78	469	149	13	34
DFS	59	76	0	99	44	83	147	118	20	46
GBR	104	145	97	0	43	77	177	116	16	45
ITA	35	35	41	41	0	33	47	47	10	26
NZL	156	79	63	79	30	0	151	105	17	30
USA	255	472	115	184	50	157	0	259	34	50

ZAF	140	149	101	114	48	101	266	0	26	42
NLD	13	8	14	13	7	14	34	21	0	10
CHE	25	31	45	44	26	28	51	40	7	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	157	92	106	35	154	260	136	17	28
CAN	163	0	104	141	37	78	469	149	13	34
DFS	69	92	0	112	47	97	165	130	22	47
GBR	104	145	108	0	43	77	177	116	16	45
ITA	35	35	46	41	0	33	47	47	10	26
NZL	156	79	76	79	30	0	151	105	17	30
USA	255	472	134	184	50	157	0	259	34	50
ZAF	140	149	113	114	48	101	266	0	26	42
NLD	13	8	16	13	7	14	34	21	0	10
CHE	25	31	46	44	26	28	51	40	7	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0	157	90	105	35	260	136	18	28
CAN	163	0	104	141	37	466	149	15	34
DFS	68	92	0	110	47	165	130	30	47
GBR	103	145	106	0	43	177	116	22	45
ITA	35	35	46	41	0	47	47	10	26
USA	255	470	134	184	50	0	258	38	50
ZAF	140	149	113	114	48	265	0	30	42
NLD	14	10	24	19	7	38	25	0	12
CHE	25	31	46	44	26	51	40	9	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	ZAF	NLD	CHE
AUS	0	157	92	106	35	154	260	136	18	28
CAN	163	0	104	141	37	78	469	149	15	34
DFS	69	92	0	112	46	97	165	130	30	47
GBR	104	145	108	0	43	77	177	116	22	45
ITA	35	35	45	41	0	33	46	47	10	26
NZL	156	79	76	79	30	0	151	105	18	30
USA	255	472	134	184	49	157	0	259	38	50
ZAF	140	149	113	114	48	101	266	0	30	42
NLD	14	10	24	19	7	15	38	25	0	12
CHE	25	31	46	44	26	28	51	40	9	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE	NZL
AUS	0	157	89	105	35	260	128	17	28	20
CAN	163	0	104	141	37	469	138	13	34	14
DFS	67	92	0	110	47	165	120	22	47	20
GBR	103	145	106	0	43	177	111	16	45	13
ITA	35	35	46	41	0	47	47	10	26	3
USA	255	472	134	184	50	0	239	34	50	17
ZAF	133	140	106	110	48	248	0	26	42	15
NLD	13	8	16	13	7	34	21	0	10	3
CHE	25	31	46	44	26	51	40	7	0	6

NZL 20 13 19 12 1 15 13 1 5 0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	NZL	ZAF	NLD	USA	CHE
AUS	0	157	76	154	126	18	260	28
CAN	163	0	82	78	135	15	469	34
DFS	54	73	0	76	105	28	140	46
NZL	156	79	58	0	92	18	151	30
ZAF	129	134	89	85	0	30	234	42
NLD	14	10	22	15	25	0	38	12
USA	255	472	110	157	235	38	0	50
CHE	25	31	45	28	40	9	51	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	ITA	NZL	USA	NLD	CHE
AUS	0	157	92	35	35	154	260	18	24
CAN	163	0	104	37	37	78	469	15	30
DFS	69	92	0	32	47	97	165	23	44
GBR	40	42	30	0	12	35	37	4	3
ITA	35	35	46	13	0	33	47	10	23
NZL	156	79	76	39	30	0	151	18	26
USA	255	472	134	40	50	157	0	38	46
NLD	14	10	17	5	7	15	38	0	8
CHE	22	29	43	4	24	24	47	6	0

JER

common bulls below diagonal
common three quarter sib group above diagonal

	AUS	CAN	DFS	GBR	NZL	USA	NLD	CHE	ITA
AUS	0	157	89	106	154	260	17	24	35
CAN	163	0	98	141	78	466	13	30	37
DFS	67	90	0	102	89	158	22	44	46
GBR	104	145	103	0	74	177	16	42	43
NZL	156	79	70	76	0	151	17	26	33
USA	255	470	129	184	157	0	34	46	46
NLD	13	8	16	13	14	34	0	8	10
CHE	22	29	43	41	24	47	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	104	141	37	469	15	30
DFS	53	92	0	110	47	165	23	44
GBR	81	145	106	0	43	177	18	42
ITA	31	35	46	41	0	47	10	23
USA	201	472	134	184	50	0	38	46
NLD	11	10	17	15	7	38	0	8
CHE	17	29	43	41	24	47	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  LVA
-----
AUS   0   27   13   55   12   18   25   16   10   5   17
CAN   27   0   11  150   77   5   34  155   4   0   10
DEU   13   11   0   58   4   12   11   4   14   0   30
DFS   43  151   49   0   60  88   59   83   36   0  127
GBR   10   76   4   55   0   0   27   64   1   0   3
NOR   14   5   11  68   0   0   6   0   27   0  11
NZL   24   32  11   57   24   5   0   23   3   2   7
USA   16  150   4   80   60   0   22   0   2   0   4
NLD   10   4   13  35   1  26   3   2   0   0  12
CAM    5   0   0   0   0   0   2   0   0   0   0
LVA   16  10   24  89   3   9   7   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   27   13   55   12   25   16   10   5  11  16
CAN   27   0   11  150   77   34  155   4   0   3  10
DEU   13   11   0   58   4   11   4   14   0   6  28
DFS   43  151   49   0   60  57  83   34   0  54 108
GBR   10   76   4   55   0   27   64   1   0   0   3
NZL   24   32  11   55   24   0   23   3   2   3   6
USA   16  150   4   80   60  22   0   2   0   0   4
NLD   10   4   13  33   1   3   2   0   0  17  11
CAM    5   0   0   0   0   2   0   0   0   0   0
NOR   10   2   5  41   0   3   0  16   0   0   1
LVA   15  10   22  74   3   6   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   27   13   55   12   11   25   16   10   5  17
CAN   27   0   11  150   77   2   34  153   4   0  10
DEU   13   11   0   58   4   7   11   4   14   0  30
DFS   43  151   49   0   60  64  57   83   34   0 127
GBR   10   76   4   55   0   0   27   63   1   0   3
NOR   10   2   6  48   0   0   3   0   22   0   2
NZL   24   32  11   55   24   3   0   23   3   2   7
USA   16  149   4   80  59   0  22   0   2   0   4
NLD   10   4   13  33   1  21   3   2   0   0  12
CAM    5   0   0   0   0   0   2   0   0   0   0
LVA   16  10   24  89   3   1   7   4  11   0   0
-----

```

```

RDC
-----
common bulls below diagonal
common three quarter sib group above diagonal
  AUS  CAN  DEU  DFS  GBR  USA  NZL  CAM  NOR  LVA
-----
AUS   0   27   3   55   12   16  10   5  12  17
CAN   27   0   0  150   77  155   4   0   4  10
DEU   3   0   0   18   0   0   2   0   3   2
DFS   43  151  16   0   60  83  33   0  64 127
GBR   10   76   0   55   0  64   1   0   0   3
USA   16  150   0   80   60   0   2   0   0   4
NLD   10   4   2  32   1   2   0   0  17  11
CAM    5   0   0   0   0   0   0   0   0   0
NOR   11   3   3  52   0   0  16   0   0   2
LVA   16  10   1  89   3   4  10   0   1   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   27   13   55   12   20   25   16   10   5   17
CAN  27   0   11  150   77   5   34  155   4   0   10
DEU  13  11   0   58   4   12   11   4   14   0   30
DFS  43 151  49   0   60  98  56  83  35   0  127
GBR  10  76   4   55   0   0   27  64   1   0   3
NOR  16   5  11  76   0   0   7   0  27   0  12
NZL  24  32  11  52  24   6   0  23   3   2   7
USA  16 150   4   80  60   0  22   0   2   0   4
NLD  10   4  13  34   1  26   3   2   0   0  12
CAM   5   0   0   0   0   0   2   0   0   0   0
LVA  16  10  24  89   3  10   7   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   27   13   55   12   25   16   10   5  11  17
CAN  27   0  11  150   77  34  155   4   0   2  10
DEU  13  11   0   58   4  11   4  14   0   6  30
DFS  43 151  49   0   60  57  83  35   0  52 127
GBR  10  76   4   55   0  27  64   1   0   0   3
NZL  24  32  11  55  24   0  23   3   2   3   7
USA  16 150   4   80  60  22   0   2   0   0   4
NLD  10   4  13  34   1   3   2   0   0  17  12
CAM   5   0   0   0   0   2   0   0   0   0   0
NOR  10   2   5  39   0   3   0  16   0   0   1
LVA  16  10  24  89   3   7   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   27   13   55   12   20   25   16   10   5  17
CAN  27   0  11  150   77   5  34  155   4   0  10
DEU  13  11   0   58   4  12  11   4  14   0  30
DFS  43 151  49   0   60 101  59  83  36   0 127
GBR  10  76   4   55   0   0  27  64   1   0   3
NOR  16   5  11  78   0   0   7   0  27   0  12
NZL  24  32  11  57  24   6   0  23   3   2   7
USA  16 150   4   80  60   0  22   0   2   0   4
NLD  10   4  13  35   1  26   3   2   0   0  12
CAM   5   0   0   0   0   0   2   0   0   0   0
LVA  16  10  24  89   3  10   7   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
-----
AUS   0   27   13   55   20  10  16   5  16
CAN  27   0  11  149   5   4  155   0  10
DEU  13  11   0   58  12  14   4   0  28
DFS  43 150  49   0  98  33  83   0 108
NOR  16   5  11  76   0  27   0   0  10
NLD  10   4  13  32  26   0   2   0  11
USA  16 150   4   80   0   2   0   0   4
CAM   5   0   0   0   0   0   0   0   0
-----

```

LVA 15 10 22 74 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	27	10	55	12	20	16	10	5	17
CAN	27	0	9	150	77	5	155	4	0	10
DEU	10	9	0	49	4	11	4	14	0	17
DFS	43	151	43	0	60	98	83	34	0	127
GBR	10	76	4	55	0	0	64	1	0	3
NOR	16	5	10	76	0	0	0	27	0	12
USA	16	150	4	80	60	0	0	2	0	4
NLD	10	4	13	33	1	26	2	0	0	12
CAM	5	0	0	0	0	0	0	0	0	0
LVA	16	10	14	89	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	27	13	55	12	20	25	16	10	5	17
CAN	27	0	11	150	77	5	34	155	4	0	10
DEU	13	11	0	58	4	12	11	4	12	0	30
DFS	43	151	49	0	60	101	59	83	32	0	127
GBR	10	76	4	55	0	0	27	64	1	0	3
NOR	16	5	11	78	0	0	7	0	24	0	12
NZL	24	32	11	57	24	6	0	23	2	2	7
USA	16	150	4	80	60	0	22	0	2	0	4
NLD	10	4	11	31	1	23	2	2	0	0	12
CAM	5	0	0	0	0	0	2	0	0	0	0
LVA	16	10	24	89	3	10	7	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	27	13	55	12	20	25	16	10	5	17
CAN	27	0	11	150	77	5	34	155	4	0	10
DEU	13	11	0	58	4	12	11	4	12	0	30
DFS	43	151	49	0	60	98	57	83	32	0	121
GBR	10	76	4	55	0	0	27	64	1	0	3
NOR	16	5	11	76	0	0	7	0	24	0	12
NZL	24	32	11	54	24	6	0	23	2	2	7
USA	16	150	4	80	60	0	22	0	2	0	4
NLD	10	4	11	31	1	23	2	2	0	0	12
CAM	5	0	0	0	0	0	2	0	0	0	0
LVA	16	10	24	85	3	10	7	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	27	13	55	12	20	25	16	10	5	17
CAN	27	0	11	150	77	5	34	155	4	0	10
DEU	13	11	0	58	4	13	11	4	12	0	30
DFS	43	151	49	0	60	93	59	83	34	0	127
GBR	10	76	4	55	0	0	27	64	1	0	3
NOR	16	5	12	73	0	0	7	0	24	0	12
NZL	24	32	11	57	24	6	0	23	2	2	7
USA	16	150	4	80	60	0	22	0	2	0	4

NLD	10	4	11	33	1	23	2	2	0	0	12
CAM	5	0	0	0	0	0	2	0	0	0	0
LVA	16	10	24	89	3	10	7	4	11	0	0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA
AUS	0	27	13	55	12	20	16	10	5	17
CAN	27	0	11	150	77	5	152	4	0	10
DEU	13	11	0	58	4	12	4	14	0	30
DFS	43	151	49	0	60	101	83	41	0	127
GBR	10	76	4	55	0	0	64	1	0	3
NOR	16	5	11	78	0	0	0	31	0	12
USA	16	149	4	80	60	0	0	2	0	4
NLD	10	4	13	40	1	30	2	0	0	13
CAM	5	0	0	0	0	0	0	0	0	0
LVA	16	10	24	89	3	10	4	12	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	27	13	55	12	20	25	16	10	5	16
CAN	27	0	11	150	77	5	34	155	4	0	10
DEU	13	11	0	58	4	13	11	4	14	0	28
DFS	43	151	49	0	60	100	57	83	40	0	108
GBR	10	76	4	55	0	0	27	64	1	0	3
NOR	16	5	12	78	0	0	7	0	31	0	11
NZL	24	32	11	55	24	6	0	23	3	2	6
USA	16	150	4	80	60	0	22	0	2	0	4
NLD	10	4	13	39	1	30	3	2	0	0	12
CAM	5	0	0	0	0	0	2	0	0	0	0
LVA	15	10	22	74	3	9	6	4	11	0	0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	GBR	NOR	USA	NLD	CAM	LVA	NZL
AUS	0	27	13	55	12	20	16	10	5	17	5
CAN	27	0	11	150	77	5	153	4	0	10	3
DEU	13	11	0	58	4	12	4	12	0	30	4
DFS	43	151	49	0	60	95	83	34	0	127	9
GBR	10	76	4	55	0	0	63	1	0	3	4
NOR	16	5	11	73	0	0	0	24	0	12	1
USA	16	149	4	80	59	0	0	2	0	4	3
NLD	10	4	11	33	1	23	2	0	0	12	0
CAM	5	0	0	0	0	0	0	0	0	0	0
LVA	16	10	24	89	3	10	4	11	0	0	1
NZL	5	3	4	9	4	1	3	0	0	1	0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

	AUS	CAN	DEU	DFS	NOR	NZL	NLD	USA	CAM	LVA
AUS	0	27	13	50	20	25	10	16	5	17
CAN	27	0	11	144	5	34	4	155	0	10
DEU	13	11	0	55	13	11	14	4	0	30
DFS	40	144	49	0	92	52	38	78	0	110
NOR	16	5	12	73	0	7	31	0	0	12
NZL	24	32	11	51	6	0	2	23	2	7

NLD	10	4	13	37	30	2	0	2	0	12
USA	16	150	4	76	0	22	2	0	0	4
CAM	5	0	0	0	0	2	0	0	0	0
LVA	16	10	24	77	10	7	11	4	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	27	13	55	11	22	25	16	10	5
CAN	27	0	11	150	74	7	34	155	4	0
DEU	13	11	0	58	4	15	11	4	14	0
DFS	43	151	49	0	60	119	59	83	36	0
GBR	9	73	4	55	0	0	24	62	1	0
NOR	18	6	14	97	0	0	9	0	28	0
NZL	24	32	11	57	21	8	0	23	3	2
USA	16	150	4	80	58	0	22	0	2	0
NLD	10	4	13	35	1	27	3	2	0	0
CAM	5	0	0	0	0	0	2	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	27	13	55	11	20	25	16	10	5
CAN	27	0	11	150	74	5	34	152	4	0
DEU	13	11	0	58	4	12	11	4	12	0
DFS	43	151	49	0	60	101	59	83	34	0
GBR	9	73	4	55	0	0	24	62	1	0
NOR	16	5	11	78	0	0	7	0	24	0
NZL	24	32	11	57	21	6	0	23	2	2
USA	16	149	4	80	58	0	22	0	2	0
NLD	10	4	11	33	1	23	2	2	0	0
CAM	5	0	0	0	0	0	2	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	27	13	55	11	20	16	10	5
CAN	27	0	11	150	74	5	155	4	0
DEU	13	11	0	58	4	12	4	14	0
DFS	43	151	49	0	60	101	83	36	0
GBR	9	73	4	55	0	0	62	1	0
NOR	16	5	11	78	0	0	0	27	0
USA	16	150	4	80	58	0	0	2	0
NLD	10	4	13	35	1	26	2	0	0
CAM	5	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