```
Introduction
-------------------------------------------------------------------------------
The latest routine international evaluation for conformation traits took place
as scheduled at the Interbull Centre. Data from twenty four (24) 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 the United States of America were computed.
Brown Swiss, Guernsey, Holstein, Jersey  and Red Dairy Cattle breed
data were included in this evaluation.


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

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


COU BRD TRT_Code    TRT_NAME    Subs_Trt
-------------------------------------
USA |BSW |ofr   |  overall frame  | sta
USA |BSW |oru   |  overall rump   | rwi
USA |BSW |rle   |  rump length    | rwi
USA |BSW |thp   |  thurl position | rwi
Changes in national procedures
-------------------------------------------------------------------------------
Changes in the national genetic evaluation of conformation traits are as
follows:
AUS (ALL)          For HOL, RDC, GUE: Changed the scale of the input data and this has changed to scale of the
                   breeding values as well. The change in scale and the relative impact is different for different traits
                   e.g. ous was previously on on 1-16 scale and is now on ca. 40 to 90.
                   Base change. Updated the status of bulls to better reflect their status as AI bull. As a result a good
                   number no longer qualify and were not submitted.
NOR (RDC)          First time with ANG
DEA (BSW)          Base change
SVN (ALL)          Small decrease in inromation due to changes in data base related to the pedigree completness as well
                   as phenotypic data improvement.
DFS (ALL)          Updated our pedigree program used for genetic evaluation. The effect is minor.
JPN (HOL)          Base change, now the cows born in 2015 are the base. Some changes in information due to pedigree
                   verification
BEL (HOL)          Base change now set to cows born in 2015
HUN (HOL)          Base change
USA (HOL)          Modified OUS to increase the correlation with Productive Life and Somatic Cell Score by increasing the
                   weight on Udder Support and decreasing the weight on Udder Height and adding Teat Length as an
                   intermediate optimum and added a penalty on Stature. For Locomotion, reduced the weight on Foot Angle,
                   increased the weight on Feet and Legs Score and added a penalty on Stature. Some drops in information
                   due to parentage verification.
CHE (JER)          Changed the definition of the fixed effect that describes the interaction of classifier * time period.
GBR (ALL)          Changes in information due to chnages from data recording agents
NZL (ALL)          Changes in information due to continuous pedigree verification
PRT (HOL)          New variance componenents estimation, Base change.
EST (HOL)          For the next two years all breeding values are standardised within breed to a base with mean of
                   100 and a genetic standard deviation of 12 points for cows born 2012-2016.
POL (HOL)          First time with BCS and LOC
ZAF (HOL,JER)      Refining genetic groups. Changing from PEST software to MIX99 for estimation of breeding values and
                   reliabilities. Base change




INTERBULL CHANGES COMPARED TO THE PREVIOUS ROUTINE RUN
----------------------------------------------------------------
Subsetting:
----------
As decided by the ITC in Orlando, new subsetting was introduced
in the september test run. Sub-setting is necessary for operational
purposes and restrictions of time scales. To minimize the effect of
```

subsetting, larger subsets with 10-12 countries and with 4 link
providing countries have been applied.

Window:

According to the decision taken by ITC in Orlando, the following
changes have been introduced in regards to the windows used for
post processing:

The upper bounds have been set to 0.99 as these were judged to have
very little effect on evaluations. The lower values have been
set to about the 25% percentile value. The largest changes are for
the lower values for conformation traits, with the lowest window being
40% for OFL otherwise it is about 50% for all other confirmation traits.
It is anticipated that these low values may not have large impact on
evaluations since there were very few countries combinations whose
estimated correlations fell between the old limit of 0.30 and these new limits.

The window so far applied for MAS evaluation have been found too high compared to the
within-country genetic correlation between mastitis and SCS available from the literature.
It has been an ITC recommendation to adjust the windows for MAS in the 2001t test run to make them more in line with the
values available from the literature. The recommendation has been approved by the Steering committee.
Also, according to the decision taken by ITC in Orlando (2015) to review all windows every five (5) years, an overall
review of the windows for all traits will take place during the first half of 2020. Implementation of the reviewed windows is aimed for January 2021 test run.

DATA AND METHOD OF ANALYSIS

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

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

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

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

SCIENTIFIC LITERATURE

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

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

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

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

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

Genetic parameter estimation:
     Klei and Weigel, 1998, Interbull Bulletin 17:8-14

Sullivan, 1999. Interbull Bulletin 22:146-148

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

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

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

NEXT ROUTINE INTERNATIONAL EVALUATION

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

NEXT TEST INTERNATIONAL EVALUATION

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

PUBLICATION OF INTERBULL ROUTINE RUN

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

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

PUBLICATION OF INTERBULL TEST RUN

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

^LTable 1. National evaluation data considered in the Interbull
evaluation for conformation traits (December Routine Evaluation 2020).
Number of records for stature by breed

Country	BSW	GUE	HOL	JER	RDC	SIM
AUS		45	3780	728	237	
BEL			1571			
CAN	218	100	11841	755	864	
CHE	2760		3307	44		
CZE			4128			
DEA	3533					
DEU			19559		240	
DFS			11980	2018	6254	
ESP			3978			
EST			751			
FRA	366		16952			
FRM						
GBR	21	216	6042	434	311	

```
HUN                              2707
IRL                              1746
ISR
ITA          2103                8935          101
JPN                              5783
KOR                              1348
LTU
LVA
NLD           126               14845           45           50
NOR                                                        2395
NZL                              6428         3989          591
POL                              8704
PRT                              2094
SVK
SVN           312                545
URY
USA           864      697      32796         4197          257
ZAF                              844          541
HRV
MEX
CAM                                                          33
==================================================================================
No.Records   10303     1058    170664        12852        11232
Pub. Proofs   8295      906    137327        11194        11957           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         6.41
CHE         0.95   12.40
FRA         0.98    0.96    0.93
ITA         0.96    0.95    0.95   14.61
NLD         0.95    0.95    0.96    0.92    4.17
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   11.30
SVN         0.92    0.90    0.91    0.93    0.91    0.91    0.92   16.06
GBR         0.96    0.93    0.96    0.94    0.93    0.96    0.91    0.90    0.74


----------------------------------------------------------------------------------
BSW    cwi
----------------------------------------------------------------------------------
             CAN     CHE     FRA     ITA     NLD     USA     DEA     SVN     GBR
CAN         8.65
CHE         0.90   10.24
FRA         0.86    0.88    0.94
ITA         0.81    0.85    0.86   21.85
NLD         0.91    0.81    0.87    0.71    4.59
USA         0.90    0.90    0.92    0.85    0.82    0.92
DEA         0.86    0.82    0.78    0.74    0.82    0.77   11.45
SVN         0.87    0.86    0.84    0.85    0.81    0.87    0.88   22.78
GBR         0.91    0.84    0.82    0.72    0.90    0.81    0.77    0.82    1.48


----------------------------------------------------------------------------------
BSW    bde
----------------------------------------------------------------------------------
             CAN     CHE     FRA     ITA     NLD     DEA     SVN     GBR     USA
CAN         6.81
CHE         0.85   10.33
FRA         0.74    0.88    0.91
ITA         0.78    0.91    0.91   18.09
NLD         0.83    0.85    0.86    0.85    4.24
DEA         0.83    0.90    0.92    0.90    0.84   11.22
SVN         0.79    0.76    0.78    0.83    0.80    0.74   25.58
GBR         0.86    0.89    0.81    0.85    0.90    0.87    0.85    1.56
```

```
USA        0.73    0.75    0.86    0.78    0.87    0.79    0.79    0.86    0.85

------------------------------------------------------------------------------------
BSW    ang
------------------------------------------------------------------------------------
           CAN     CHE     FRA     NLD     USA     GBR
CAN        8.45
CHE        0.70   10.99
FRA        0.88    0.67    0.87
NLD        0.80    0.68    0.70    3.82
USA        0.89    0.67    0.78    0.78    1.08
GBR        0.89    0.77    0.80    0.83    0.90    0.71


------------------------------------------------------------------------------------
BSW    ran
------------------------------------------------------------------------------------
           CAN     CHE     FRA     ITA     NLD     USA     DEA     SVN     GBR
CAN        6.97
CHE        0.94   10.67
FRA        0.97    0.96    0.94
ITA        0.94    0.93    0.94   23.13
NLD        0.95    0.93    0.96    0.93    4.52
USA        0.97    0.94    0.97    0.92    0.95    1.36
DEA        0.96    0.94    0.95    0.95    0.92    0.97   11.91
SVN        0.92    0.91    0.92    0.91    0.92    0.92    0.91   21.32
GBR        0.96    0.94    0.97    0.94    0.97    0.97    0.92    0.93    1.88


------------------------------------------------------------------------------------
BSW    rwi
------------------------------------------------------------------------------------
           CAN     CHE     FRA     NLD     USA     DEA     GBR     SVN     ITA
CAN        7.13
CHE        0.89   10.12
FRA        0.96    0.86    0.94
NLD        0.92    0.86    0.93    3.92
USA        0.91    0.84    0.87    0.81    0.97
DEA        0.93    0.89    0.93    0.81    0.90   13.34
GBR        0.93    0.86    0.93    0.89    0.93    0.85    1.37
SVN        0.91    0.83    0.94    0.87    0.83    0.90    0.88   26.86
ITA        0.88    0.80    0.89    0.81    0.85    0.86    0.89    0.85   19.90


------------------------------------------------------------------------------------
BSW    rls
------------------------------------------------------------------------------------
           CAN     CHE     FRA     ITA     NLD     USA     DEA     SVN     GBR
CAN        7.54
CHE        0.92   13.04
FRA        0.91    0.91    1.03
ITA        0.91    0.85    0.93   23.78
NLD        0.88    0.83    0.88    0.85    5.12
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   12.27
SVN        0.87    0.83    0.88    0.86    0.84    0.87    0.89   21.90
GBR        0.84    0.87    0.91    0.82    0.86    0.83    0.89    0.83    1.28


------------------------------------------------------------------------------------
BSW    fan
------------------------------------------------------------------------------------
           CAN     CHE     FRA     ITA     NLD     USA     DEA     SVN     GBR
CAN        8.35
CHE        0.70   13.78
FRA        0.75    0.72    1.10
ITA        0.71    0.85    0.80   21.98
NLD        0.73    0.69    0.84    0.70    5.24
USA        0.80    0.72    0.84    0.85    0.81    0.87
DEA        0.66    0.91    0.67    0.89    0.66    0.66   11.67
SVN        0.69    0.84    0.71    0.85    0.67    0.70    0.94   24.67
GBR        0.81    0.70    0.90    0.74    0.88    0.83    0.70    0.70    1.19
```

```
--------------------------------------------------------------------------------
BSW    hde
--------------------------------------------------------------------------------
         CAN     CHE     FRA     ITA     NLD     DEA     SVN     USA
CAN      8.37
CHE      0.87   12.62
FRA      0.81    0.80    1.17
ITA      0.79    0.83    0.85   22.21
NLD      0.77    0.74    0.84    0.75    5.24
DEA      0.79    0.86    0.84    0.92    0.78   12.25
SVN      0.77    0.76    0.84    0.89    0.75    0.90   30.23
USA      0.85    0.75    0.86    0.89    0.81    0.77    0.83    0.87


--------------------------------------------------------------------------------
BSW    fua
--------------------------------------------------------------------------------
         CAN     CHE     FRA     ITA     NLD     USA     DEA     SVN     GBR
CAN      6.96
CHE      0.86   11.90
FRA      0.89    0.87    0.90
ITA      0.90    0.83    0.85   20.53
NLD      0.91    0.85    0.91    0.84    4.56
USA      0.94    0.86    0.87    0.93    0.87    1.31
DEA      0.86    0.85    0.95    0.83    0.83    0.85   11.23
SVN      0.81    0.75    0.84    0.86    0.79    0.79    0.90   21.53
GBR      0.93    0.85    0.88    0.89    0.91    0.92    0.77    0.72    1.28


--------------------------------------------------------------------------------
BSW    ruh
--------------------------------------------------------------------------------
         CAN     CHE     FRA     ITA     NLD     USA     DEA     SVN     GBR
CAN      7.56
CHE      0.91   11.83
FRA      0.86    0.84    0.94
ITA      0.77    0.85    0.85   13.14
NLD      0.78    0.85    0.87    0.86    4.26
USA      0.84    0.84    0.88    0.87    0.87    1.09
DEA      0.82    0.86    0.89    0.93    0.91    0.86   11.82
SVN      0.82    0.84    0.80    0.86    0.88    0.82    0.90   19.41
GBR      0.76    0.81    0.87    0.85    0.88    0.91    0.79    0.78    1.62


--------------------------------------------------------------------------------
BSW    ruw
--------------------------------------------------------------------------------
         CAN     CHE     FRA     ITA     NLD     USA     DEA     SVN
CAN      8.21
CHE      0.91   11.80
FRA      0.86    0.86    0.86
ITA      0.81    0.88    0.79   13.57
NLD      0.70    0.66    0.79    0.70    4.26
USA      0.86    0.89    0.85    0.89    0.79    1.03
DEA      0.85    0.91    0.76    0.95    0.55    0.90   12.33
SVN      0.82    0.81    0.75    0.84    0.71    0.82    0.82   17.77


--------------------------------------------------------------------------------
BSW    usu
--------------------------------------------------------------------------------
         CAN     CHE     FRA     ITA     NLD     USA     DEA     SVN     GBR
CAN      8.09
CHE      0.91   11.97
FRA      0.83    0.91    0.91
ITA      0.89    0.89    0.88   18.77
NLD      0.83    0.83    0.90    0.82    4.16
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   11.56
SVN      0.84    0.83    0.72    0.83    0.69    0.74    0.85   23.68
GBR      0.81    0.79    0.87    0.87    0.91    0.93    0.75    0.68    3.08

--------------------------------------------------------------------------------
```

```
BSW    ude
-------------------------------------------------------------------------------
          CAN    CHE    FRA    ITA    NLD    USA    DEA    SVN    GBR
CAN    6.65
CHE    0.96   12.03
FRA    0.95    0.95   0.98
ITA    0.94    0.96   0.95   20.89
NLD    0.96    0.94   0.95    0.94   4.02
USA    0.96    0.95   0.96    0.95   0.95   1.24
DEA    0.93    0.97   0.92    0.97   0.94   0.93   12.04
SVN    0.93    0.95   0.91    0.97   0.95   0.93    0.96   21.36
GBR    0.96    0.95   0.96    0.94   0.97   0.96    0.92    0.92   1.83


-------------------------------------------------------------------------------
BSW    ftp
-------------------------------------------------------------------------------
          CAN    CHE    FRA    NLD    USA    DEA    SVN    GBR    ITA
CAN    7.25
CHE    0.97   13.95
FRA    0.97    0.95   0.93
NLD    0.96    0.95   0.95    5.03
USA    0.92    0.90   0.88    0.91   1.32
DEA    0.95    0.99   0.95    0.95   0.90   11.07
SVN    0.94    0.93   0.92    0.93   0.90   0.92   17.92
GBR    0.96    0.93   0.89    0.94   0.95   0.91    0.93   1.38
ITA    0.87    0.85   0.85    0.86   0.88   0.85    0.86    0.87   21.96


-------------------------------------------------------------------------------
BSW    ftl
-------------------------------------------------------------------------------
          CAN    CHE    FRA    ITA    NLD    USA    DEA    SVN    GBR
CAN    6.31
CHE    0.91   14.68
FRA    0.95    0.95   0.96
ITA    0.92    0.94   0.95   18.62
NLD    0.93    0.96   0.92    0.92   5.01
USA    0.94    0.96   0.96    0.93   0.96   1.77
DEA    0.90    0.98   0.98    0.96   0.94   0.96   11.13
SVN    0.91    0.93   0.91    0.93   0.95   0.91    0.93   18.04
GBR    0.95    0.95   0.93    0.95   0.97   0.97    0.93    0.94   1.38


-------------------------------------------------------------------------------
BSW    rtp
-------------------------------------------------------------------------------
          CAN    CHE    FRA    ITA    NLD    DEA    SVN    USA
CAN    6.68
CHE    0.97   14.54
FRA    0.96    0.97   0.94
ITA    0.92    0.95   0.93   21.17
NLD    0.97    0.96   0.97    0.93   4.68
DEA    0.96    0.99   0.97    0.96   0.94   12.12
SVN    0.94    0.93   0.92    0.94   0.95   0.92   17.43
USA    0.93    0.90   0.92    0.90   0.94   0.90    0.91   1.32


-------------------------------------------------------------------------------
BSW    ocs
-------------------------------------------------------------------------------
          CAN    CHE    FRA    ITA    NLD    USA    DEA    SVN    GBR
CAN    7.77
CHE    0.86    9.18
FRA    0.80    0.87   0.95
ITA    0.82    0.82   0.89    9.49
NLD    0.76    0.79   0.82    0.78   3.47
USA    0.85    0.78   0.84    0.83   0.83   0.53
DEA    0.83    0.91   0.90    0.88   0.77   0.76   10.71
SVN    0.79    0.78   0.78    0.77   0.78   0.78    0.78   21.15
GBR    0.82    0.89   0.88    0.82   0.87   0.89    0.82    0.79   1.77


-------------------------------------------------------------------------------
```

```
BSW     ous
------------------------------------------------------------------------------------
          CAN     CHE     FRA     ITA     NLD     USA     DEA     SVN     GBR
CAN      8.15
CHE      0.89   13.66
FRA      0.88    0.92    0.96
ITA      0.83    0.89    0.90   10.70
NLD      0.88    0.87    0.92    0.79    4.43
USA      0.86    0.89    0.87    0.84    0.86    0.99
DEA      0.87    0.96    0.91    0.91    0.86    0.90   12.40
SVN      0.76    0.84    0.78    0.82    0.78    0.84    0.92   20.15
GBR      0.82    0.85    0.76    0.82    0.77    0.88    0.80    0.76    1.44


------------------------------------------------------------------------------------
BSW     ofl
------------------------------------------------------------------------------------
          CAN     CHE     FRA     ITA     NLD     USA     DEA     SVN     GBR
CAN      8.48
CHE      0.86   11.54
FRA      0.68    0.69    1.26
ITA      0.68    0.71    0.85   16.58
NLD      0.68    0.68    0.75    0.67    4.25
USA      0.75    0.68    0.78    0.74    0.67    1.05
DEA      0.68    0.85    0.68    0.81    0.66    0.66   11.39
SVN      0.76    0.86    0.68    0.77    0.68    0.73    0.90   28.20
GBR      0.74    0.78    0.82    0.69    0.73    0.73    0.70    0.68    1.72


------------------------------------------------------------------------------------
BSW     ofr
------------------------------------------------------------------------------------
          CAN     CHE     DEA     ITA     SVN     USA     FRA
CAN      7.23
CHE      0.83   12.10
DEA      0.87    0.90   11.64
ITA      0.84    0.91    0.95   18.05
SVN      0.81    0.82    0.79    0.85   22.29
USA      0.83    0.85    0.91    0.86    0.80    1.63
FRA      0.81    0.87    0.93    0.91    0.83    0.90    0.90


------------------------------------------------------------------------------------
BSW     tpl
------------------------------------------------------------------------------------
          CAN     CHE     DEA     ITA     SVN     FRA
CAN      6.92
CHE      0.91   11.95
DEA      0.92    0.91   11.75
ITA      0.93    0.92    0.94   24.28
SVN      0.91    0.90    0.89    0.89   23.11
FRA      0.97    0.94    0.90    0.91    0.90    1.29


------------------------------------------------------------------------------------
BSW     oru
------------------------------------------------------------------------------------
          CAN     CHE     DEA     ITA     SVN     USA     FRA
CAN      7.22
CHE      0.76   16.17
DEA      0.71    0.87   12.62
ITA      0.92    0.77    0.75   18.08
SVN      0.84    0.59    0.64    0.72   27.16
USA      0.89    0.56    0.46    0.83    0.69    0.97
FRA      0.90    0.89    0.83    0.89    0.72    0.85    1.10


------------------------------------------------------------------------------------
BSW     rle
------------------------------------------------------------------------------------
          CHE     DEA     ITA     SVN     USA     FRA
CHE     11.78
DEA      0.96   12.41
ITA      0.83    0.87   20.52
```

```
SVN      0.81    0.82    0.83    26.40
USA      0.54    0.51    0.78    0.73    0.97
FRA      0.93    0.93    0.90    0.83    0.74    1.03

------------------------------------------------------------------------------------
BSW     thp
------------------------------------------------------------------------------------
         CAN     CHE     DEA     ITA     SVN     USA     FRA
CAN      7.66
CHE      0.83    11.34
DEA      0.76    0.85    12.19
ITA      0.88    0.91    0.83    29.20
SVN      0.80    0.85    0.85    0.88    36.24
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      6.83
CHE      0.92    11.92
DEA      0.91    0.89    12.57
ITA      0.92    0.83    0.86    19.95
SVN      0.94    0.88    0.91    0.90    22.13
FRA      0.90    0.83    0.89    0.88    0.91    1.04

------------------------------------------------------------------------------------
BSW     ful
------------------------------------------------------------------------------------
         CHE     DEA     ITA     SVN     FRA
CHE      11.68
DEA      0.91    12.40
ITA      0.91    0.96    12.75
SVN      0.79    0.87    0.86    21.28
FRA      0.66    0.81    0.74    0.75    0.95

------------------------------------------------------------------------------------
BSW     udb
------------------------------------------------------------------------------------
         CHE     DEA     ITA     SVN     FRA
CHE      11.75
DEA      0.97    13.24
ITA      0.93    0.97    26.57
SVN      0.81    0.85    0.80    25.83
FRA      0.91    0.88    0.85    0.79    0.95

------------------------------------------------------------------------------------
BSW     tdi
------------------------------------------------------------------------------------
         CHE     DEA     ITA     SVN     FRA
CHE      15.82
DEA      0.96    11.39
ITA      0.94    0.95    21.22
SVN      0.91    0.93    0.94    17.83
FRA      0.96    0.96    0.91    0.91    0.93

------------------------------------------------------------------------------------
BSW     tth
------------------------------------------------------------------------------------
         CHE     DEA     ITA     SVN     FRA
CHE      14.40
DEA      0.97    12.97
ITA      0.93    0.94    23.16
SVN      0.88    0.91    0.88    20.29
FRA      0.93    0.92    0.95    0.88    0.86

------------------------------------------------------------------------------------
GUE     sta
```

```
----------------------------------------------------------------------------------
         CAN      GBR      USA      AUS
CAN     6.38
GBR     0.97     1.22
USA     0.98     0.96     2.81
AUS     0.90     0.93     0.91     0.84

----------------------------------------------------------------------------------
GUE     cwi
----------------------------------------------------------------------------------
         CAN      GBR      USA      AUS
CAN     7.09
GBR     0.92     1.73
USA     0.87     0.86     1.56
AUS     0.73     0.80     0.67     0.34

----------------------------------------------------------------------------------
GUE     bde
----------------------------------------------------------------------------------
         CAN      GBR      USA      AUS
CAN     6.20
GBR     0.87     1.51
USA     0.75     0.89     1.80
AUS     0.81     0.79     0.72     0.45

----------------------------------------------------------------------------------
GUE     ang
----------------------------------------------------------------------------------
         CAN      GBR      USA      AUS
CAN     7.92
GBR     0.89     1.77
USA     0.88     0.91     1.91
AUS     0.65     0.76     0.68     0.39

----------------------------------------------------------------------------------
GUE     ran
----------------------------------------------------------------------------------
         CAN      GBR      USA      AUS
CAN     6.53
GBR     0.97     1.62
USA     0.97     0.97     2.01
AUS     0.92     0.94     0.91     0.76

----------------------------------------------------------------------------------
GUE     rwi
----------------------------------------------------------------------------------
         CAN      GBR      USA      AUS
CAN     6.83
GBR     0.93     1.50
USA     0.92     0.92     1.75
AUS     0.87     0.86     0.81     0.64

----------------------------------------------------------------------------------
GUE     rls
----------------------------------------------------------------------------------
         CAN      GBR      USA      AUS
CAN     8.05
GBR     0.82     1.81
USA     0.93     0.80     0.91
AUS     0.74     0.82     0.74     0.32

----------------------------------------------------------------------------------
GUE     rlr
----------------------------------------------------------------------------------
         CAN      USA      AUS
CAN     7.04
USA     0.85     0.91
AUS     0.63     0.56     0.20
```

```
-------------------------------------------------------------------------------------
GUE    fan
-------------------------------------------------------------------------------------
            CAN      GBR      USA      AUS
CAN        7.66
GBR        0.79     1.70
USA        0.83     0.77     0.89
AUS        0.66     0.78     0.67     0.26


-------------------------------------------------------------------------------------
GUE    fua
-------------------------------------------------------------------------------------
            CAN      GBR      USA      AUS
CAN        7.13
GBR        0.94     1.68
USA        0.92     0.91     1.84
AUS        0.81     0.80     0.77     0.38


-------------------------------------------------------------------------------------
GUE    ruh
-------------------------------------------------------------------------------------
            CAN      GBR      USA      AUS
CAN        6.58
GBR        0.76     2.08
USA        0.80     0.90     1.50
AUS        0.78     0.79     0.77     0.36


-------------------------------------------------------------------------------------
GUE    usu
-------------------------------------------------------------------------------------
            CAN      GBR      USA      AUS
CAN        6.92
GBR        0.80     1.77
USA        0.80     0.86     1.35
AUS        0.79     0.79     0.77     0.29


-------------------------------------------------------------------------------------
GUE    ude
-------------------------------------------------------------------------------------
            CAN      GBR      USA      AUS
CAN        6.19
GBR        0.97     1.59
USA        0.95     0.95     1.86
AUS        0.92     0.92     0.91     0.53


-------------------------------------------------------------------------------------
GUE    ftp
-------------------------------------------------------------------------------------
            CAN      GBR      USA      AUS
CAN        5.62
GBR        0.96     1.29
USA        0.92     0.93     1.62
AUS        0.93     0.92     0.87     0.40


-------------------------------------------------------------------------------------
GUE    ftl
-------------------------------------------------------------------------------------
            CAN      GBR      USA      AUS
CAN        4.73
GBR        0.95     1.92
USA        0.95     0.97     2.05
AUS        0.94     0.95     0.94     0.94


-------------------------------------------------------------------------------------
GUE    rtp
-------------------------------------------------------------------------------------
            CAN      AUS      USA
CAN        5.48
AUS        0.91     0.35
```

```
USA         0.94    0.90    1.62

--------------------------------------------------------------------------------
GUE     ocs
--------------------------------------------------------------------------------
            CAN     GBR     USA     AUS
CAN         8.11
GBR         0.83    2.10
USA         0.80    0.87    0.90
AUS         0.60    0.67    0.61    0.82

--------------------------------------------------------------------------------
GUE     ous
--------------------------------------------------------------------------------
            CAN     GBR     USA     AUS
CAN         7.95
GBR         0.83    1.60
USA         0.90    0.83    0.86
AUS         0.68    0.80    0.70    1.07

--------------------------------------------------------------------------------
GUE     ofl
--------------------------------------------------------------------------------
            CAN     GBR     USA     AUS
CAN         7.63
GBR         0.74    1.41
USA         0.81    0.70    0.99
AUS         0.50    0.46    0.48    8.89

--------------------------------------------------------------------------------
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
AUS     0.64
BEL     0.89   1.09
CAN     0.89   0.95   5.57
CHE     0.89   0.92   0.96   10.62
DEU     0.89   0.93   0.98   0.96   12.90
DFS     0.87   0.95   0.97   0.96   0.97   10.74
ESP     0.89   0.94   0.98   0.96   0.98   0.97   0.83
FRA     0.90   0.96   0.98   0.97   0.97   0.97   0.98   1.07
GBR     0.93   0.93   0.97   0.95   0.96   0.94   0.96   0.97   1.10
ITA     0.87   0.89   0.95   0.92   0.94   0.93   0.95   0.95   0.95   1.12
NLD     0.88   0.93   0.96   0.97   0.98   0.97   0.97   0.97   0.94   0.92   4.14
USA     0.90   0.92   0.98   0.94   0.96   0.94   0.96   0.96   0.97   0.93   0.93   1.20
HUN     0.89   0.92   0.96   0.93   0.96   0.93   0.96   0.97   0.95   0.93   0.94   0.94   0.91
POL     0.85   0.87   0.92   0.90   0.93   0.91   0.93   0.92   0.91   0.90   0.91   0.90   0.92   9.93
NZL     0.88   0.86   0.85   0.85   0.85   0.85   0.85   0.87   0.89   0.85   0.85   0.86   0.85   0.85   0.43
ZAF     0.91   0.91   0.91   0.89   0.90   0.87   0.89   0.91   0.93   0.86   0.86   0.91   0.89   0.86   0.89   0.73
JPN     0.89   0.95   0.98   0.97   0.97   0.97   0.98   0.98   0.96   0.95   0.96   0.97   0.96   0.92   0.86   0.91   1.20
CZE     0.89   0.94   0.97   0.94   0.97   0.95   0.96   0.96   0.95   0.92   0.95   0.94   0.95   0.92   0.85   0.92   0.96   13.34
EST     0.87   0.92   0.94   0.93   0.95   0.95   0.93   0.95   0.92   0.93   0.96   0.90   0.93   0.91   0.86   0.88   0.94   0.95   15.12
IRL     0.89   0.89   0.93   0.91   0.91   0.88   0.92   0.93   0.97   0.92   0.89   0.93   0.91   0.86   0.89   0.90   0.91   0.93   0.88   0.72
KOR     0.85   0.85   0.85   0.85   0.85   0.85   0.85   0.85   0.86   0.85   0.85   0.85   0.85   0.86   0.85   0.85   0.85   0.86   0.87   0.85   4.56
SVN     0.87   0.92   0.94   0.94   0.95   0.95   0.95   0.94   0.91   0.90   0.96   0.92   0.91   0.93   0.86   0.86   0.95   0.93   0.93   0.88   0.86   14.62
PRT     0.88   0.90   0.94   0.91   0.95   0.93   0.94   0.94   0.94   0.92   0.91   0.92   0.93   0.89   0.85   0.87   0.94   0.94   0.90   0.90   0.85   0.89   1.25

--------------------------------------------------------------------------------
HOL     cwi
--------------------------------------------------------------------------------
        AUS    BEL    CAN    CHE    DEU    DFS    ESP    FRA    GBR    ITA    NLD    USA    HUN    POL    NZL    ZAF    JPN    CZE    EST    IRL    KOR    SVN    PRT
AUS     0.41
BEL     0.67   1.71
CAN     0.73   0.85   6.47
CHE     0.66   0.85   0.90   11.23
DEU     0.69   0.87   0.90   0.84   12.47
DFS     0.71   0.87   0.92   0.84   0.93   12.47
ESP     0.67   0.88   0.92   0.87   0.82   0.85   1.05
FRA     0.65   0.90   0.86   0.92   0.86   0.83   0.86   1.15
```

GBR	0.81	0.85	0.92	0.85	0.90	0.89	0.85	0.82	1.42													
ITA	0.65	0.78	0.77	0.81	0.70	0.66	0.81	0.88	0.70	1.26												
NLD	0.71	0.87	0.92	0.87	0.94	0.91	0.86	0.86	0.92	0.70	5.02											
USA	0.65	0.82	0.87	0.88	0.82	0.80	0.86	0.92	0.80	0.91	0.81	1.26										
HUN	0.65	0.82	0.86	0.84	0.84	0.83	0.83	0.89	0.77	0.81	0.81	0.88	1.14									
POL	0.65	0.89	0.87	0.83	0.85	0.85	0.87	0.85	0.83	0.78	0.84	0.82	0.83	12.34								
NZL	0.79	0.66	0.71	0.66	0.70	0.70	0.70	0.65	0.80	0.65	0.69	0.67	0.65	0.65	0.38							
ZAF	0.67	0.89	0.84	0.86	0.85	0.85	0.86	0.88	0.89	0.76	0.85	0.87	0.83	0.83	0.69	0.83						
JPN	0.65	0.82	0.76	0.83	0.71	0.71	0.81	0.91	0.67	0.91	0.71	0.91	0.83	0.75	0.65	0.77	1.53					
CZE	0.71	0.90	0.92	0.84	0.91	0.91	0.91	0.84	0.88	0.77	0.89	0.84	0.86	0.89	0.70	0.87	0.77	14.12				
EST	0.72	0.77	0.83	0.75	0.75	0.82	0.80	0.70	0.78	0.65	0.82	0.66	0.66	0.70	0.66	0.71	0.66	0.78	23.87			
IRL	0.78	0.77	0.83	0.79	0.86	0.81	0.74	0.77	0.93	0.67	0.83	0.74	0.72	0.74	0.83	0.83	0.65	0.82	0.72	1.35		
KOR	0.65	0.73	0.65	0.65	0.71	0.72	0.70	0.71	0.66	0.65	0.65	0.70	0.71	0.65	0.67	0.66	0.70	0.76	0.66	0.65	2.64	
SVN	0.66	0.77	0.83	0.80	0.84	0.84	0.83	0.77	0.80	0.70	0.84	0.80	0.84	0.79	0.66	0.85	0.69	0.80	0.74	0.73	0.66	20.99
PRT	0.66	0.82	0.82	0.78	0.86	0.83	0.81	0.83	0.80	0.74	0.84	0.82	0.85	0.83	0.65	0.78	0.75	0.85	0.66	0.74	0.69	0.74	2.08

HOL   bde

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN
AUS	0.54																						
BEL	0.70	1.43																					
CAN	0.85	0.77	5.58																				
CHE	0.72	0.91	0.86	11.23																			
DEU	0.77	0.91	0.88	0.91	11.74																		
DFS	0.82	0.85	0.92	0.87	0.93	11.63																	
ESP	0.76	0.90	0.89	0.92	0.91	0.89	0.99																
FRA	0.70	0.92	0.70	0.88	0.82	0.73	0.84	1.07															
GBR	0.79	0.91	0.87	0.91	0.92	0.90	0.93	0.81	1.34														
ITA	0.70	0.87	0.71	0.85	0.85	0.77	0.87	0.90	0.86	1.22													
NLD	0.71	0.88	0.83	0.92	0.91	0.85	0.91	0.86	0.92	0.88	4.78												
USA	0.70	0.92	0.74	0.90	0.89	0.80	0.89	0.92	0.88	0.92	0.90	1.15											
HUN	0.70	0.90	0.80	0.88	0.89	0.85	0.91	0.84	0.89	0.84	0.84	0.89	1.05										
POL	0.77	0.82	0.85	0.82	0.92	0.89	0.87	0.71	0.87	0.79	0.83	0.81	0.87	12.51									
NZL	0.78	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.69	0.70	0.70	0.71	0.38								
ZAF	0.75	0.87	0.83	0.83	0.87	0.87	0.89	0.75	0.92	0.77	0.82	0.85	0.85	0.87	0.70	0.87							
JPN	0.70	0.93	0.74	0.91	0.89	0.81	0.89	0.95	0.86	0.90	0.90	0.94	0.88	0.78	0.69	0.79	1.37						
CZE	0.82	0.83	0.93	0.84	0.94	0.92	0.88	0.70	0.89	0.75	0.83	0.79	0.87	0.92	0.70	0.87	0.78	15.43					
EST	0.77	0.83	0.91	0.87	0.89	0.90	0.89	0.75	0.88	0.75	0.85	0.82	0.85	0.87	0.68	0.79	0.82	0.90	18.89				
IRL	0.81	0.85	0.85	0.88	0.90	0.89	0.88	0.76	0.94	0.83	0.86	0.84	0.82	0.84	0.72	0.88	0.80	0.87	0.80	1.17			
KOR	0.70	0.80	0.70	0.79	0.83	0.82	0.78	0.75	0.75	0.70	0.70	0.73	0.79	0.71	0.70	0.74	0.79	0.78	0.73	0.72	3.36		
PRT	0.76	0.80	0.79	0.78	0.89	0.86	0.83	0.70	0.85	0.76	0.78	0.79	0.84	0.87	0.71	0.83	0.79	0.87	0.78	0.85	0.70	2.00	
SVN	0.76	0.88	0.85	0.89	0.90	0.87	0.92	0.84	0.88	0.84	0.92	0.86	0.86	0.85	0.70	0.79	0.87	0.84	0.86	0.84	0.76	0.77	20.74

HOL   ang

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN
AUS	0.43																					
BEL	0.60	1.17																				
CAN	0.65	0.75	6.51																			
CHE	0.60	0.76	0.88	11.71																		
DEU	0.62	0.67	0.72	0.69	12.74																	
DFS	0.68	0.85	0.89	0.81	0.73	10.53																
ESP	0.64	0.75	0.88	0.78	0.67	0.84	0.73															
FRA	0.63	0.83	0.88	0.86	0.70	0.88	0.83	0.94														
GBR	0.77	0.75	0.91	0.80	0.70	0.87	0.81	0.81	1.50													
ITA	0.67	0.73	0.90	0.78	0.70	0.84	0.86	0.81	0.85	1.29												
NLD	0.72	0.61	0.81	0.75	0.62	0.71	0.78	0.67	0.83	0.78	4.47											
USA	0.67	0.75	0.93	0.81	0.73	0.90	0.84	0.85	0.90	0.85	0.75	1.38										
HUN	0.60	0.71	0.76	0.70	0.73	0.78	0.70	0.81	0.71	0.74	0.60	0.79	1.02									
POL	0.60	0.67	0.70	0.66	0.61	0.72	0.78	0.72	0.65	0.79	0.64	0.68	0.60	10.15								
ZAF	0.63	0.80	0.71	0.67	0.69	0.79	0.69	0.73	0.86	0.74	0.61	0.76	0.78	0.62	0.72							
JPN	0.65	0.80	0.90	0.81	0.71	0.91	0.87	0.85	0.86	0.91	0.78	0.88	0.76	0.76	0.77	1.43						
CZE	0.65	0.77	0.82	0.74	0.68	0.85	0.74	0.77	0.75	0.79	0.63	0.77	0.80	0.64	0.68	0.79	14.54					
EST	0.63	0.78	0.62	0.63	0.67	0.79	0.62	0.67	0.64	0.61	0.60	0.61	0.75	0.64	0.72	0.69	0.72	24.70				
IRL	0.73	0.72	0.87	0.77	0.71	0.83	0.80	0.82	0.92	0.83	0.74	0.89	0.73	0.64	0.81	0.85	0.76	0.61	0.74			
KOR	0.69	0.77	0.78	0.72	0.67	0.74	0.76	0.74	0.78	0.73	0.63	0.76	0.76	0.62	0.76	0.84	0.69	0.69	0.75	2.29		
PRT	0.60	0.69	0.77	0.63	0.68	0.78	0.74	0.73	0.77	0.78	0.60	0.79	0.70	0.65	0.69	0.79	0.73	0.62	0.75	0.78	1.25	

SVN	0.68	0.65	0.74	0.75	0.61	0.66	0.70	0.67	0.70	0.74	0.73	0.67	0.61	0.84	0.64	0.69	0.64	0.72	0.64	0.72	0.62	21.37

HOL   ran

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.63																						
BEL	0.94	1.48																					
CAN	0.92	0.97	6.10																				
CHE	0.93	0.96	0.96	11.39																			
DEU	0.93	0.97	0.98	0.95	12.21																		
DFS	0.92	0.98	0.98	0.96	0.98	11.61																	
ESP	0.92	0.97	0.97	0.97	0.97	0.96	0.97																
FRA	0.95	0.98	0.97	0.97	0.97	0.96	0.97	1.07															
GBR	0.94	0.96	0.97	0.95	0.97	0.95	0.96	0.98	1.42														
ITA	0.90	0.95	0.95	0.93	0.96	0.94	0.95	0.96	0.95	1.51													
NLD	0.91	0.96	0.97	0.95	0.98	0.96	0.97	0.96	0.97	0.94	5.06												
USA	0.91	0.95	0.97	0.95	0.96	0.96	0.96	0.96	0.97	0.94	0.96	1.46											
HUN	0.92	0.96	0.96	0.95	0.97	0.96	0.97	0.97	0.95	0.95	0.95	0.94	1.05										
POL	0.90	0.95	0.96	0.94	0.96	0.95	0.96	0.94	0.94	0.95	0.95	0.92	0.95	11.23									
NZL	0.95	0.90	0.90	0.90	0.90	0.90	0.90	0.93	0.94	0.90	0.90	0.90	0.90	0.90	0.34								
ZAF	0.95	0.95	0.92	0.92	0.93	0.93	0.93	0.95	0.94	0.90	0.93	0.92	0.94	0.90	0.91	0.88							
JPN	0.90	0.95	0.98	0.96	0.96	0.97	0.96	0.94	0.92	0.94	0.95	0.94	0.95	0.95	0.89	0.90	1.44						
CZE	0.90	0.94	0.96	0.92	0.97	0.95	0.95	0.94	0.96	0.94	0.96	0.96	0.95	0.94	0.89	0.90	0.93	14.58					
EST	0.90	0.93	0.94	0.90	0.95	0.94	0.92	0.92	0.93	0.92	0.96	0.93	0.90	0.94	0.87	0.89	0.92	0.94	19.04				
IRL	0.94	0.92	0.93	0.93	0.94	0.91	0.92	0.96	0.98	0.92	0.94	0.94	0.91	0.90	0.94	0.91	0.90	0.91	0.90	1.75			
KOR	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.89	0.89	4.91		
SVN	0.91	0.96	0.95	0.93	0.95	0.96	0.94	0.95	0.93	0.94	0.93	0.93	0.93	0.94	0.89	0.89	0.95	0.91	0.92	0.91	0.89	17.92	
PRT	0.90	0.92	0.92	0.91	0.94	0.92	0.94	0.93	0.94	0.92	0.93	0.93	0.93	0.92	0.90	0.90	0.90	0.93	0.90	0.90	0.90	0.93	1.79

HOL   rwi

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	PRT	SVN
AUS	0.53																						
BEL	0.86	1.46																					
CAN	0.89	0.95	5.83																				
CHE	0.87	0.95	0.93	11.11																			
DEU	0.84	0.93	0.95	0.89	11.44																		
DFS	0.82	0.92	0.94	0.89	0.97	12.33																	
ESP	0.90	0.93	0.97	0.91	0.95	0.94	1.00																
FRA	0.88	0.96	0.97	0.93	0.95	0.95	0.95	1.11															
GBR	0.86	0.91	0.94	0.87	0.90	0.91	0.92	0.94	1.33														
ITA	0.80	0.84	0.88	0.81	0.84	0.84	0.88	0.89	0.90	1.30													
NLD	0.86	0.95	0.94	0.93	0.96	0.93	0.94	0.95	0.89	0.80	4.79												
USA	0.80	0.84	0.91	0.80	0.84	0.87	0.88	0.89	0.94	0.89	0.81	1.28											
HUN	0.80	0.91	0.92	0.85	0.92	0.91	0.89	0.93	0.90	0.89	0.89	0.88	1.02										
POL	0.82	0.90	0.92	0.89	0.90	0.90	0.90	0.90	0.88	0.86	0.88	0.82	0.91	11.23									
NZL	0.86	0.84	0.86	0.80	0.81	0.80	0.85	0.84	0.87	0.80	0.83	0.81	0.80	0.80	0.31								
ZAF	0.80	0.82	0.85	0.80	0.84	0.84	0.80	0.84	0.91	0.80	0.80	0.87	0.85	0.81	0.80	0.89							
JPN	0.84	0.95	0.96	0.93	0.94	0.95	0.94	0.97	0.93	0.90	0.93	0.90	0.93	0.92	0.84	0.86	1.32						
CZE	0.83	0.92	0.94	0.88	0.95	0.93	0.94	0.92	0.90	0.86	0.93	0.86	0.91	0.91	0.84	0.82	0.93	14.96					
EST	0.81	0.90	0.91	0.91	0.92	0.89	0.89	0.89	0.85	0.84	0.92	0.80	0.88	0.92	0.81	0.82	0.89	0.92	17.14				
IRL	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.87	0.80	0.80	0.85	0.80	0.80	0.80	0.80	0.80	0.80	0.82	1.58			
KOR	0.80	0.84	0.81	0.81	0.81	0.80	0.80	0.83	0.80	0.80	0.80	0.80	0.82	0.80	0.80	0.80	0.80	0.83	0.80	0.81	3.37		
PRT	0.80	0.85	0.87	0.80	0.88	0.89	0.86	0.87	0.85	0.84	0.82	0.85	0.88	0.84	0.80	0.83	0.86	0.86	0.81	0.80	0.80	1.73	
SVN	0.83	0.90	0.93	0.90	0.92	0.92	0.93	0.90	0.90	0.81	0.92	0.84	0.86	0.90	0.81	0.84	0.91	0.91	0.91	0.81	0.81	0.81	21.57

HOL   rls

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.31																						
BEL	0.80	1.84																					
CAN	0.74	0.95	6.26																				
CHE	0.81	0.93	0.93	11.65																			
DEU	0.75	0.94	0.95	0.91	11.94																		
DFS	0.73	0.94	0.97	0.91	0.96	13.30																	
ESP	0.75	0.95	0.95	0.92	0.96	0.95	1.19																

```
FRA    0.80   0.91   0.88   0.90   0.89   0.88   0.91   1.07
GBR    0.82   0.87   0.84   0.86   0.86   0.82   0.83   0.91   1.44
ITA    0.72   0.89   0.89   0.85   0.90   0.90   0.90   0.89   0.82   1.53
NLD    0.75   0.91   0.92   0.91   0.94   0.92   0.92   0.89   0.87   0.87   5.24
USA    0.73   0.95   0.96   0.89   0.93   0.95   0.95   0.87   0.82   0.88   0.90   1.64
HUN    0.76   0.92   0.92   0.87   0.94   0.91   0.94   0.88   0.83   0.90   0.87   0.91   1.01
POL    0.74   0.92   0.92   0.87   0.95   0.91   0.92   0.89   0.81   0.89   0.86   0.90   0.94   12.01
NZL    0.73   0.72   0.72   0.72   0.72   0.72   0.72   0.72   0.75   0.72   0.72   0.72   0.72   0.72   0.16
ZAF    0.85   0.81   0.78   0.79   0.75   0.72   0.79   0.84   0.87   0.72   0.76   0.78   0.76   0.80   0.72   0.84
JPN    0.73   0.92   0.97   0.89   0.95   0.97   0.94   0.87   0.80   0.89   0.89   0.94   0.90   0.93   0.72   0.72   1.77
CZE    0.75   0.91   0.92   0.83   0.94   0.92   0.91   0.87   0.85   0.87   0.88   0.91   0.92   0.94   0.72   0.77   0.92   15.37
EST    0.73   0.86   0.85   0.85   0.90   0.88   0.88   0.84   0.74   0.84   0.90   0.85   0.84   0.88   0.71   0.71   0.86   0.82   20.96
IRL    0.81   0.78   0.73   0.79   0.75   0.73   0.73   0.82   0.90   0.73   0.77   0.73   0.73   0.72   0.74   0.80   0.72   0.74   0.72   1.56
KOR    0.72   0.81   0.84   0.80   0.83   0.86   0.87   0.81   0.73   0.78   0.82   0.85   0.84   0.81   0.72   0.72   0.86   0.80   0.75   0.72   2.29
SVN    0.73   0.90   0.94   0.90   0.93   0.95   0.91   0.89   0.81   0.88   0.91   0.91   0.90   0.88   0.72   0.71   0.92   0.86   0.88   0.72   0.81   22.68
PRT    0.73   0.86   0.83   0.78   0.84   0.84   0.85   0.83   0.77   0.84   0.80   0.84   0.84   0.81   0.72   0.72   0.82   0.81   0.73   0.72   0.80   0.82   2.40
```

HOL   rlr

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.25																					
BEL	0.64	1.80																				
CAN	0.58	0.85	6.85																			
CHE	0.70	0.85	0.75	12.13																		
DEU	0.61	0.92	0.89	0.74	11.37																	
DFS	0.56	0.88	0.90	0.74	0.93	12.88																
ESP	0.59	0.87	0.87	0.72	0.87	0.90	1.12															
FRA	0.70	0.92	0.84	0.86	0.85	0.82	0.87	1.07														
GBR	0.54	0.65	0.69	0.56	0.65	0.61	0.70	0.64	1.51													
ITA	0.57	0.78	0.81	0.66	0.77	0.74	0.80	0.82	0.70	1.89												
NLD	0.57	0.89	0.88	0.71	0.92	0.91	0.84	0.83	0.65	0.75	4.04											
USA	0.54	0.78	0.87	0.62	0.76	0.82	0.79	0.77	0.67	0.87	0.80	1.79										
HUN	0.61	0.84	0.76	0.76	0.80	0.77	0.75	0.81	0.54	0.76	0.75	0.78	1.12									
POL	0.54	0.81	0.82	0.67	0.78	0.82	0.76	0.80	0.54	0.78	0.74	0.76	0.71	14.88								
ZAF	0.57	0.72	0.56	0.60	0.55	0.55	0.54	0.63	0.54	0.63	0.55	0.70	0.64	0.62	0.73							
JPN	0.59	0.82	0.88	0.76	0.84	0.91	0.80	0.81	0.54	0.69	0.82	0.77	0.75	0.76	0.55	2.01						
CZE	0.55	0.83	0.81	0.69	0.85	0.81	0.77	0.78	0.56	0.82	0.78	0.79	0.78	0.84	0.68	0.73	16.66					
EST	0.56	0.66	0.57	0.56	0.73	0.76	0.59	0.58	0.55	0.55	0.71	0.56	0.56	0.59	0.53	0.76	0.60	19.25				
IRL	0.54	0.55	0.57	0.54	0.55	0.54	0.60	0.56	0.72	0.67	0.55	0.55	0.54	0.55	0.54	0.54	0.55	0.57	1.65			
KOR	0.56	0.70	0.76	0.63	0.72	0.77	0.80	0.77	0.54	0.70	0.71	0.73	0.65	0.71	0.55	0.74	0.72	0.60	0.55	2.10		
SVN	0.55	0.88	0.78	0.73	0.85	0.86	0.78	0.82	0.55	0.72	0.86	0.79	0.82	0.71	0.55	0.84	0.74	0.67	0.55	0.68	25.54	
PRT	0.54	0.84	0.73	0.67	0.85	0.75	0.76	0.80	0.59	0.72	0.75	0.69	0.71	0.75	0.55	0.67	0.78	0.60	0.54	0.69	0.85	2.51

HOL   fan

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.33																					
BEL	0.69	2.10																				
CAN	0.65	0.83	7.22																			
CHE	0.67	0.84	0.78	11.75																		
DEU	0.71	0.88	0.82	0.76	12.74																	
DFS	0.65	0.91	0.87	0.77	0.86	12.94																
ESP	0.67	0.77	0.86	0.68	0.85	0.81	1.01															
FRA	0.79	0.79	0.78	0.72	0.90	0.72	0.85	1.04														
GBR	0.77	0.79	0.82	0.70	0.92	0.76	0.85	0.92	1.44													
ITA	0.65	0.69	0.76	0.66	0.76	0.71	0.75	0.73	0.75	1.62												
NLD	0.70	0.78	0.75	0.71	0.91	0.78	0.79	0.85	0.89	0.73	5.05											
USA	0.66	0.75	0.87	0.69	0.84	0.80	0.85	0.82	0.84	0.85	0.81	1.60										
HUN	0.75	0.76	0.76	0.76	0.87	0.72	0.84	0.91	0.87	0.68	0.81	0.80	1.17									
POL	0.65	0.71	0.75	0.70	0.71	0.71	0.71	0.70	0.68	0.72	0.65	0.75	0.73	13.13								
ZAF	0.85	0.77	0.77	0.74	0.83	0.71	0.78	0.86	0.87	0.70	0.75	0.80	0.87	0.65	0.89							
JPN	0.75	0.76	0.73	0.83	0.81	0.73	0.76	0.79	0.75	0.67	0.79	0.76	0.85	0.66	0.76	2.13						
CZE	0.73	0.86	0.83	0.74	0.91	0.83	0.85	0.88	0.85	0.74	0.81	0.83	0.92	0.74	0.80	0.86	15.71					
EST	0.74	0.72	0.70	0.71	0.83	0.75	0.86	0.84	0.80	0.65	0.84	0.74	0.83	0.65	0.72	0.87	0.86	23.61				
IRL	0.69	0.68	0.73	0.65	0.80	0.67	0.74	0.76	0.90	0.69	0.75	0.72	0.70	0.65	0.74	0.65	0.71	0.67	1.59			
KOR	0.65	0.65	0.71	0.65	0.72	0.65	0.77	0.74	0.72	0.66	0.67	0.74	0.75	0.66	0.65	0.65	0.72	0.66	0.65	1.58		
SVN	0.65	0.66	0.72	0.65	0.75	0.75	0.72	0.65	0.68	0.65	0.65	0.72	0.66	0.66	0.65	0.66	0.72	0.65	0.71	0.65	22.04	

```
PRT    0.65   0.65   0.65   0.65   0.75   0.65   0.71   0.74   0.67   0.65   0.68   0.73   0.65   0.65   0.66   0.65   0.71   0.74   0.65   0.73   0.70   2.17

------------------------------------------------------------------------------
HOL    fua
------------------------------------------------------------------------------
        AUS    BEL    CAN    CHE    DEU    DFS    ESP    FRA    GBR    ITA    NLD    USA    HUN    POL    NZL    ZAF    JPN    CZE    EST    IRL    KOR    SVN    PRT
AUS    0.37
BEL    0.75   1.49
CAN    0.79   0.77   5.46
CHE    0.84   0.80   0.92  11.86
DEU    0.76   0.83   0.93   0.86  12.32
DFS    0.79   0.85   0.91   0.89   0.89  11.76
ESP    0.79   0.78   0.88   0.85   0.83   0.83   0.85
FRA    0.80   0.90   0.90   0.88   0.91   0.92   0.84   1.07
GBR    0.79   0.78   0.95   0.88   0.96   0.87   0.87   0.90   1.35
ITA    0.72   0.68   0.88   0.82   0.86   0.77   0.85   0.80   0.90   1.33
NLD    0.77   0.87   0.93   0.90   0.95   0.90   0.86   0.93   0.93   0.82   4.96
USA    0.76   0.69   0.94   0.86   0.90   0.84   0.89   0.84   0.94   0.93   0.88   1.42
HUN    0.81   0.74   0.89   0.87   0.86   0.88   0.82   0.85   0.86   0.80   0.86   0.82   1.03
POL    0.72   0.81   0.85   0.84   0.91   0.88   0.79   0.88   0.88   0.78   0.87   0.80   0.84  11.82
NZL    0.78   0.77   0.83   0.79   0.84   0.80   0.79   0.86   0.88   0.78   0.84   0.84   0.73   0.77   0.42
ZAF    0.77   0.78   0.86   0.82   0.89   0.87   0.81   0.84   0.88   0.74   0.86   0.82   0.83   0.77   0.78   0.85
JPN    0.77   0.75   0.95   0.91   0.89   0.91   0.84   0.86   0.91   0.86   0.89   0.91   0.88   0.86   0.81   0.81   1.44
CZE    0.78   0.85   0.89   0.86   0.94   0.91   0.80   0.90   0.90   0.77   0.91   0.80   0.92   0.90   0.77   0.91   0.87  14.23
EST    0.69   0.74   0.79   0.77   0.81   0.84   0.68   0.81   0.78   0.69   0.81   0.70   0.82   0.79   0.72   0.79   0.71   0.83  19.13
IRL    0.79   0.74   0.84   0.81   0.85   0.75   0.86   0.82   0.92   0.87   0.82   0.88   0.71   0.77   0.84   0.79   0.79   0.77   0.69   1.17
KOR    0.71   0.75   0.69   0.76   0.70   0.78   0.73   0.75   0.69   0.68   0.72   0.68   0.77   0.74   0.68   0.81   0.73   0.79   0.72   0.69   3.30
SVN    0.68   0.79   0.68   0.69   0.69   0.68   0.68   0.69   0.69   0.68   0.68   0.68   0.68   0.68   0.68   0.67   0.68   0.69   0.68   0.68   0.72  17.61
PRT    0.68   0.72   0.68   0.68   0.68   0.68   0.71   0.68   0.68   0.68   0.68   0.68   0.68   0.68   0.69   0.68   0.68   0.68   0.68   0.68   0.68   0.69   1.50

------------------------------------------------------------------------------
HOL    ruh
------------------------------------------------------------------------------
        AUS    BEL    CAN    CHE    DEU    DFS    ESP    FRA    GBR    ITA    NLD    USA    HUN    POL    NZL    ZAF    JPN    CZE    EST    IRL    KOR    SVN    PRT
AUS    0.40
BEL    0.83   1.25
CAN    0.78   0.91   5.49
CHE    0.82   0.90   0.92  11.11
DEU    0.82   0.89   0.88   0.88  13.11
DFS    0.78   0.90   0.87   0.91   0.95  11.54
ESP    0.82   0.86   0.83   0.85   0.91   0.91   0.81
FRA    0.78   0.89   0.87   0.88   0.90   0.93   0.89   1.08
GBR    0.79   0.82   0.75   0.81   0.86   0.89   0.87   0.88   1.37
ITA    0.75   0.75   0.75   0.75   0.82   0.85   0.89   0.82   0.86   1.29
NLD    0.76   0.83   0.75   0.83   0.92   0.92   0.90   0.87   0.88   0.84   4.36
USA    0.77   0.83   0.82   0.84   0.89   0.92   0.89   0.88   0.93   0.88   0.85   1.50
HUN    0.82   0.77   0.79   0.78   0.86   0.83   0.88   0.82   0.82   0.82   0.81   0.82   0.97
POL    0.75   0.83   0.75   0.76   0.83   0.86   0.86   0.83   0.83   0.83   0.84   0.79   0.79  10.60
NZL    0.80   0.80   0.75   0.82   0.82   0.86   0.83   0.84   0.91   0.80   0.83   0.89   0.82   0.77   0.40
ZAF    0.75   0.76   0.75   0.79   0.77   0.82   0.79   0.75   0.86   0.78   0.77   0.81   0.75   0.75   0.79   0.80
JPN    0.81   0.91   0.92   0.92   0.90   0.92   0.92   0.90   0.82   0.84   0.86   0.87   0.86   0.85   0.82   0.78   1.46
CZE    0.82   0.88   0.88   0.84   0.89   0.86   0.80   0.83   0.75   0.75   0.76   0.79   0.85   0.75   0.76   0.76   0.86  15.00
EST    0.74   0.80   0.80   0.75   0.83   0.83   0.85   0.80   0.77   0.77   0.78   0.83   0.84   0.79   0.77   0.75   0.85   0.80  17.55
IRL    0.75   0.76   0.75   0.76   0.79   0.82   0.84   0.79   0.92   0.86   0.81   0.88   0.77   0.76   0.83   0.79   0.77   0.74   0.76   1.03
KOR    0.75   0.84   0.83   0.76   0.75   0.75   0.75   0.75   0.75   0.75   0.75   0.75   0.75   0.75   0.75   0.75   0.83   0.78   0.74   0.75   3.52
SVN    0.76   0.91   0.85   0.80   0.87   0.86   0.82   0.83   0.76   0.75   0.81   0.76   0.75   0.76   0.74   0.73   0.84   0.84   0.83   0.73   0.80  16.00
PRT    0.75   0.78   0.75   0.75   0.79   0.83   0.84   0.80   0.86   0.84   0.81   0.80   0.79   0.80   0.75   0.76   0.78   0.75   0.75   0.80   0.75   0.76   1.33

------------------------------------------------------------------------------
HOL    usu
------------------------------------------------------------------------------
        AUS    BEL    CAN    CHE    DEU    DFS    ESP    FRA    GBR    ITA    NLD    USA    HUN    POL    NZL    ZAF    JPN    CZE    EST    IRL    KOR    SVN    PRT
AUS    0.36
BEL    0.65   1.51
CAN    0.79   0.76   5.63
CHE    0.77   0.88   0.90  11.91
DEU    0.74   0.79   0.92   0.92  11.64
DFS    0.70   0.86   0.80   0.90   0.82  11.51
ESP    0.79   0.69   0.84   0.81   0.79   0.80   0.78
```

```
FRA    0.74    0.85    0.78    0.86    0.74    0.91    0.82    1.07
GBR    0.81    0.65    0.81    0.80    0.76    0.82    0.91    0.88    1.33
ITA    0.73    0.70    0.80    0.79    0.79    0.79    0.90    0.82    0.89    1.39
NLD    0.79    0.80    0.84    0.87    0.80    0.90    0.89    0.92    0.92    0.82    4.42
USA    0.79    0.69    0.82    0.79    0.75    0.86    0.91    0.88    0.95    0.88    0.90    1.48
HUN    0.72    0.90    0.81    0.91    0.85    0.91    0.77    0.90    0.77    0.78    0.85    0.79    1.01
POL    0.67    0.76    0.82    0.84    0.89    0.80    0.75    0.71    0.70    0.76    0.75    0.71    0.83    11.38
NZL    0.63    0.63    0.63    0.63    0.63    0.63    0.67    0.63    0.63    0.64    0.63    0.64    0.63    0.64    0.40
ZAF    0.79    0.64    0.67    0.65    0.63    0.75    0.78    0.75    0.81    0.68    0.78    0.83    0.75    0.65    0.64    0.83
JPN    0.63    0.95    0.72    0.84    0.72    0.85    0.63    0.88    0.65    0.66    0.78    0.68    0.88    0.71    0.62    0.63    1.64
CZE    0.63    0.87    0.80    0.86    0.87    0.76    0.64    0.70    0.63    0.69    0.69    0.63    0.88    0.85    0.63    0.63    0.81    14.47
EST    0.69    0.89    0.82    0.86    0.86    0.83    0.69    0.81    0.70    0.67    0.82    0.69    0.85    0.80    0.62    0.63    0.86    0.87    19.19
IRL    0.79    0.69    0.83    0.80    0.79    0.75    0.88    0.80    0.91    0.87    0.84    0.86    0.76    0.75    0.70    0.75    0.64    0.68    0.70    1.07
KOR    0.67    0.69    0.84    0.77    0.82    0.68    0.74    0.64    0.63    0.76    0.65    0.70    0.74    0.82    0.63    0.64    0.65    0.75    0.66    0.69    2.70
SVN    0.65    0.76    0.83    0.78    0.87    0.70    0.65    0.63    0.63    0.63    0.64    0.63    0.70    0.80    0.62    0.60    0.70    0.86    0.84    0.68    0.69    20.66
PRT    0.69    0.65    0.76    0.74    0.81    0.69    0.79    0.63    0.73    0.78    0.72    0.70    0.72    0.74    0.63    0.63    0.63    0.71    0.64    0.76    0.71    0.67    1.61
```

HOL   ude

```
       AUS    BEL    CAN    CHE    DEU    DFS    ESP    FRA    GBR    ITA    NLD    USA    HUN    POL    ZAF    JPN    CZE    EST    IRL    KOR    SVN    PRT
AUS    0.57
BEL    0.92    1.36
CAN    0.92    0.96    5.41
CHE    0.94    0.95    0.95    11.76
DEU    0.92    0.96    0.98    0.96    13.17
DFS    0.91    0.95    0.97    0.96    0.97    11.84
ESP    0.92    0.97    0.98    0.96    0.97    0.97    1.05
FRA    0.93    0.97    0.97    0.98    0.98    0.97    0.97    1.11
GBR    0.91    0.97    0.97    0.95    0.96    0.94    0.96    0.97    1.32
ITA    0.91    0.95    0.96    0.96    0.96    0.95    0.98    0.97    0.95    1.36
NLD    0.92    0.96    0.97    0.97    0.98    0.96    0.97    0.98    0.97    0.95    4.87
USA    0.91    0.95    0.96    0.96    0.96    0.97    0.97    0.97    0.97    0.96    0.96    1.48
HUN    0.90    0.95    0.96    0.95    0.95    0.95    0.96    0.95    0.95    0.95    0.95    0.95    1.01
POL    0.91    0.95    0.93    0.94    0.95    0.93    0.94    0.94    0.93    0.93    0.94    0.93    0.94    11.11
ZAF    0.91    0.93    0.94    0.91    0.93    0.91    0.92    0.92    0.95    0.91    0.93    0.95    0.91    0.91    0.92
JPN    0.90    0.95    0.97    0.96    0.96    0.97    0.98    0.97    0.95    0.97    0.95    0.97    0.95    0.95    0.90    1.22
CZE    0.92    0.96    0.97    0.94    0.96    0.94    0.95    0.94    0.95    0.94    0.95    0.93    0.96    0.93    0.94    0.93    13.71
EST    0.90    0.92    0.94    0.92    0.93    0.94    0.94    0.91    0.92    0.92    0.93    0.94    0.93    0.94    0.91    0.93    0.94    15.71
IRL    0.91    0.93    0.91    0.92    0.91    0.90    0.92    0.92    0.96    0.90    0.93    0.93    0.90    0.90    0.95    0.90    0.90    0.89    1.30
KOR    0.90    0.90    0.90    0.90    0.90    0.90    0.91    0.90    0.90    0.90    0.90    0.90    0.90    0.90    0.90    0.90    0.92    0.90    0.90    4.72
SVN    0.90    0.93    0.94    0.92    0.95    0.92    0.93    0.93    0.91    0.94    0.94    0.91    0.93    0.94    0.90    0.92    0.95    0.93    0.89    0.90    16.28
PRT    0.90    0.92    0.91    0.90    0.91    0.90    0.91    0.90    0.90    0.92    0.91    0.90    0.90    0.90    0.91    0.90    0.93    0.90    0.90    0.90    0.90    1.58
```

HOL   ftp

```
       AUS    BEL    CAN    CHE    DEU    DFS    ESP    FRA    GBR    ITA    NLD    USA    HUN    POL    NZL    ZAF    JPN    CZE    EST    IRL    KOR    SVN    PRT
AUS    0.61
BEL    0.95    1.46
CAN    0.95    0.96    5.97
CHE    0.97    0.97    0.98    11.93
DEU    0.95    0.95    0.98    0.96    13.88
DFS    0.91    0.96    0.96    0.94    0.95    10.79
ESP    0.94    0.92    0.97    0.95    0.97    0.93    0.93
FRA    0.94    0.99    0.97    0.97    0.95    0.96    0.92    1.10
GBR    0.93    0.90    0.96    0.93    0.96    0.91    0.96    0.90    1.39
ITA    0.85    0.85    0.87    0.85    0.86    0.86    0.85    0.85    0.87    1.20
NLD    0.94    0.97    0.98    0.97    0.98    0.95    0.95    0.97    0.95    0.85    5.17
USA    0.87    0.87    0.93    0.88    0.92    0.92    0.92    0.87    0.95    0.87    0.90    1.39
HUN    0.95    0.93    0.95    0.95    0.96    0.91    0.96    0.92    0.92    0.85    0.94    0.88    0.93
POL    0.88    0.88    0.93    0.89    0.93    0.89    0.92    0.88    0.92    0.85    0.93    0.88    0.90    11.76
NZL    0.92    0.89    0.92    0.90    0.90    0.86    0.88    0.90    0.91    0.85    0.91    0.87    0.89    0.88    0.32
ZAF    0.92    0.91    0.94    0.93    0.92    0.89    0.93    0.92    0.93    0.85    0.92    0.88    0.93    0.87    0.90    0.83
JPN    0.93    0.99    0.97    0.97    0.95    0.95    0.93    0.98    0.90    0.85    0.97    0.86    0.92    0.89    0.89    0.92    1.50
CZE    0.95    0.95    0.96    0.95    0.95    0.92    0.95    0.93    0.93    0.85    0.95    0.88    0.96    0.91    0.90    0.92    0.95    13.06
EST    0.95    0.95    0.96    0.95    0.94    0.91    0.94    0.94    0.92    0.86    0.96    0.86    0.93    0.91    0.89    0.90    0.96    0.96    18.83
IRL    0.91    0.87    0.93    0.91    0.94    0.89    0.92    0.87    0.96    0.85    0.91    0.90    0.89    0.87    0.88    0.90    0.88    0.88    0.90    1.32
KOR    0.89    0.91    0.90    0.91    0.89    0.90    0.90    0.90    0.86    0.85    0.89    0.85    0.91    0.86    0.85    0.91    0.92    0.90    0.90    0.85    3.27
```

SVN	0.94	0.94	0.96	0.95	0.97	0.94	0.96	0.93	0.94	0.85	0.95	0.89	0.94	0.88	0.87	0.87	0.93	0.92	0.93	0.92	0.88	16.21
PRT	0.89	0.88	0.92	0.89	0.93	0.87	0.93	0.86	0.93	0.85	0.90	0.88	0.92	0.91	0.85	0.87	0.89	0.91	0.90	0.88	0.86	0.92	1.53

HOL   ftl

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	ZAF	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.78																					
BEL	0.94	1.42																				
CAN	0.95	0.93	5.28																			
CHE	0.93	0.97	0.91	11.35																		
DEU	0.95	0.98	0.95	0.96	13.59																	
DFS	0.93	0.97	0.93	0.98	0.98	10.83																
ESP	0.93	0.98	0.93	0.96	0.98	0.97	1.09															
FRA	0.95	0.91	0.98	0.90	0.93	0.92	0.91	1.07														
GBR	0.95	0.97	0.96	0.95	0.98	0.95	0.97	0.94	1.32													
ITA	0.90	0.93	0.93	0.91	0.93	0.92	0.93	0.92	0.95	1.44												
NLD	0.94	0.98	0.93	0.97	0.98	0.97	0.98	0.91	0.97	0.92	4.96											
USA	0.95	0.95	0.96	0.94	0.96	0.95	0.96	0.94	0.97	0.94	0.95	1.45										
HUN	0.90	0.96	0.90	0.96	0.94	0.95	0.95	0.90	0.92	0.90	0.95	0.90	1.12									
POL	0.93	0.96	0.91	0.96	0.97	0.97	0.96	0.90	0.95	0.92	0.96	0.94	0.95	11.14								
ZAF	0.93	0.93	0.90	0.92	0.92	0.93	0.94	0.90	0.92	0.90	0.92	0.91	0.91	0.93	0.87							
JPN	0.95	0.98	0.94	0.97	0.98	0.98	0.98	0.92	0.97	0.93	0.98	0.97	0.95	0.98	0.94	1.42						
CZE	0.93	0.96	0.92	0.97	0.97	0.97	0.97	0.91	0.96	0.92	0.97	0.95	0.95	0.97	0.92	0.98	14.31					
EST	0.92	0.94	0.90	0.94	0.96	0.96	0.94	0.90	0.93	0.91	0.94	0.91	0.94	0.96	0.90	0.95	0.96	16.31				
IRL	0.92	0.95	0.94	0.91	0.96	0.93	0.94	0.93	0.98	0.93	0.93	0.94	0.90	0.92	0.90	0.94	0.94	0.91	1.73			
KOR	0.91	0.93	0.90	0.94	0.93	0.94	0.94	0.90	0.93	0.90	0.94	0.92	0.92	0.93	0.90	0.95	0.93	0.91	0.90	4.44		
SVN	0.90	0.94	0.90	0.95	0.95	0.94	0.95	0.90	0.95	0.93	0.96	0.92	0.92	0.95	0.90	0.95	0.94	0.93	0.92	0.91	17.60	
PRT	0.90	0.95	0.91	0.93	0.95	0.94	0.93	0.90	0.94	0.91	0.94	0.93	0.91	0.94	0.90	0.94	0.95	0.93	0.93	0.90	0.90	1.88

HOL   rtp

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	POL	NZL	JPN	CZE	EST	IRL	KOR	SVN	PRT	ZAF	HUN
AUS	0.43																						
BEL	0.93	1.44																					
CAN	0.91	0.97	6.08																				
CHE	0.92	0.97	0.98	12.00																			
DEU	0.90	0.96	0.97	0.97	14.07																		
DFS	0.90	0.94	0.95	0.95	0.96	11.01																	
ESP	0.90	0.96	0.97	0.96	0.98	0.96	0.89																
FRA	0.92	0.97	0.98	0.98	0.97	0.96	0.98	1.05															
GBR	0.92	0.96	0.97	0.96	0.97	0.95	0.97	0.98	1.48														
ITA	0.89	0.90	0.89	0.89	0.93	0.92	0.92	0.92	0.91	1.30													
NLD	0.92	0.96	0.98	0.97	0.98	0.97	0.98	0.98	0.98	0.91	5.09												
USA	0.90	0.94	0.95	0.93	0.95	0.97	0.96	0.94	0.97	0.91	0.96	1.60											
POL	0.89	0.93	0.94	0.92	0.96	0.93	0.96	0.94	0.94	0.91	0.95	0.91	11.27										
NZL	0.93	0.95	0.95	0.94	0.94	0.91	0.93	0.95	0.95	0.89	0.95	0.91	0.93	0.47									
JPN	0.91	0.97	0.98	0.97	0.96	0.96	0.98	0.97	0.96	0.91	0.98	0.96	0.94	0.94	1.58								
CZE	0.90	0.97	0.95	0.95	0.96	0.94	0.94	0.94	0.95	0.90	0.94	0.94	0.95	0.93	0.95	14.76							
EST	0.92	0.95	0.95	0.95	0.96	0.91	0.94	0.94	0.94	0.89	0.96	0.91	0.93	0.92	0.94	0.94	16.78						
IRL	0.90	0.94	0.95	0.93	0.94	0.93	0.94	0.95	0.95	0.89	0.94	0.93	0.90	0.94	0.94	0.90	0.90	1.29					
KOR	0.89	0.91	0.93	0.93	0.93	0.93	0.95	0.92	0.90	0.91	0.93	0.91	0.90	0.90	0.94	0.89	0.90	0.90	2.23				
SVN	0.89	0.92	0.94	0.94	0.96	0.92	0.96	0.94	0.94	0.91	0.95	0.91	0.94	0.92	0.91	0.92	0.93	0.91	0.92	14.58			
PRT	0.89	0.90	0.91	0.89	0.91	0.89	0.92	0.90	0.92	0.89	0.89	0.90	0.91	0.90	0.90	0.89	0.89	0.89	0.89	0.92	1.55		
ZAF	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.56	
HUN	0.89	0.95	0.94	0.94	0.97	0.95	0.96	0.96	0.96	0.91	0.97	0.95	0.96	0.92	0.95	0.95	0.94	0.91	0.89	0.95	0.90	0.89	1.07

HOL   ocs

	AUS	BEL	CAN	CHE	DEU	DFS	ESP	FRA	GBR	ITA	NLD	USA	HUN	POL	NZL	JPN	CZE	EST	IRL	KOR	SVN	PRT
AUS	0.98																					
BEL	0.58	1.26																				
CAN	0.59	0.75	5.67																			
CHE	0.62	0.79	0.92	11.55																		
DEU	0.58	0.75	0.83	0.85	12.97																	
DFS	0.65	0.75	0.76	0.80	0.86	10.24																
ESP	0.66	0.75	0.78	0.81	0.86	0.86	0.80															

```
FRA   0.58   0.76   0.76   0.88   0.86   0.87   0.88   1.10
GBR   0.67   0.75   0.83   0.91   0.92   0.87   0.87   0.89   1.04
ITA   0.55   0.75   0.79   0.83   0.82   0.81   0.85   0.87   0.83   0.79
NLD   0.59   0.75   0.76   0.82   0.89   0.88   0.86   0.85   0.88   0.79   2.88
USA   0.61   0.75   0.82   0.87   0.88   0.88   0.86   0.87   0.90   0.84   0.86   0.90
HUN   0.57   0.75   0.78   0.80   0.82   0.75   0.77   0.79   0.82   0.78   0.75   0.77   1.03
POL   0.56   0.75   0.75   0.75   0.75   0.75   0.75   0.75   0.75   0.75   0.75   0.75   0.75   10.76
NZL   0.78   0.56   0.63   0.63   0.62   0.58   0.61   0.56   0.72   0.56   0.64   0.67   0.57   0.56   0.31
JPN   0.57   0.80   0.85   0.92   0.76   0.76   0.78   0.83   0.77   0.81   0.77   0.82   0.75   0.75   0.56   0.59
CZE   0.62   0.75   0.83   0.82   0.87   0.76   0.79   0.78   0.81   0.76   0.77   0.79   0.84   0.75   0.68   0.75   13.48
EST   0.59   0.77   0.76   0.78   0.76   0.77   0.76   0.77   0.77   0.76   0.76   0.76   0.77   0.76   0.63   0.77   0.77   19.11
IRL   0.60   0.56   0.70   0.69   0.70   0.65   0.67   0.62   0.79   0.66   0.62   0.66   0.64   0.56   0.61   0.57   0.66   0.60   0.90
KOR   0.56   0.75   0.74   0.75   0.74   0.74   0.75   0.74   0.75   0.75   0.75   0.74   0.75   0.75   0.56   0.75   0.75   0.78   0.56   6.56
SVN   0.60   0.80   0.76   0.76   0.76   0.76   0.76   0.76   0.76   0.76   0.76   0.76   0.76   0.76   0.60   0.76   0.76   0.79   0.58   0.77   17.56
PRT   0.56   0.75   0.75   0.75   0.79   0.78   0.78   0.78   0.81   0.78   0.78   0.76   0.75   0.75   0.56   0.75   0.75   0.77   0.61   0.75   0.76   0.29
```

HOL   ous

```
      AUS    BEL    CAN    CHE    DEU    DFS    ESP    FRA    GBR    ITA    NLD    USA    HUN    POL    NZL    JPN    CZE    EST    IRL    SVN    PRT
AUS   1.30
BEL   0.69   1.32
CAN   0.72   0.79   5.35
CHE   0.80   0.85   0.95   11.90
DEU   0.76   0.80   0.90   0.92   13.70
DFS   0.61   0.83   0.84   0.89   0.87   12.89
ESP   0.75   0.71   0.83   0.88   0.84   0.78   0.87
FRA   0.68   0.82   0.86   0.93   0.90   0.91   0.82   1.02
GBR   0.85   0.70   0.83   0.87   0.84   0.88   0.75   0.88   1.41
ITA   0.69   0.71   0.85   0.91   0.85   0.83   0.90   0.88   0.82   1.00
NLD   0.67   0.82   0.88   0.94   0.91   0.89   0.82   0.94   0.77   0.84   4.69
USA   0.75   0.75   0.90   0.93   0.88   0.81   0.88   0.85   0.88   0.89   0.86   1.20
HUN   0.72   0.79   0.82   0.87   0.86   0.80   0.81   0.82   0.77   0.79   0.78   0.79   1.16
POL   0.72   0.80   0.74   0.78   0.77   0.71   0.71   0.74   0.77   0.70   0.71   0.73   0.73   11.45
NZL   0.82   0.69   0.82   0.87   0.80   0.69   0.75   0.79   0.84   0.74   0.80   0.85   0.73   0.72   0.44
JPN   0.77   0.82   0.93   0.94   0.89   0.80   0.81   0.85   0.85   0.85   0.85   0.90   0.80   0.81   0.82   0.75
CZE   0.71   0.86   0.88   0.91   0.94   0.90   0.81   0.92   0.76   0.84   0.89   0.83   0.89   0.75   0.75   0.85   13.32
EST   0.71   0.83   0.81   0.88   0.86   0.91   0.77   0.90   0.75   0.81   0.87   0.77   0.81   0.71   0.72   0.77   0.89   16.42
IRL   0.83   0.61   0.73   0.79   0.76   0.56   0.80   0.67   0.95   0.76   0.67   0.82   0.69   0.71   0.81   0.77   0.70   0.67   0.94
SVN   0.70   0.76   0.71   0.73   0.73   0.71   0.71   0.71   0.71   0.70   0.70   0.71   0.71   0.81   0.63   0.73   0.72   0.72   0.65   18.03
PRT   0.70   0.70   0.78   0.78   0.76   0.70   0.76   0.73   0.80   0.75   0.75   0.78   0.70   0.72   0.73   0.79   0.75   0.71   0.73   0.71   0.43
```

HOL   ofl

```
      AUS    BEL    CAN    CHE    DEU    DFS    ESP    FRA    GBR    ITA    NLD    USA    HUN    POL    JPN    CZE    EST    IRL    SVN    PRT
AUS   5.76
BEL   0.44   1.76
CAN   0.40   0.70   6.48
CHE   0.43   0.77   0.90   11.53
DEU   0.40   0.75   0.84   0.77   11.83
DFS   0.40   0.66   0.86   0.77   0.80   12.90
ESP   0.40   0.72   0.82   0.76   0.71   0.82   0.91
FRA   0.43   0.80   0.70   0.74   0.76   0.65   0.76   1.06
GBR   0.41   0.75   0.75   0.79   0.74   0.71   0.80   0.85   1.56
ITA   0.41   0.72   0.71   0.70   0.71   0.65   0.69   0.80   0.68   1.69
NLD   0.40   0.82   0.68   0.69   0.75   0.65   0.65   0.81   0.74   0.67   4.67
USA   0.40   0.71   0.81   0.77   0.74   0.67   0.73   0.72   0.73   0.77   0.68   1.52
HUN   0.47   0.76   0.65   0.65   0.70   0.65   0.65   0.75   0.65   0.72   0.68   0.70   1.19
POL   0.45   0.70   0.67   0.67   0.68   0.65   0.65   0.67   0.65   0.71   0.65   0.74   0.71   13.56
JPN   0.40   0.65   0.85   0.77   0.78   0.72   0.70   0.65   0.65   0.71   0.65   0.84   0.65   0.74   0.54
CZE   0.42   0.75   0.80   0.72   0.79   0.65   0.65   0.69   0.65   0.78   0.65   0.83   0.80   0.84   0.80   16.68
EST   0.44   0.67   0.66   0.67   0.66   0.66   0.66   0.66   0.66   0.66   0.66   0.66   0.69   0.66   0.67   0.70   20.70
IRL   0.65   0.71   0.74   0.79   0.68   0.65   0.69   0.67   0.79   0.67   0.63   0.66   0.65   0.59   0.68   0.64   0.44   1.35
SVN   0.43   0.76   0.68   0.66   0.68   0.66   0.66   0.68   0.66   0.67   0.69   0.83   0.85   0.78   0.77   0.83   0.78   0.61   24.55
PRT   0.40   0.65   0.65   0.65   0.65   0.65   0.65   0.68   0.65   0.67   0.65   0.65   0.65   0.65   0.65   0.65   0.68   0.50   0.66   0.19
```

HOL   loc

```
--------------------------------------------------------------------------------
        BEL    CAN    CHE    DEU    DFS    ESP    FRA    GBR    ITA    NLD    USA    CZE    IRL    KOR    SVN    PRT    EST    HUN    POL
BEL    1.80
CAN    0.85   6.85
CHE    0.55   0.63  12.46
DEU    0.65   0.74   0.68  11.68
DFS    0.87   0.90   0.51   0.67  12.88
ESP    0.61   0.73   0.69   0.73   0.73   0.96
FRA    0.79   0.78   0.71   0.83   0.69   0.76   1.06
GBR    0.66   0.69   0.88   0.82   0.64   0.79   0.86   1.51
ITA    0.62   0.69   0.65   0.73   0.57   0.74   0.78   0.74   1.94
NLD    0.85   0.82   0.70   0.82   0.77   0.68   0.82   0.78   0.64   4.28
USA    0.62   0.75   0.50   0.76   0.69   0.72   0.74   0.68   0.76   0.64   1.59
CZE    0.51   0.61   0.58   0.65   0.60   0.65   0.64   0.66   0.71   0.50   0.65  19.82
IRL    0.58   0.57   0.51   0.66   0.52   0.64   0.69   0.73   0.62   0.64   0.56   0.50   1.66
KOR    0.57   0.70   0.55   0.53   0.61   0.69   0.67   0.53   0.60   0.57   0.55   0.58   0.51  10.99
SVN    0.69   0.64   0.56   0.64   0.64   0.66   0.74   0.66   0.62   0.57   0.61   0.67   0.53   0.57  29.14
PRT    0.50   0.50   0.55   0.61   0.50   0.58   0.53   0.61   0.58   0.52   0.50   0.65   0.50   0.54   0.62   2.29
EST    0.55   0.53   0.53   0.52   0.53   0.53   0.54   0.53   0.52   0.51   0.52   0.53   0.53   0.62   0.67   0.54  22.97
HUN    0.69   0.70   0.51   0.68   0.72   0.60   0.75   0.68   0.65   0.66   0.64   0.83   0.51   0.66   0.67   0.58   0.64   1.17
POL    0.51   0.57   0.51   0.67   0.50   0.55   0.67   0.58   0.62   0.50   0.71   0.75   0.51   0.51   0.77   0.51   0.53   0.67  15.63


--------------------------------------------------------------------------------
HOL    bcs
--------------------------------------------------------------------------------
        BEL    CHE    DEU    DFS    FRA    GBR    ITA    NLD    USA    CZE    JPN    IRL    KOR    CAN    PRT    ESP    SVN    EST    HUN    NZL    POL
BEL    1.01
CHE    0.75  11.79
DEU    0.75   0.89  13.37
DFS    0.76   0.89   0.95  12.18
FRA    0.75   0.92   0.94   0.95   1.00
GBR    0.76   0.91   0.90   0.90   0.93   1.53
ITA    0.75   0.90   0.95   0.95   0.96   0.90   6.64
NLD    0.75   0.93   0.95   0.96   0.95   0.91   0.93   5.01
USA    0.77   0.75   0.78   0.78   0.78   0.75   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  14.03
JPN    0.82   0.92   0.96   0.96   0.96   0.93   0.96   0.95   0.84   0.95   1.70
IRL    0.75   0.87   0.80   0.85   0.87   0.93   0.82   0.85   0.75   0.78   0.86   1.02
KOR    0.75   0.76   0.84   0.86   0.86   0.81   0.84   0.79   0.75   0.85   0.87   0.76   2.51
CAN    0.75   0.92   0.95   0.94   0.94   0.95   0.93   0.95   0.79   0.94   0.98   0.88   0.84   6.05
PRT    0.75   0.84   0.86   0.86   0.88   0.87   0.84   0.85   0.75   0.83   0.86   0.81   0.83   0.88   1.92
ESP    0.75   0.88   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   1.05
SVN    0.76   0.85   0.90   0.91   0.86   0.79   0.88   0.91   0.76   0.90   0.89   0.76   0.78   0.85   0.76   0.85  22.25
EST    0.76   0.83   0.88   0.86   0.87   0.77   0.85   0.90   0.81   0.85   0.87   0.75   0.76   0.83   0.76   0.79   0.86  16.67
HUN    0.75   0.87   0.94   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   0.85   0.82   1.00
NZL    0.75   0.89   0.89   0.90   0.91   0.91   0.91   0.86   0.75   0.87   0.91   0.87   0.77   0.90   0.83   0.85   0.82   0.81   0.87   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   0.78   0.90   0.84   0.88   0.84   0.78   0.91   0.84  11.44


--------------------------------------------------------------------------------
JER    sta
--------------------------------------------------------------------------------
        AUS    CAN    DFS    GBR    ITA    NZL    USA    ZAF    NLD    CHE
AUS    0.55
CAN    0.89   6.62
DFS    0.90   0.96  11.68
GBR    0.91   0.96   0.94   1.08
ITA    0.89   0.94   0.92   0.94   1.33
NZL    0.89   0.86   0.87   0.91   0.87   0.36
USA    0.91   0.96   0.95   0.96   0.93   0.88   1.69
ZAF    0.87   0.87   0.86   0.92   0.86   0.91   0.87   8.86
NLD    0.90   0.95   0.97   0.94   0.92   0.87   0.94   0.87   4.50
CHE    0.90   0.96   0.96   0.95   0.93   0.87   0.94   0.88   0.97  11.36


--------------------------------------------------------------------------------
JER    cwi
--------------------------------------------------------------------------------
        AUS    CAN    DFS    GBR    ITA    NZL    USA    ZAF    NLD    CHE
AUS    0.30
CAN    0.72   6.92
```

```
DFS     0.76    0.85   15.46
GBR     0.81    0.92    0.84    1.81
ITA     0.67    0.80    0.71    0.72    1.45
NZL     0.81    0.69    0.69    0.79    0.68    0.38
USA     0.74    0.91    0.81    0.84    0.87    0.67    1.04
ZAF     0.69    0.81    0.72    0.84    0.71    0.80    0.78    8.80
NLD     0.75    0.91    0.90    0.90    0.71    0.70    0.84    0.81    4.49
CHE     0.68    0.89    0.86    0.83    0.84    0.69    0.88    0.73    0.86   12.73

------------------------------------------------------------------------------------
JER    bde
------------------------------------------------------------------------------------
        AUS     CAN     DFS     GBR     ITA     NZL     ZAF     NLD     USA     CHE
AUS     0.34
CAN     0.76    5.73
DFS     0.82    0.86   13.55
GBR     0.75    0.86    0.84    1.55
ITA     0.71    0.74    0.76    0.83    1.46
NZL     0.78    0.71    0.72    0.71    0.72    0.38
ZAF     0.81    0.74    0.83    0.82    0.74    0.80    8.96
NLD     0.71    0.83    0.84    0.90    0.87    0.72    0.79    4.32
USA     0.70    0.72    0.75    0.78    0.90    0.71    0.73    0.88    1.04
CHE     0.78    0.87    0.89    0.89    0.84    0.74    0.82    0.91    0.86   13.54

------------------------------------------------------------------------------------
JER    ang
------------------------------------------------------------------------------------
        AUS     CAN     DFS     GBR     ITA     USA     ZAF     NLD     CHE
AUS     0.34
CAN     0.65    7.59
DFS     0.70    0.81   13.17
GBR     0.78    0.78    0.86    1.24
ITA     0.65    0.82    0.79    0.85    1.32
USA     0.71    0.83    0.88    0.84    0.77    1.04
ZAF     0.62    0.63    0.69    0.81    0.69    0.69    8.88
NLD     0.71    0.81    0.72    0.82    0.77    0.74    0.65    5.78
CHE     0.63    0.80    0.71    0.72    0.73    0.73    0.65    0.75    9.91

------------------------------------------------------------------------------------
JER    ran
------------------------------------------------------------------------------------
        AUS     CAN     DFS     GBR     ITA     NZL     USA     ZAF     NLD     CHE
AUS     0.36
CAN     0.91    5.78
DFS     0.91    0.97   11.47
GBR     0.95    0.95    0.96    1.16
ITA     0.91    0.96    0.94    0.94    1.27
NZL     0.94    0.90    0.90    0.92    0.90    0.30
USA     0.91    0.95    0.96    0.97    0.93    0.90    1.23
ZAF     0.91    0.91    0.91    0.92    0.91    0.91    0.90    9.16
NLD     0.91    0.96    0.96    0.96    0.94    0.90    0.95    0.93    4.78
CHE     0.93    0.96    0.95    0.94    0.94    0.91    0.93    0.91    0.95   13.19

------------------------------------------------------------------------------------
JER    rwi
------------------------------------------------------------------------------------
        AUS     CAN     DFS     GBR     ITA     NZL     USA     ZAF     NLD     CHE
AUS     0.32
CAN     0.84    6.44
DFS     0.82    0.91   12.02
GBR     0.83    0.93    0.86    1.44
ITA     0.81    0.85    0.83    0.86    1.63
NZL     0.89    0.85    0.81    0.82    0.81    0.30
USA     0.80    0.84    0.83    0.86    0.86    0.80    1.02
ZAF     0.81    0.81    0.81    0.83    0.81    0.80    0.81    9.28
NLD     0.86    0.94    0.92    0.88    0.81    0.85    0.81    0.81    4.96
CHE     0.85    0.92    0.85    0.86    0.82    0.82    0.81    0.81    0.92   12.37

------------------------------------------------------------------------------------
```

```
JER    rls
--------------------------------------------------------------------------------
        AUS     CAN     DFS     GBR     ITA     NZL     USA     ZAF     NLD     CHE
AUS     0.18
CAN     0.73    6.02
DFS     0.74    0.96   12.59
GBR     0.77    0.84    0.81    1.70
ITA     0.74    0.84    0.83    0.79    1.58
NZL     0.73    0.73    0.73    0.76    0.74    0.13
USA     0.73    0.93    0.94    0.89    0.82    0.73    0.96
ZAF     0.75    0.74    0.73    0.80    0.74    0.89    0.76   12.16
NLD     0.75    0.91    0.92    0.86    0.86    0.73    0.88    0.76    3.56
CHE     0.79    0.92    0.87    0.83    0.81    0.75    0.86    0.76    0.90    9.38

--------------------------------------------------------------------------------
JER    rlr
--------------------------------------------------------------------------------
        AUS     CAN     DFS     ITA     ZAF     NLD     USA     CHE
AUS     0.21
CAN     0.56    6.58
DFS     0.57    0.75   13.13
ITA     0.57    0.80    0.66    1.04
ZAF     0.56    0.57    0.57    0.59   13.03
NLD     0.57    0.86    0.88    0.73    0.64    4.60
USA     0.55    0.76    0.67    0.81    0.57    0.75    0.96
CHE     0.67    0.70    0.65    0.64    0.59    0.71    0.60   11.79

--------------------------------------------------------------------------------
JER    fan
--------------------------------------------------------------------------------
        AUS     CAN     DFS     GBR     ITA     USA     ZAF     NLD     CHE
AUS     0.22
CAN     0.66    5.95
DFS     0.66    0.87   12.79
GBR     0.73    0.78    0.73    1.47
ITA     0.66    0.74    0.69    0.74    1.71
USA     0.65    0.86    0.78    0.86    0.82    0.93
ZAF     0.70    0.68    0.68    0.88    0.68    0.76    9.84
NLD     0.69    0.74    0.79    0.87    0.73    0.79    0.72    3.95
CHE     0.68    0.77    0.79    0.69    0.67    0.69    0.69    0.72   11.87

--------------------------------------------------------------------------------
JER    fua
--------------------------------------------------------------------------------
        AUS     CAN     DFS     GBR     ITA     NZL     USA     ZAF     NLD     CHE
AUS     0.38
CAN     0.77    5.55
DFS     0.78    0.86   12.66
GBR     0.78    0.94    0.85    1.65
ITA     0.72    0.87    0.79    0.87    1.43
NZL     0.81    0.73    0.73    0.81    0.74    0.43
USA     0.77    0.94    0.88    0.92    0.90    0.72    1.64
ZAF     0.74    0.91    0.86    0.93    0.83    0.74    0.90   11.93
NLD     0.77    0.92    0.89    0.92    0.83    0.83    0.87    0.87    4.63
CHE     0.81    0.92    0.84    0.87    0.82    0.75    0.87    0.89    0.90   11.13

--------------------------------------------------------------------------------
JER    ruh
--------------------------------------------------------------------------------
        AUS     CAN     DFS     GBR     ITA     NZL     USA     ZAF     NLD     CHE
AUS     0.36
CAN     0.76    6.94
DFS     0.77    0.86   10.67
GBR     0.82    0.81    0.84    1.30
ITA     0.76    0.79    0.82    0.85    1.39
NZL     0.76    0.76    0.79    0.80    0.79    0.43
USA     0.77    0.84    0.90    0.91    0.83    0.78    1.26
ZAF     0.83    0.75    0.82    0.89    0.81    0.77    0.86    9.34
NLD     0.76    0.77    0.91    0.88    0.83    0.82    0.86    0.79    4.12
```

```
CHE      0.80    0.92    0.86    0.83    0.79    0.79    0.83    0.79    0.83   12.61

-------------------------------------------------------------------------------
JER    usu
-------------------------------------------------------------------------------
         AUS     CAN     DFS     GBR     ITA     NZL     USA     ZAF     NLD     CHE
AUS      0.39
CAN      0.79    6.51
DFS      0.71    0.85   12.93
GBR      0.82    0.88    0.84    1.83
ITA      0.69    0.77    0.73    0.80    1.55
NZL      0.64    0.65    0.65    0.66    0.66    0.42
USA      0.73    0.85    0.87    0.84    0.79    0.64    0.99
ZAF      0.77    0.81    0.74    0.82    0.66    0.64    0.78   10.28
NLD      0.81    0.84    0.88    0.91    0.81    0.65    0.88    0.79    4.79
CHE      0.76    0.90    0.87    0.80    0.78    0.66    0.84    0.77    0.86    9.66

-------------------------------------------------------------------------------
JER    ude
-------------------------------------------------------------------------------
         AUS     CAN     DFS     GBR     ITA     USA     ZAF     NLD     CHE
AUS      0.35
CAN      0.93    5.35
DFS      0.93    0.94   12.15
GBR      0.92    0.97    0.93    1.45
ITA      0.93    0.94    0.93    0.93    1.36
USA      0.91    0.96    0.95    0.94    0.95    1.82
ZAF      0.90    0.91    0.91    0.93    0.91    0.91   10.63
NLD      0.91    0.97    0.96    0.96    0.94    0.95    0.92    4.15
CHE      0.95    0.95    0.94    0.94    0.95    0.94    0.91    0.96    9.72

-------------------------------------------------------------------------------
JER    ftp
-------------------------------------------------------------------------------
         AUS     CAN     DFS     GBR     ITA     NZL     USA     ZAF     NLD     CHE
AUS      0.46
CAN      0.90    6.26
DFS      0.88    0.95   12.66
GBR      0.91    0.93    0.91    1.35
ITA      0.86    0.87    0.86    0.86    1.77
NZL      0.89    0.93    0.87    0.87    0.86    0.31
USA      0.86    0.96    0.95    0.93    0.87    0.89    1.34
ZAF      0.86    0.93    0.90    0.93    0.86    0.90    0.90   10.26
NLD      0.93    0.97    0.94    0.94    0.85    0.90    0.90    0.90    5.58
CHE      0.93    0.95    0.92    0.92    0.86    0.88    0.90    0.88    0.96   10.24

-------------------------------------------------------------------------------
JER    ftl
-------------------------------------------------------------------------------
         AUS     CAN     DFS     GBR     ITA     USA     ZAF     NLD     CHE
AUS      0.32
CAN      0.92    5.77
DFS      0.92    0.92   13.94
GBR      0.92    0.92    0.94    1.44
ITA      0.91    0.91    0.91    0.93    1.67
USA      0.91    0.92    0.94    0.97    0.92    1.12
ZAF      0.93    0.91    0.91    0.95    0.91    0.97   10.97
NLD      0.93    0.93    0.97    0.97    0.92    0.96    0.93    4.53
CHE      0.93    0.92    0.94    0.96    0.91    0.94    0.93    0.96   11.97

-------------------------------------------------------------------------------
JER    rtp
-------------------------------------------------------------------------------
         AUS     CAN     DFS     NZL     ZAF     NLD     USA     CHE
AUS      0.31
CAN      0.89    6.41
DFS      0.90    0.95   12.99
NZL      0.90    0.96    0.91    0.42
ZAF      0.89    0.93    0.90    0.90    9.53
```

```
NLD      0.91    0.97    0.96    0.94    0.90    4.86
USA      0.89    0.91    0.94    0.89    0.89    0.94    1.40
CHE      0.91    0.98    0.96    0.95    0.93    0.97    0.92   11.16


-------------------------------------------------------------------------------
JER    ocs
-------------------------------------------------------------------------------
         AUS     CAN     DFS     GBR     ITA     NZL     USA     NLD     CHE
AUS      0.79
CAN      0.57    6.32
DFS      0.61    0.76   12.65
GBR      0.65    0.84    0.84    2.66
ITA      0.57    0.80    0.79    0.82    0.73
NZL      0.64    0.59    0.58    0.64    0.59    0.32
USA      0.65    0.79    0.81    0.87    0.81    0.60    0.88
NLD      0.60    0.76    0.87    0.88    0.80    0.63    0.84    2.78
CHE      0.63    0.90    0.79    0.91    0.82    0.63    0.83    0.83    7.79


-------------------------------------------------------------------------------
JER    ous
-------------------------------------------------------------------------------
         AUS     CAN     DFS     GBR     NZL     USA     NLD     CHE
AUS      0.80
CAN      0.68    6.51
DFS      0.57    0.84   12.84
GBR      0.74    0.87    0.72    1.42
NZL      0.81    0.71    0.60    0.72    0.46
USA      0.65    0.90    0.77    0.85    0.65    1.04
NLD      0.65    0.88    0.89    0.78    0.75    0.88    4.50
CHE      0.71    0.92    0.81    0.87    0.69    0.88    0.93   10.75


-------------------------------------------------------------------------------
JER    ofl
-------------------------------------------------------------------------------
         AUS     CAN     DFS     GBR     ITA     USA     NLD     CHE
AUS      6.32
CAN      0.51    6.00
DFS      0.42    0.81   13.55
GBR      0.57    0.72    0.68    1.34
ITA      0.42    0.73    0.65    0.72    1.09
USA      0.65    0.82    0.67    0.72    0.76    1.62
NLD      0.42    0.68    0.66    0.73    0.67    0.67    4.49
CHE      0.47    0.87    0.72    0.73    0.69    0.74    0.69   10.56


-------------------------------------------------------------------------------
RDC    sta
-------------------------------------------------------------------------------
         AUS     CAN     DEU     DFS     GBR     NOR     NZL     USA     NLD     CAM
AUS      0.64
CAN      0.89    6.33
DEU      0.90    0.97   13.48
DFS      0.88    0.97    0.97    8.64
GBR      0.93    0.96    0.96    0.93    1.29
NOR      0.90    0.94    0.96    0.98    0.93   13.41
NZL      0.89    0.90    0.87    0.90    0.92    0.93    0.49
USA      0.90    0.97    0.96    0.94    0.97    0.93    0.89    2.36
NLD      0.89    0.95    0.97    0.97    0.94    0.96    0.86    0.93    4.41
CAM      0.93    0.92    0.93    0.92    0.92    0.93    0.92    0.92    0.92    6.06


-------------------------------------------------------------------------------
RDC    cwi
-------------------------------------------------------------------------------
         AUS     CAN     DEU     DFS     GBR     NZL     USA     NLD     CAM     NOR
AUS      0.41
CAN      0.74    7.32
DEU      0.72    0.88   11.24
DFS      0.78    0.83    0.89   12.76
GBR      0.83    0.88    0.89    0.87    1.61
NZL      0.80    0.70    0.72    0.69    0.81    0.35
```

```
USA      0.69    0.85    0.81    0.83    0.84    0.71    1.29
NLD      0.74    0.92    0.92    0.89    0.91    0.70    0.82    4.53
CAM      0.80    0.81    0.81    0.81    0.81    0.83    0.81    0.82    6.95
NOR      0.82    0.81    0.80    0.83    0.83    0.83    0.83    0.88    0.82   15.03

------------------------------------------------------------------------------
RDC     bde
------------------------------------------------------------------------------
         AUS     CAN     DEU     DFS     GBR     NOR     NZL     USA     NLD     CAM
AUS      0.49
CAN      0.81    6.12
DEU      0.79    0.87    9.77
DFS      0.80    0.84    0.92   11.79
GBR      0.78    0.86    0.91    0.89    1.56
NOR      0.81    0.82    0.80    0.89    0.83   14.73
NZL      0.78    0.72    0.74    0.75    0.75    0.82    0.35
USA      0.72    0.76    0.89    0.83    0.89    0.83    0.74    1.28
NLD      0.71    0.83    0.90    0.85    0.91    0.83    0.71    0.90    4.07
CAM      0.84    0.83    0.84    0.84    0.84    0.84    0.86    0.84    0.84    4.81

------------------------------------------------------------------------------
RDC     ang
------------------------------------------------------------------------------
         AUS     CAN     DEU     DFS     GBR     USA     NLD     CAM     NOR
AUS      0.47
CAN      0.65    7.11
DEU      0.64    0.72   12.68
DFS      0.67    0.77    0.74    9.06
GBR      0.76    0.81    0.70    0.83    1.37
USA      0.68    0.86    0.73    0.82    0.85    1.21
NLD      0.73    0.81    0.63    0.74    0.83    0.75    4.79
CAM      0.79    0.76    0.77    0.77    0.76    0.77    0.78    7.06
NOR      0.75    0.74    0.77    0.63    0.75    0.76    0.68    0.77   15.41

------------------------------------------------------------------------------
RDC     ran
------------------------------------------------------------------------------
         AUS     CAN     DEU     DFS     GBR     NOR     NZL     USA     NLD     CAM
AUS      0.42
CAN      0.92    6.04
DEU      0.93    0.97    8.91
DFS      0.92    0.94    0.95   10.03
GBR      0.94    0.97    0.97    0.95    1.54
NOR      0.92    0.94    0.92    0.91    0.95   12.14
NZL      0.94    0.93    0.91    0.91    0.93    0.93    0.28
USA      0.91    0.98    0.96    0.94    0.97    0.95    0.92    1.68
NLD      0.92    0.97    0.98    0.96    0.97    0.95    0.90    0.96    5.97
CAM      0.94    0.95    0.95    0.95    0.95    0.95    0.95    0.95    0.95    5.56

------------------------------------------------------------------------------
RDC     rwi
------------------------------------------------------------------------------
         AUS     CAN     DEU     DFS     GBR     NZL     USA     NLD     CAM     NOR
AUS      0.45
CAN      0.86    6.09
DEU      0.83    0.94    9.57
DFS      0.81    0.93    0.93   10.48
GBR      0.85    0.92    0.90    0.88    1.42
NZL      0.85    0.88    0.82    0.89    0.90    0.33
USA      0.81    0.91    0.85    0.88    0.94    0.86    1.41
NLD      0.84    0.94    0.95    0.93    0.89    0.84    0.81    5.89
CAM      0.87    0.88    0.87    0.88    0.87    0.88    0.88    0.88    6.42
NOR      0.86    0.89    0.87    0.95    0.88    0.90    0.88    0.90    0.88   13.90

------------------------------------------------------------------------------
RDC     rls
------------------------------------------------------------------------------
         AUS     CAN     DEU     DFS     GBR     NOR     NZL     USA     NLD     CAM
AUS      0.23
```

```
CAN       0.75   6.39
DEU       0.76   0.95   9.37
DFS       0.74   0.97   0.94   9.21
GBR       0.81   0.80   0.86   0.79   1.62
NOR       0.78   0.90   0.90   0.96   0.83   13.43
NZL       0.74   0.74   0.74   0.74   0.75   0.78    0.13
USA       0.73   0.93   0.93   0.94   0.82   0.87    0.74   0.91
NLD       0.75   0.92   0.92   0.89   0.86   0.81    0.73   0.90   5.18
CAM       0.83   0.84   0.84   0.83   0.83   0.84    0.83   0.84   0.84   6.15


------------------------------------------------------------------------------------
RDC     rlr
------------------------------------------------------------------------------------
          AUS    CAN    DEU    DFS    NOR    NLD     USA    CAM
AUS       0.18
CAN       0.59   6.48
DEU       0.62   0.88   10.15
DFS       0.58   0.84   0.91   10.75
NOR       0.65   0.77   0.85   0.89   15.21
NLD       0.58   0.87   0.91   0.89   0.87   4.71
USA       0.56   0.74   0.77   0.70   0.74   0.80    0.91
CAM       0.79   0.75   0.74   0.74   0.74   0.74    0.74   6.86


------------------------------------------------------------------------------------
RDC     fan
------------------------------------------------------------------------------------
          AUS    CAN    DEU    DFS    GBR    NOR     USA    NLD    CAM
AUS       0.29
CAN       0.67   6.30
DEU       0.71   0.81   14.13
DFS       0.66   0.73   0.81   9.30
GBR       0.75   0.79   0.91   0.72   1.63
NOR       0.71   0.73   0.84   0.66   0.76   14.37
USA       0.68   0.84   0.84   0.73   0.84   0.76    1.07
NLD       0.69   0.75   0.89   0.77   0.88   0.69    0.80   4.63
CAM       0.77   0.77   0.76   0.76   0.76   0.76    0.77   0.77   7.65


------------------------------------------------------------------------------------
RDC     fua
------------------------------------------------------------------------------------
          AUS    CAN    DEU    DFS    GBR    NOR     NZL    USA    NLD    CAM
AUS       0.38
CAN       0.78   5.58
DEU       0.77   0.91   12.42
DFS       0.76   0.82   0.83   11.66
GBR       0.79   0.89   0.95   0.87   1.54
NOR       0.80   0.83   0.76   0.87   0.83   12.92
NZL       0.77   0.82   0.83   0.73   0.80   0.77    0.36
USA       0.76   0.93   0.90   0.84   0.92   0.83    0.86   1.50
NLD       0.78   0.93   0.93   0.89   0.92   0.87    0.84   0.88   4.18
CAM       0.83   0.84   0.83   0.83   0.83   0.83    0.84   0.84   0.84   6.42


------------------------------------------------------------------------------------
RDC     ruh
------------------------------------------------------------------------------------
          AUS    CAN    DEU    DFS    GBR    NOR     NZL    USA    NLD    CAM
AUS       0.47
CAN       0.78   5.68
DEU       0.81   0.87   14.89
DFS       0.77   0.88   0.89   10.64
GBR       0.80   0.77   0.86   0.86   1.43
NOR       0.80   0.85   0.87   0.87   0.83   12.84
NZL       0.82   0.76   0.82   0.79   0.91   0.80    0.33
USA       0.77   0.85   0.89   0.91   0.89   0.85    0.85   1.38
NLD       0.76   0.76   0.91   0.92   0.88   0.92    0.83   0.85   4.21
CAM       0.86   0.83   0.83   0.83   0.85   0.83    0.85   0.83   0.83   5.99


------------------------------------------------------------------------------------
RDC     usu
```

```
----------------------------------------------------------------------------------------
          AUS     CAN     DEU     DFS     GBR     NOR     NZL     USA     NLD     CAM
AUS      0.35
CAN      0.75    5.79
DEU      0.73    0.89   12.57
DFS      0.69    0.75    0.78   12.56
GBR      0.80    0.81    0.75    0.78    1.87
NOR      0.71    0.75    0.72    0.77    0.78   13.59
NZL      0.69    0.73    0.66    0.65    0.71    0.73    0.33
USA      0.78    0.82    0.76    0.83    0.89    0.79    0.69    1.22
NLD      0.78    0.83    0.80    0.89    0.92    0.83    0.64    0.90    4.60
CAM      0.80    0.80    0.78    0.79    0.80    0.78    0.82    0.80    0.80    6.42


----------------------------------------------------------------------------------------
RDC    ude
----------------------------------------------------------------------------------------
          AUS     CAN     DEU     DFS     GBR     NOR     USA     NLD     CAM
AUS      0.51
CAN      0.92    5.48
DEU      0.92    0.97   12.43
DFS      0.91    0.97    0.95   10.74
GBR      0.92    0.96    0.96    0.94    1.85
NOR      0.92    0.95    0.93    0.91    0.95   11.96
USA      0.90    0.97    0.96    0.96    0.96    0.95    1.30
NLD      0.92    0.97    0.97    0.95    0.97    0.96    0.96    4.26
CAM      0.94    0.95    0.95    0.95    0.95    0.95    0.95    0.95    4.61


----------------------------------------------------------------------------------------
RDC    ftp
----------------------------------------------------------------------------------------
          AUS     CAN     DEU     DFS     GBR     NOR     NZL     USA     NLD     CAM
AUS      0.52
CAN      0.93    5.42
DEU      0.94    0.97   13.11
DFS      0.89    0.94    0.92   11.85
GBR      0.92    0.93    0.95    0.89    1.52
NOR      0.89    0.91    0.89    0.88    0.92   11.78
NZL      0.93    0.89    0.89    0.86    0.89    0.90    0.27
USA      0.87    0.92    0.92    0.92    0.93    0.92    0.87    1.45
NLD      0.94    0.98    0.97    0.95    0.95    0.88    0.91    0.90    4.70
CAM      0.92    0.92    0.92    0.92    0.92    0.92    0.92    0.92    0.92    6.51


----------------------------------------------------------------------------------------
RDC    ftl
----------------------------------------------------------------------------------------
          AUS     CAN     DEU     DFS     GBR     NOR     USA     NLD     CAM
AUS      0.53
CAN      0.93    4.92
DEU      0.94    0.94   13.78
DFS      0.92    0.91    0.98   10.56
GBR      0.95    0.94    0.98    0.93    1.41
NOR      0.92    0.93    0.95    0.93    0.95   12.82
USA      0.94    0.94    0.96    0.93    0.97    0.95    1.66
NLD      0.93    0.93    0.98    0.97    0.97    0.94    0.95    5.40
CAM      0.95    0.95    0.95    0.95    0.95    0.95    0.95    0.95    7.48


----------------------------------------------------------------------------------------
RDC    rtp
----------------------------------------------------------------------------------------
          AUS     CAN     DEU     DFS     NOR     NZL     NLD     USA     CAM
AUS      0.39
CAN      0.89    6.18
DEU      0.90    0.96   14.35
DFS      0.90    0.94    0.96   12.14
NOR      0.92    0.92    0.91    0.90   13.69
NZL      0.93    0.95    0.94    0.90    0.92    0.35
NLD      0.91    0.98    0.97    0.96    0.91    0.94    5.58
USA      0.90    0.92    0.95    0.93    0.94    0.90    0.96    1.45
CAM      0.93    0.94    0.94    0.94    0.94    0.93    0.94    0.94    6.25
```

```
-------------------------------------------------------------------------------
RDC    ocs
-------------------------------------------------------------------------------
         AUS    CAN    DEU    DFS    GBR    NOR    NZL    USA    NLD    CAM
AUS      1.12
CAN      0.61   5.32
DEU      0.61   0.83   20.40
DFS      0.67   0.76   0.83   10.46
GBR      0.68   0.81   0.92   0.83   1.61
NOR      0.66   0.83   0.81   0.76   0.86   11.68
NZL      0.74   0.61   0.64   0.59   0.68   0.70   0.28
USA      0.64   0.82   0.89   0.82   0.89   0.86   0.71   0.57
NLD      0.62   0.76   0.88   0.85   0.88   0.79   0.64   0.86   3.03
CAM      0.77   0.86   0.86   0.86   0.86   0.86   0.79   0.87   0.86   5.92


-------------------------------------------------------------------------------
RDC    ous
-------------------------------------------------------------------------------
         AUS    CAN    DEU    DFS    GBR    NOR    NZL    USA    NLD    CAM
AUS      1.45
CAN      0.71   5.42
DEU      0.75   0.89   17.26
DFS      0.60   0.80   0.82   10.96
GBR      0.82   0.83   0.84   0.73   1.57
NOR      0.60   0.83   0.84   0.82   0.88   11.34
NZL      0.82   0.79   0.77   0.73   0.77   0.63   0.36
USA      0.74   0.90   0.88   0.88   0.87   0.88   0.84   1.00
NLD      0.68   0.88   0.91   0.89   0.77   0.82   0.79   0.87   4.05
CAM      0.73   0.88   0.88   0.88   0.89   0.88   0.73   0.90   0.90   6.39


-------------------------------------------------------------------------------
RDC    ofl
-------------------------------------------------------------------------------
         AUS    CAN    DEU    DFS    GBR    NOR    USA    NLD    CAM
AUS      7.30
CAN      0.42   5.65
DEU      0.43   0.83   16.05
DFS      0.42   0.80   0.79   13.30
GBR      0.42   0.74   0.74   0.69   1.41
NOR      0.49   0.72   0.75   0.66   0.74   14.84
USA      0.47   0.75   0.74   0.67   0.71   0.74   1.34
NLD      0.42   0.69   0.75   0.66   0.74   0.71   0.67   6.51
CAM      0.56   0.74   0.74   0.74   0.74   0.74   0.74   0.74   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  120   73  118   39  141  105   28   17
  CHE  101    0  155  451   64  263  504   61   15
  FRA   62  114    0  174   55   90  174   44   14
  ITA   99  391  136    0   86  199  543   78   16
  NLD   32   60   44   68    0   56   80   31   11
  USA  125  233   62  147   42    0  216   29   17
  DEA   83  410  127  458   70  173    0   74   13
  SVN   25   58   42   76   30   24   69    0    8
  GBR   13   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  114   44  118   33  141  103   27   17
CHE   98    0   92  396   59  234  441   58   15
FRA   39   63    0  101   36   54  112   35   10
ITA   99  337   77    0   78  199  508   76   16
NLD   29   57   31   64    0   42   74   31   11
USA  125  200   36  147   33    0  198   28   17
DEA   82  351   78  422   68  148    0   72   12
SVN   24   55   34   74   30   23   68    0    8
GBR   13   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  120   73  118   33  105   21   17  141
CHE  101    0  155  451   63  504   47   15  263
FRA   62  114    0  174   51  174   32   14   90
ITA   99  391  136    0   78  543   60   16  199
NLD   29   60   41   64    0   75   23   11   42
DEA   83  410  127  458   69    0   55   13  216
SVN   19   43   32   57   23   52    0    6   21
GBR   13   13   13   14    9   11    4    0   17
USA  125  233   62  147   33  173   18   15    0
--------------------------------------------------------------------------------
BSW
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
        CAN  CHE  FRA  NLD  USA  GBR
--------------------------------------------------------------------------------
CAN    0  119   73   22  140   17
CHE  101    0  150   40  261   15
FRA   62  110    0   32   90   14
NLD   19   40   27    0   27    8
USA  124  233   62   22    0   17
GBR   13   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  120   73  118   39  141  105   28   17
CHE  101    0  155  451   64  263  504   61   15
FRA   62  114    0  174   55   90  174   44   14
ITA   99  391  136    0   86  199  543   78   16
NLD   32   60   44   68    0   56   80   31   11
USA  125  233   62  147   42    0  216   29   17
DEA   83  410  127  458   70  173    0   74   13
SVN   25   58   42   76   30   24   69    0    8
GBR   13   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  120   44   39  141  105   17   21  115
CHE  101    0   92   64  263  504   15   47  444
FRA   39   63    0   36   54  112   10   32  101
NLD   32   60   31    0   56   80   11   23   85
USA  125  233   36   42    0  216   17   21  187
DEA   83  410   78   70  173    0   13   55  537
GBR   13   13    9    9   15   11    0    6   16
```

```
  SVN   19    43    32    23    18    52     4     0    60
  ITA   97   385    77    68   135   451    14    57     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    73   118    39   141   105    28    17
 CHE   101     0   155   451    64   263   504    61    15
 FRA    62   114     0   174    55    90   174    44    14
 ITA    99   391   136     0    86   199   543    78    16
 NLD    32    60    44    68     0    56    80    31    11
 USA   125   233    62   147    42     0   216    29    17
 DEA    83   410   127   458    70   173     0    74    13
 SVN    25    58    42    76    30    24    69     0     8
 GBR    13    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    73   118    32   141   105    28    17
 CHE   101     0   155   451    62   263   504    61    15
 FRA    62   114     0   174    51    90   174    44    14
 ITA    99   391   136     0    77   199   543    78    16
 NLD    28    59    41    63     0    41    74    31    11
 USA   125   233    62   147    31     0   216    29    17
 DEA    83   410   127   458    68   173     0    74    13
 SVN    25    58    42    76    30    24    69     0     8
 GBR    13    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   120    73   115    32   105    28   141
 CHE   101     0   155   445    62   504    61   263
 FRA    62   114     0   173    51   174    44    90
 ITA    97   386   136     0    77   537    78   187
 NLD    28    59    41    63     0    74    31    41
 DEA    83   410   127   451    68     0    74   216
 SVN    25    58    42    76    30    69     0    29
 USA   125   233    62   135    31   173    24     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    79    32   141    72    21    17
 CHE   101     0    92   280    63   262   310    47    15
 FRA    39    63     0    93    35    54   102    32    10
 ITA    71   230    70     0    58   103   261    53    13
 NLD    28    60    30    53     0    41    62    23    11
 USA   125   233    36    76    32     0   119    21    17
 DEA    60   244    71   226    57    84     0    53    10
 SVN    19    43    32    51    23    18    50     0     6
 GBR    13    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  120   73  118   33  141  105   28   17
 CHE   101    0  155  451   63  263  504   61   15
 FRA    62  114    0  174   51   90  174   44   14
 ITA    99  391  136    0   78  199  543   78   16
 NLD    29   60   41   64    0   42   75   31   11
 USA   125  233   62  147   33    0  216   29   17
 DEA    83  410  127  458   69  173    0   74   13
 SVN    25   58   42   76   30   24   69    0    8
 GBR    13   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  120   73  118   33  141  105   28
 CHE   101    0  155  451   63  263  504   61
 FRA    62  114    0  174   51   90  174   44
 ITA    99  391  136    0   78  199  543   78
 NLD    29   60   41   64    0   42   75   31
 USA   125  233   62  147   33    0  216   29
 DEA    83  410  127  458   69  173    0   74
 SVN    25   58   42   76   30   24   69    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   73  118   39  141  105   21   17
 CHE   101    0  155  451   64  263  504   47   15
 FRA    62  114    0  174   55   90  174   32   14
 ITA    99  391  136    0   86  199  543   60   16
 NLD    32   60   44   68    0   56   80   23   11
 USA   125  233   62  147   42    0  216   21   17
 DEA    83  410  127  458   70  173    0   55   13
 SVN    19   43   32   57   23   18   52    0    6
 GBR    13   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   73  118   39  139  105   28   17
 CHE   101    0  155  451   64  263  504   61   15
 FRA    62  114    0  174   55   90  174   44   14
 ITA    99  391  136    0   86  199  543   78   16
 NLD    32   60   44   68    0   56   80   31   11
 USA   124  233   62  147   42    0  216   29   17
 DEA    83  410  127  458   70  173    0   74   13
 SVN    25   58   42   76   30   24   69    0    8
 GBR    13   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  120   73   39  141   94   27   17  107
 CHE   101    0  155   64  263  472   59   15  409
 FRA    62  114    0   55   90  164   43   14  161
```

```
 NLD    32    60    44     0    56    74    31    11    77
 USA   125   233    62    42     0   191    28    17   157
 DEA    75   379   119    68   145     0    72    12   450
 SVN    24    56    41    30    23    68     0     8    75
 GBR    13    13    13     9    15    11     6     0    16
 ITA    90   354   124    64   116   387    73    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   120    73   118    39   141   105    27    17
 CHE   101     0   155   451    64   263   504    60    15
 FRA    62   114     0   174    55    90   174    43    14
 ITA    99   391   136     0    86   197   543    77    16
 NLD    32    60    44    68     0    56    80    31    11
 USA   125   233    62   146    42     0   216    28    17
 DEA    83   410   127   458    70   173     0    73    13
 SVN    24    57    41    75    30    23    68     0     8
 GBR    13    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   120    73    79    28    72    27   141
 CHE   101     0   152   280    59   310    59   262
 FRA    62   111     0   113    48   122    43    90
 ITA    71   230    84     0    57   261    63   103
 NLD    25    58    39    53     0    61    30    36
 DEA    60   244    82   226    57     0    65   119
 SVN    24    56    41    62    30    59     0    27
 USA   125   233    62    76    28    84    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   114    63   118    39   141    72    21    17
 CHE    98     0   117   395    59   234   305    47    15
 FRA    57    86     0   140    45    75   111    32    14
 ITA    99   335   112     0    84   196   297    60    16
 NLD    32    57    39    68     0    56    62    23    11
 USA   125   200    55   147    42     0   119    21    17
 DEA    60   240    79   261    57    84     0    53    10
 SVN    19    43    32    57    23    18    50     0     6
 GBR    13    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   114    63   118    39   140   105    21    17
 CHE    98     0   117   396    59   234   449    47    15
 FRA    57    86     0   140    45    75   143    32    14
 ITA    99   337   112     0    86   199   536    60    16
 NLD    32    57    39    68     0    56    80    23    11
 USA   124   200    55   147    42     0   214    21    17
 DEA    82   361   105   454    70   169     0    55    13
 SVN    19    43    32    57    23    18    52     0     6
 GBR    13    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  114   63  115   39  141  105   21   17
 CHE    98    0  117  395   59  234  449   47   15
 FRA    57   86    0  139   45   75  143   32   14
 ITA    97  336  112    0   85  187  531   60   16
 NLD    32   57   39   68    0   56   80   23   11
 USA   125  200   55  135   42    0  214   21   17
 DEA    82  361  105  448   70  169    0   55   13
 SVN    19   43   32   57   23   18   52    0    6
 GBR    13   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  114  104   80   21  148   45
 CHE    97    0  443  280   47  233   92
 DEA    83  358    0  302   55  210  112
 ITA    72  229  251    0   53  103   93
 SVN    19   43   52   51    0   21   32
 USA   125  200  168   76   18    0   54
 FRA    40   63   78   70   32   36    0
----------------------------------------------------------------------------
BSW
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
        CAN  CHE  DEA  ITA  SVN  FRA
----------------------------------------------------------------------------
 CAN     0  121  106  122   28   76
 CHE   100    0  504  451   60  155
 DEA    83  410    0  541   74  174
 ITA   100  391  457    0   77  174
 SVN    25   58   69   76    0   44
 FRA    63  114  127  136   42    0
----------------------------------------------------------------------------
BSW
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
        CAN  CHE  DEA  ITA  SVN  USA  FRA
----------------------------------------------------------------------------
 CAN     0  114   82   80   21  148   45
 CHE    97    0  340  280   47  233   92
 DEA    70  271    0  268   54  147  104
 ITA    72  229  233    0   53  103   93
 SVN    19   43   51   51    0   21   32
 USA   125  200  108   76   18    0   54
 FRA    40   63   73   70   32   36    0
----------------------------------------------------------------------------
BSW
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
        CHE  DEA  ITA  SVN  USA  FRA
----------------------------------------------------------------------------
 CHE     0  486  280   47  262  153
```

```
  DEA  395    0  301   55  201  170
  ITA  230  250    0   53  103  113
  SVN   43   52   51    0   21   32
  USA  233  157   76   18    0   89
  FRA  113  125   84   32   62    0
-----------------------------------------------------------------------------
BSW
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
       CAN  CHE  DEA  ITA  SVN  USA  FRA
-----------------------------------------------------------------------------

  CAN    0   71   56   61   19   80   33
  CHE   61    0  340  280   44  233   92
  DEA   45  271    0  268   50  147  104
  ITA   55  229  233    0   47  103   93
  SVN   17   41   47   46    0   20   31
  USA   71  200  108   76   17    0   54
  FRA   28   63   73   70   31   36    0
-----------------------------------------------------------------------------
BSW
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
       CAN  CHE  DEA  ITA  SVN  FRA
-----------------------------------------------------------------------------

  CAN    0  121  106  119   27   76
  CHE  100    0  504  445   58  155
  DEA   83  410    0  535   73  174
  ITA   98  386  450    0   75  173
  SVN   24   56   68   74    0   43
  FRA   63  114  127  136   41    0
-----------------------------------------------------------------------------
BSW
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
       CHE  DEA  ITA  SVN  FRA
-----------------------------------------------------------------------------

  CHE    0  503  447   46  152
  DEA  409    0  541   55  173
  ITA  388  457    0   59  172
  SVN   43   52   57    0   32
  FRA  113  126  136   32    0
-----------------------------------------------------------------------------
BSW
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
       CHE  DEA  ITA  SVN  FRA
-----------------------------------------------------------------------------

  CHE    0  276  254   45  105
  DEA  229    0  259   53  121
  ITA  214  226    0   53  112
  SVN   42   50   51    0   32
  FRA   76   81   84   32    0
-----------------------------------------------------------------------------
BSW
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
       CHE  DEA  ITA  SVN  FRA
-----------------------------------------------------------------------------

  CHE    0  503  441   59  152
  DEA  409    0  535   73  173
  ITA  383  450    0   76  171
  SVN   57   68   75    0   43
  FRA  113  126  136   41    0
-----------------------------------------------------------------------------
```

```
BSW
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
       CHE  DEA  ITA  SVN  FRA
 -------------------------------------------------------------------------------
  CHE    0  309  277   59   88
  DEA  243    0  260   65  100
  ITA  228  226    0   63   92
  SVN   57   59   62    0   35
  FRA   62   70   69   34    0
 -------------------------------------------------------------------------------
GUE
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
       CAN  GBR  USA  AUS
 -------------------------------------------------------------------------------
  CAN    0   22   63   18
  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   18
  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   18
  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   18
  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   18
  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   18
  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   18
  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   18
  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   18
  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   18
  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   18
  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    18
 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    17
 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    18
 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    18
 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    18    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    18
 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    17
 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   21
 GBR   17    0   72   12
 USA   52   71    0   26
 AUS   20    9   22    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  469  837  445  746  735  599  776  841  683  853 1018  451  525  488  302  532  515   85  404  298  118  473
 BEL   405    0  610  497  783  638  555  728  688  655  978  720  390  528  275  245  407  502   84  388  246  145  490
 CAN   752  575    0  823 1702 1107 1233 1256 1455 1675 1244 2933  857 1034  364  374 1116 1014  133  425  630  176  846
 CHE   380  492  664    0  876  589  542  571  674  706  796  889  373  514  246  219  389  485   73  345  250  120  439
 DEU   403  661  660  593    0 1862 1267 1915 1567 2130 2151 2430  929 1467  401  352 1078 1455  187  527  486  266  872
 DFS   475  557  791  495  873    0  917 1395 1295 1310 1573 1610  708 1069  453  381  776 1033  142  529  416  202  751
 ESP   452  533  741  426  581  635    0 1058 1023 1246 1016 1453  679  848  314  365  817  825  117  405  454  167  719
 FRA   462  663  701  469  659  593  690    0 1366 1462 1723 2192  772 1269  478  354 1059 1104  132  518  458  165  731
 GBR   690  693 1465  644  795  877  820  749    0 1491 1553 1962  752 1046  470  392  855  981  135  705  467  195  815
 ITA   539  643 1360  624 1081  988  900  718 1247    0 1533 2364  894 1277  366  365  994 1209  162  488  567  233  898
 NLD   696 1073 1076  750 1211 1128  854  865 1277 1258    0 2087  776 1233  581  381  877 1302  173  644  436  224  860
 USA   827  612 2876  772  887  977  914  982 1773 1767 1624    0 1113 1478  533  462 1641 1466  182  547  786  204 1075
 HUN   315  313  744  296  547  494  508  447  599  733  568  992    0  691  270  296  576  805  103  322  398  130  553
 POL   337  413  740  354  766  676  527  650  769  918  908 1188  514    0  301  286  705 1025  159  381  453  211  746
 NZL   390  212  311  204  244  287  254  234  367  290  515  446  204  186    0  206  312  322   41  337  173   60  284
 ZAF   276  207  349  189  250  297  334  248  363  318  341  488  251  210  186    0  303  299   48  236  223   73  308
 JPN   267  218  367  204  248  287  287  254  325  337  311  425  230  225  145  191    0  712  100  323  468  128  531
 CZE   323  371  676  336  852  584  554  627  683  868 1088 1062  673  689  209  219  211    0  125  390  444  193  682
 EST    41   51   60   34   91   68   51   50   64   80  103  109   62   86   18   21   23   69    0   60   66   51  101
 IRL   363  372  400  337  374  420  388  406  755  456  584  505  270  282  275  223  183  295   33    0  193   96  360
 KOR   208  169  562  174  232  272  314  229  348  468  288  879  314  330  118  173  212  309   28  135    0   92  405
 SVN    80  117  130   84  235  160  121  110  148  199  190  156   95  167   45   52   62  139   28   73   58    0  140
 PRT   355  490  849  380  595  640  683  577  750  861  848 1095  527  687  220  293  253  561   63  310  341  111    0
-------------------------------------------------------------------------------------------------------------------------
HOL
--------

 common bulls below diagonal
 common three quarter sib group above diagonal
       AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  NZL  ZAF  JPN  CZE  EST  IRL  KOR  SVN  PRT
-------------------------------------------------------------------------------------------------------------------------
 AUS     0  462  837  445  746  734  611  634  841  683  798 1018  451  523  488  252  531  515   85  404  296  118  476
 BEL   404    0  603  494  778  631  567  652  680  650  922  703  387  524  271  214  397  500   84  385  245  145  491
 CAN   752  575    0  823 1701 1107 1243 1080 1455 1675 1170 2933  857 1033  364  321 1114 1014  133  425  625  176  848
 CHE   380  491  664    0  876  589  550  520  674  706  773  889  373  512  246  196  388  485   73  345  249  120  440
 DEU   403  661  660  593    0 1862 1293 1778 1566 2130 2110 2430  929 1461  401  317 1076 1455  187  527  482  266  872
 DFS   475  556  791  495  873    0  940 1209 1293 1309 1494 1609  707 1064  452  327  775 1033  142  527  414  202  754
 ESP   461  558  751  435  613  658    0  979 1045 1264 1005 1473  689  864  326  320  822  841  121  418  455  171  736
 FRA   416  616  642  430  586  560  684    0 1205 1398 1372 1745  718 1176  387  268  891 1047  129  458  418  164  692
 GBR   690  693 1465  644  795  877  850  695    0 1491 1486 1960  752 1044  470  336  853  981  135  702  465  195  817
 ITA   539  643 1360  624 1081  988  929  691 1247    0 1508 2365  894 1277  366  342  992 1209  162  488  560  233  899
 NLD   664 1011 1019  726 1189 1104  853  733 1223 1237    0 1851  755 1209  554  318  805 1283  171  630  416  224  844
 USA   827  611 2876  772  887  976  932  779 1773 1767 1380    0 1113 1476  533  393 1639 1466  182  545  779  204 1078
 HUN   315  313  744  296  547  494  518  430  599  733  551  992    0  690  270  268  576  805  103  322  394  130  556
 POL   337  413  740  354  766  676  545  607  768  918  897 1188  514    0  301  260  704 1025  159  381  450  211  748
 NZL   390  212  311  204  244  287  263  205  367  290  493  446  204  186    0  169  312  322   41  337  172   60  285
 ZAF   236  190  305  173  231  273  295  208  312  306  282  403  234  202  149    0  256  278   47  199  203   73  292
 JPN   263  213  361  200  244  283  285  242  318  333  301  417  227  223  143  175    0  711  100  323  462  128  532
-------------------------------------------------------------------------------------------------------------------------
```

```
  CZE  323  371  676  336  852  584  574  592  683  868 1071 1062  673  689  209  207  208    0  125  390  441  193  684
  EST   41   51   60   34   91   68   54   50   64   80  102  109   62   86   18   21   23   69    0   60   66   51  101
  IRL  363  372  400  337  374  420  405  375  753  456  570  505  270  282  275  192  181  295   33    0  191   96  361
  KOR  207  168  558  174  232  272  315  219  346  465  276  870  311  328  118  157  209  308   28  135    0   91  403
  SVN   80  117  130   84  235  160  127  110  148  199  188  156   95  167   45   52   62  139   28   73   57    0  140
  PRT  356  492  851  380  595  642  702  569  753  861  835 1095  531  690  220  283  248  563   63  311  338  111    0
-----------------------------------------------------------------------------------------------------------------
HOL
--------
common bulls below diagonal
common three quarter sib group above diagonal
       AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  NZL  ZAF  JPN  CZE  EST  IRL  KOR  PRT  SVN
-----------------------------------------------------------------------------------------------------------------
  AUS    0  469  837  445  746  734  601  776  841  683  827 1018  451  525  488  302  532  515   85  404  296  476   91
  BEL  405    0  610  497  783  637  559  728  688  655  954  720  390  528  275  245  407  502   84  388  245  492  113
  CAN  752  575    0  823 1702 1107 1237 1256 1455 1675 1213 2933  857 1034  364  374 1116 1014  133  425  626  848  150
  CHE  380  492  664    0  876  589  544  572  674  706  788  889  373  514  246  219  389  485   73  345  249  440   94
  DEU  403  661  660  593    0 1862 1273 1916 1567 2130 2137 2430  929 1467  401  352 1078 1455  187  527  483  872  231
  DFS  475  557  791  495  873    0  921 1394 1294 1309 1531 1609  707 1068  452  381  776 1033  142  528  414  755  169
  ESP  453  537  743  428  588  639    0 1062 1026 1250 1006 1457  680  851  317  365  818  828  119  406  451  724  138
  FRA  462  663  701  470  660  593  695    0 1366 1462 1608 2192  772 1269  478  354 1059 1104  132  518  455  736  140
  GBR  690  693 1465  644  795  877  824  749    0 1491 1524 1961  752 1046  470  392  855  981  135  703  466  819  161
  ITA  539  643 1360  624 1081  988  906  718 1247    0 1525 2364  894 1277  366  365  994 1209  162  488  562  899  201
  NLD  692 1048 1069  749 1209 1127  857  843 1265 1257    0 1959  767 1224  568  371  843 1297  172  637  429  857  184
  USA  827  612 2876  772  887  976  917  982 1773 1767 1582    0 1113 1478  533  462 1641 1466  182  546  781 1078  172
  HUN  315  313  744  296  547  494  509  447  599  733  568  992    0  691  270  296  576  805  103  322  396  556  112
  POL  337  413  740  354  766  676  529  650  769  918  907 1188  514    0  301  286  705 1025  159  381  451  748  185
  NZL  390  212  311  204  244  287  256  234  367  290  513  446  204  186    0  206  312  322   41  337  172  285   49
  ZAF  276  207  349  189  250  297  335  248  363  318  339  488  251  210  186    0  303  299   48  236  222  308   54
  JPN  264  216  364  202  246  285  285  251  322  335  307  421  228  224  143  189    0  712  100  323  463  533  104
  CZE  323  371  676  336  852  584  556  627  683  868 1087 1062  673  689  209  219  209    0  125  390  442  685  164
  EST   41   51   60   34   91   68   52   50   64   80  103  109   62   86   18   21   23   69    0   60   66  101   47
  IRL  363  372  400  337  374  420  389  406  753  456  581  505  270  282  275  223  181  295   33    0  192  361   73
  KOR  207  168  559  174  232  272  312  227  347  466  284  872  313  329  118  172  211  308   28  135    0  404   78
  PRT  356  491  851  380  595  642  688  581  752  861  847 1095  530  690  220  293  251  563   63  311  339    0  113
  SVN   63   90  113   69  209  134  101   94  122  172  157  134   81  147   38   39   47  119   24   59   50   91    0
-----------------------------------------------------------------------------------------------------------------
HOL
--------
common bulls below diagonal
common three quarter sib group above diagonal
       AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  ZAF  JPN  CZE  EST  IRL  KOR  PRT  SVN
-----------------------------------------------------------------------------------------------------------------
  AUS    0  455  837  430  744  734  614  634  838  682  436 1015  450  520  299  531  515   83  402  296  468   91
  BEL  402    0  595  470  767  622  565  648  667  647  571  688  381  517  234  392  497   83  378  240  481  113
  CAN  752  570    0  787 1700 1103 1245 1079 1452 1674  790 2932  857 1032  370 1113 1014  132  424  625  842  149
  CHE  376  467  634    0  793  575  544  515  661  685  509  832  365  492  216  387  464   70  342  247  425   92
  DEU  402  659  660  540    0 1850 1302 1777 1564 2129 1295 2426  926 1457  348 1075 1454  186  526  482  856  229
  DFS  475  554  791  485  872    0  944 1203 1282 1304  875 1599  703 1054  378  772 1031  140  526  414  740  167
  ESP  463  561  752  433  630  667    0  986 1048 1269  661 1478  690  869  368  825  846  122  420  455  735  142
  FRA  416  616  642  425  586  560  696    0 1204 1397  786 1744  717 1174  299  891 1047  127  457  418  678  140
  GBR  690  684 1465  634  794  877  857  695    0 1488  850 1955  748 1035  387  852  980  132  694  465  803  160
  ITA  539  643 1359  608 1080  988  937  691 1246    0 1040 2363  894 1272  361  991 1209  160  487  560  887  201
  NLD  410  622  779  471  875  796  578  547  802  962    0  994  472  861  206  434  877  132  351  280  540  174
  USA  826  603 2875  717  886  976  934  779 1772 1766  867    0 1111 1474  457 1639 1465  181  542  778 1066  171
  HUN  315  311  744  291  547  494  522  430  598  733  356  991    0  688  294  576  805  103  319  394  550  112
  POL  337  410  740  334  766  674  555  607  765  916  726 1188  514    0  282  704 1022  158  378  450  739  184
  ZAF  274  205  347  186  248  295  336  216  361  316  182  485  250  208    0  300  295   46  234  220  304   52
  JPN  263  213  361  200  244  283  285  242  318  333  227  417  227  223  187    0  711  100  322  462  530  104
  CZE  323  371  676  324  852  584  580  592  683  868  839 1062  673  689  217  208    0  123  389  441  677  163
  EST   41   51   60   34   91   68   57   50   64   80   84  109   62   86   21   23   69    0   58   66   99   47
  IRL  363  370  400  333  373  420  409  375  746  456  350  505  270  281  222  181  295   33    0  191  354   73
  KOR  207  168  558  173  232  272  315  219  346  465  202  869  311  328  172  209  308   28  135    0  403   78
  PRT  356  488  851  370  594  639  704  569  751  859  548 1095  530  684  292  248  563   62  311  338    0  113
  SVN   63   90  113   68  207  133  105   94  122  172  156  134   81  147   37   47  119   24   59   50   91    0
-----------------------------------------------------------------------------------------------------------------
HOL
--------
common bulls below diagonal
```

```
common three quarter sib group above diagonal
      AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  NZL  ZAF  JPN  CZE  EST  IRL  KOR  SVN  PRT
    -----------------------------------------------------------------------------------------------------------------
AUS     0  469  837  445  746  735  598  776  841  683  853 1018  451  525  488  302  532  515   85  404  298  119  476
BEL   405    0  610  497  783  638  552  728  688  655  978  720  390  528  275  245  407  502   84  388  246  146  491
CAN   752  575    0  823 1702 1107 1231 1256 1455 1675 1244 2933  857 1034  364  374 1116 1014  133  425  630  177  848
CHE   380  492  664    0  876  589  541  571  674  706  796  889  373  514  246  219  389  485   73  345  250  121  440
DEU   403  661  660  593    0 1862 1261 1915 1567 2130 2151 2430  929 1467  401  352 1078 1455  187  527  486  267  872
DFS   475  557  791  495  873    0  912 1395 1295 1310 1573 1610  708 1069  453  381  776 1033  142  529  416  203  754
ESP   451  530  739  424  574  630    0 1054 1018 1241 1011 1448  678  845  313  365  814  823  117  404  453  168  720
FRA   462  663  701  469  659  592  685    0 1366 1462 1723 2192  772 1269  478  354 1059 1104  132  518  458  166  735
GBR   690  693 1465  644  795  877  814  749    0 1491 1553 1962  752 1046  470  392  855  981  135  705  467  196  819
ITA   539  643 1360  624 1081  988  894  718 1247    0 1533 2364  894 1277  366  365  994 1209  162  488  567  234  899
NLD   696 1073 1076  750 1211 1128  848  865 1277 1258    0 2087  776 1233  581  381  877 1302  173  644  436  225  861
USA   827  612 2876  772  887  976  909  982 1773 1767 1624    0 1113 1478  533  462 1641 1466  182  547  786  205 1077
HUN   315  313  744  296  547  494  508  447  599  733  568  992    0  691  270  296  576  805  103  322  398  131  555
POL   337  413  740  354  766  676  523  650  769  918  908 1188  514    0  301  286  705 1025  159  381  453  212  747
NZL   390  212  311  204  244  287  253  234  367  290  515  446  204  186    0  206  312  322   41  337  173   60  285
ZAF   276  207  349  189  250  297  334  248  363  318  341  488  251  210  186    0  303  299   48  236  223   74  308
JPN   265  216  364  202  246  285  285  252  323  335  309  422  228  224  143  189    0  712  100  323  468  129  533
CZE   323  371  676  336  852  584  552  627  683  868 1088 1062  673  689  209  219  210    0  125  390  444  194  684
EST    41   51   60   34   91   68   51   50   64   80  103  109   62   86   18   21   23   69    0   60   66   51  101
IRL   363  372  400  337  374  420  387  406  755  456  584  505  270  282  275  223  181  295   33    0  193   97  361
KOR   208  169  562  174  232  272  312  229  348  468  288  879  314  330  118  173  212  309   28  135    0   93  405
SVN    81  118  131   85  236  161  122  111  149  200  191  157   96  168   45   52   63  140   28   74   59    0  141
PRT   356  490  851  380  595  641  682  580  752  861  849 1095  529  689  220  293  251  562   63  311  341  111    0
    -----------------------------------------------------------------------------------------------------------------
HOL
--------

common bulls below diagonal
common three quarter sib group above diagonal
      AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  NZL  ZAF  JPN  CZE  EST  IRL  KOR  PRT  SVN
    -----------------------------------------------------------------------------------------------------------------
AUS     0  444  837  445  746  735  598  776  841  683  851 1018  451  525  488  302  337  515   85  404  296  476   91
BEL   402    0  589  490  763  617  535  681  657  646  889  673  375  516  260  233  297  488   84  373  236  484  113
CAN   752  565    0  823 1702 1107 1232 1256 1455 1675 1241 2933  857 1034  364  374  812 1014  133  425  627  848  150
CHE   380  488  664    0  876  589  541  572  674  706  794  889  373  514  246  219  307  485   73  345  248  440   94
DEU   403  656  660  593    0 1862 1262 1916 1567 2130 2149 2430  929 1467  401  352  853 1455  187  527  482  872  231
DFS   475  552  791  495  873    0  914 1395 1295 1310 1565 1610  708 1069  453  381  548 1033  142  529  413  755  169
ESP   451  524  741  424  576  632    0 1055 1020 1243 1009 1450  679  846  313  365  634  824  117  404  451  721  138
FRA   462  651  701  470  660  593  688    0 1366 1462 1712 2192  772 1269  478  354  722 1104  132  518  455  736  140
GBR   690  676 1465  644  795  877  817  749    0 1491 1550 1962  752 1046  470  392  614  981  135  705  465  819  161
ITA   539  643 1360  624 1081  988  897  718 1247    0 1532 2364  894 1277  366  365  854 1209  162  488  563  899  201
NLD   696  976 1076  750 1210 1128  849  866 1276 1258    0 2080  776 1232  580  381  631 1302  172  643  431  862  184
USA   827  597 2876  772  887  976  912  982 1773 1767 1621    0 1113 1478  533  462 1120 1466  182  547  780 1078  172
HUN   315  309  744  296  547  494  508  447  599  733  568  992    0  691  270  296  458  805  103  322  396  556  112
POL   337  410  740  354  766  676  525  650  769  918  908 1188  514    0  301  286  600 1025  159  381  451  748  185
NZL   390  206  311  204  244  287  254  234  367  290  515  446  204  186    0  206  198  322   41  337  171  285   49
ZAF   275  204  348  188  249  296  333  247  362  317  340  487  250  209  186    0  205  299   48  236  221  308   54
JPN   225  188  324  183  224  255  242  221  274  310  266  363  200  214  119  144    0  569   88  235  381  419  101
CZE   323  368  676  336  852  584  553  627  683  868 1088 1062  673  689  209  219  191    0  125  390  442  685  164
EST    41   51   60   34   91   68   51   50   64   80  103  109   62   86   18   21   23   69    0   60   66  101   47
IRL   363  366  400  337  374  420  387  406  755  456  584  505  270  282  275  222  157  295   33    0  191  361   73
KOR   208  169  562  174  232  272  314  229  348  468  288  875  314  330  118  172  197  309   28  135    0  404   79
PRT   356  488  851  380  595  642  684  581  752  861  850 1095  530  690  220  292  221  563   63  311  341    0  113
SVN    63   90  113   69  209  134  100   94  122  172  157  134   81  147   38   39   47  119   24   59   51   91    0
    -----------------------------------------------------------------------------------------------------------------
HOL
--------

common bulls below diagonal
common three quarter sib group above diagonal
      AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  NZL  ZAF  JPN  CZE  EST  IRL  KOR  SVN  PRT
    -----------------------------------------------------------------------------------------------------------------
AUS     0  469  837  445  746  735  602  776  841  683  853 1018  451  525  488  302  531  515   85  404  296  119  476
BEL   405    0  610  497  783  638  559  728  688  655  978  720  390  528  275  245  405  502   84  388  244  146  492
CAN   752  575    0  823 1702 1107 1237 1256 1455 1675 1244 2933  857 1034  364  374 1114 1014  133  425  624  177  849
CHE   380  492  664    0  876  589  544  571  674  706  796  889  373  514  246  219  388  485   73  345  249  121  440
DEU   403  661  660  593    0 1862 1275 1915 1567 2130 2151 2430  929 1467  401  352 1076 1455  187  527  482  267  873
DFS   475  557  791  495  873    0  924 1395 1295 1310 1573 1610  708 1069  453  381  775 1033  142  529  414  203  756
```

```
ESP  454  538  743  429  591  641    0 1063 1028 1251 1022 1457  680  852  318  366  817  829  119  407  451  169  725
FRA  462  663  701  469  659  593  697    0 1366 1462 1723 2192  772 1269  478  354 1057 1104  132  518  453  166  737
GBR  690  693 1465  644  795  877  826  749    0 1491 1553 1962  752 1046  470  392  853  981  135  705  465  196  819
ITA  539  643 1360  624 1081  988  908  718 1247    0 1533 2364  894 1277  366  365  992 1209  162  488  559  234  900
NLD  696 1073 1076  750 1211 1128  861  865 1277 1258    0 2087  776 1233  581  381  875 1302  173  644  430  225  863
USA  827  612 2876  772  887  977  918  982 1773 1767 1624    0 1113 1478  533  462 1639 1466  182  547  778  205 1079
HUN  315  313  744  296  547  494  510  447  599  733  568  992    0  691  270  296  576  805  103  322  394  131  557
POL  337  413  740  354  766  676  530  650  769  918  908 1188  514    0  301  286  705 1025  159  381  450  212  749
NZL  390  212  311  204  244  287  257  234  367  290  515  446  204  186    0  206  312  322   41  337  172   60  285
ZAF  276  207  349  189  250  297  336  248  363  318  341  488  251  210  186    0  302  299   48  236  222   74  308
JPN  263  213  361  200  244  283  282  248  318  333  304  417  227  223  143  187    0  711  100  323  461  129  533
CZE  323  371  676  336  852  584  558  627  683  868 1088 1062  673  689  209  219  208    0  125  390  441  194  685
EST   41   51   60   34   91   68   52   50   64   80  103  109   62   86   18   21   23   69    0   60   66   51  101
IRL  363  372  400  337  374  420  390  406  755  456  584  505  270  282  275  223  181  295   33    0  191   97  361
KOR  207  168  558  174  232  272  311  225  346  465  285  869  311  328  118  172  209  308   28  135    0   91  402
SVN   81  118  131   85  236  161  124  111  149  200  191  157   96  168   45   52   63  140   28   74   58    0  141
PRT  356  492  851  380  595  642  691  581  754  863  852 1098  533  691  220  293  248  564   63  311  339  111    0
---------------------------------------------------------------------------------
```

HOL
----

common bulls below diagonal
common three quarter sib group above diagonal

```
      AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  ZAF  JPN  CZE  EST  IRL  KOR  SVN  PRT
---------------------------------------------------------------------------------
AUS     0  424  755  445  745  734  600  508  838  683  760 1017  449  486  254  493  399   85  389  214  116  473
BEL   396    0  560  479  739  588  526  561  627  636  830  641  365  484  205  362  411   81  350  191  142  475
CAN   699  554    0  788 1641 1011 1169  930 1361 1652 1106 2739  835  983  311  991  879  130  395  523  173  832
CHE   380  478  649    0  876  588  546  481  674  706  763  889  371  489  197  380  407   73  336  201  117  437
DEU   403  639  658  593    0 1861 1279 1571 1565 2130 2088 2429  925 1432  319 1050 1259  187  510  418  263  871
DFS   475  543  788  495  873    0  920  997 1289 1308 1457 1608  703 1016  329  732  843  142  502  329  201  750
ESP   456  525  732  430  597  646    0  856 1027 1257  972 1457  681  823  321  783  725  119  396  375  169  728
FRA   359  533  572  396  549  505  601    0  997 1277 1176 1404  637 1103  227  739  869  118  375  339  157  612
GBR   689  655 1392  643  795  875  833  595    0 1490 1437 1953  749 1001  338  806  826  134  660  380  192  813
ITA   539  638 1356  624 1081  988  915  640 1246    0 1503 2364  892 1253  343  978 1102  162  480  491  230  897
NLD   637  914  999  721 1190 1099  826  672 1199 1240    0 1756  738 1159  314  773 1131  171  581  346  221  835
USA   827  587 2763  772  887  976  921  648 1772 1767 1347    0 1110 1426  396 1507 1257  182  519  647  201 1073
HUN   315  300  738  296  547  494  512  387  598  733  554  992    0  664  269  561  689  103  308  340  128  556
POL   323  396  719  341  750  653  507  600  746  908  873 1158  496    0  247  669  921  158  344  403  208  727
ZAF   239  189  304  174  232  274  296  174  315  307  283  406  235  194    0  249  237   47  196  158   72  292
JPN   258  212  359  200  244  282  278  220  314  333  298  410  226  217  175    0  600   98  296  376  128  526
CZE   271  315  598  280  748  504  462  482  571  788  976  910  564  633  171  193    0  118  309  371  184  611
EST    41   50   60   34   91   68   52   46   64   80  102  109   62   85   21   23   64    0   58   61   51  101
IRL   361  357  397  334  372  418  392  317  721  454  554  499  268  269  193  180  240   33    0  138   95  347
KOR   148  144  470  148  201  229  249  200  272  405  230  717  263  306  115  177  264   26  101    0   83  346
SVN    79  114  129   83  233  160  124  106  147  197  187  155   94  166   52   62  135   28   73   55    0  139
PRT   353  483  831  378  596  640  694  524  751  862  831 1095  532  679  283  247  504   63  308  294  111    0
---------------------------------------------------------------------------------
```

HOL
----

common bulls below diagonal
common three quarter sib group above diagonal

```
      AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  ZAF  JPN  CZE  EST  IRL  KOR  SVN  PRT
---------------------------------------------------------------------------------
AUS     0  442  837  445  495  734  611  771  841  683  817 1018  450  524  302  531  515   85  403  296  118  481
BEL   402    0  587  489  594  613  551  673  655  645  882  672  375  515  233  383  488   84  372  237  146  487
CAN   752  565    0  823 1326 1107 1243 1240 1455 1675 1199 2933  856 1032  374 1114 1014  133  425  625  176  852
CHE   380  488  664    0  667  589  550  565  674  704  784  889  373  512  219  388  484   73  345  249  120  444
DEU   328  535  579  479    0 1271 1026 1317 1133 1748 1563 1752  705 1197  234  775 1096  162  367  392  244  670
DFS   475  552  791  495  736    0  940 1367 1293 1308 1518 1608  706 1066  381  775 1033  142  528  414  202  760
ESP   461  549  751  435  480  658    0 1069 1045 1264 1019 1473  688  863  370  821  841  121  418  455  171  741
FRA   461  646  701  469  502  592  726    0 1351 1460 1553 2151  769 1260  353 1043 1099  130  512  449  165  739
GBR   690  676 1465  644  638  877  850  749    0 1491 1508 1959  751 1042  391  852  981  135  699  465  195  822
ITA   539  643 1360  623  920  988  929  718 1247    0 1517 2364  894 1275  365  992 1209  162  488  560  233  901
NLD   687  973 1063  748  975 1125  879  823 1256 1255    0 1916  760 1210  369  834 1292  172  630  425  224  857
USA   827  597 2876  772  716  976  932  946 1773 1767 1566    0 1112 1474  462 1638 1466  182  545  777  204 1081
HUN   315  309  744  296  425  493  518  447  599  733  566  992    0  690  295  576  804  103  321  394  130  557
POL   337  410  740  353  670  674  544  650  768  918  900 1188  513    0  285  705 1022  158  379  449  210  750
ZAF   276  205  349  189  169  297  338  248  363  318  335  488  251  210    0  301  299   48  236  222   74  313
JPN   263  213  361  200  211  283  284  247  317  333  301  416  227  223  186    0  711  100  323  462  128  537
```

```
  CZE  323  368  676  336  678  584  573  627  683  868 1086 1062  673  689  219  208    0  124  390  441  193  686
  EST   41   51   60   34   78   68   54   50   64   80  103  109   62   85   21   23   69    0   60   66   51  100
  IRL  363  366  400  337  289  420  405  406  749  456  580  505  270  282  223  181  295   33    0  191   96  362
  KOR  207  168  558  174  205  272  313  225  346  465  281  863  311  328  172  209  308   28  135    0   92  405
  SVN   81  118  131   85  225  160  128  111  149  200  191  157   96  167   52   63  140   28   74   58    0  140
  PRT  358  492  854  384  500  646  708  584  759  864  850 1102  535  694  294  248  567   62  312  340  111    0
------------------------------------------------------------------------------
HOL
--------
common bulls below diagonal
common three quarter sib group above diagonal
     AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  NZL  ZAF  JPN  CZE  EST  IRL  KOR  SVN  PRT
------------------------------------------------------------------------------

  AUS    0  462  837  445  746  734  611  725  841  683  798 1018  451  524  488  302  531  515   85  404  297  118  476
  BEL  404    0  605  496  779  633  569  703  682  652  924  705  387  525  271  243  398  500   84  386  245  145  492
  CAN  752  575    0  823 1701 1107 1243 1178 1455 1675 1170 2933  857 1034  364  374 1114 1014  133  425  629  176  849
  CHE  380  491  664    0  876  589  550  564  674  706  773  889  373  514  246  219  388  485   73  345  249  120  440
  DEU  403  661  660  593    0 1862 1293 1897 1567 2130 2111 2430  929 1466  401  352 1076 1455  187  527  484  265  873
  DFS  475  556  791  495  873    0  940 1316 1294 1309 1494 1609  707 1068  452  381  775 1033  142  528  415  201  756
  ESP  461  557  751  435  613  658    0 1043 1046 1264 1006 1473  689  865  326  370  822  841  121  418  457  171  736
  FRA  460  659  698  469  658  590  726    0 1311 1453 1518 1992  758 1258  445  339  979 1092  131  500  439  165  729
  GBR  690  693 1465  644  795  877  850  744    0 1491 1487 1961  752 1046  470  392  853  981  135  703  466  195  819
  ITA  539  643 1360  624 1081  988  929  717 1247    0 1508 2364  894 1277  366  365  992 1209  162  488  565  233  900
  NLD  664 1011 1020  726 1189 1103  853  812 1224 1237    0 1853  755 1211  554  362  805 1283  171  630  418  223  845
  USA  827  611 2876  772  887  977  932  911 1773 1767 1380    0 1113 1478  533  462 1639 1466  182  546  783  204 1079
  HUN  315  313  744  296  547  494  518  446  599  733  551  992    0  691  270  296  576  805  103  322  398  130  557
  POL  337  413  740  354  766  676  545  650  769  918  899 1188  514    0  301  286  705 1025  159  381  453  210  749
  NZL  390  212  311  204  244  287  263  232  367  290  493  446  204  186    0  206  312  322   41  337  172   60  285
  ZAF  276  207  349  189  250  297  338  246  363  318  321  488  251  210  186    0  302  299   48  236  222   73  308
  JPN  263  213  361  200  244  283  285  248  318  333  301  417  227  223  143  187    0  711  100  323  465  128  533
  CZE  323  371  676  336  852  584  573  625  683  868 1071 1062  673  689  209  219  208    0  125  390  443  193  685
  EST   41   51   60   34   91   68   54   50   64   80  102  109   62   86   18   21   23   69    0   60   66   51  101
  IRL  363  372  400  337  374  420  405  404  753  456  569  505  270  282  275  223  181  295   33    0  192   96  361
  KOR  208  169  561  174  232  272  317  228  348  468  278  875  314  330  118  172  210  309   28  135    0   92  405
  SVN   80  117  130   84  234  160  127  110  148  199  188  156   95  167   45   52   62  139   28   73   58    0  140
  PRT  356  492  851  380  595  642  702  579  753  862  836 1096  532  691  220  293  248  563   63  311  341  111    0
------------------------------------------------------------------------------
HOL
--------
common bulls below diagonal
common three quarter sib group above diagonal
     AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  NZL  ZAF  JPN  CZE  EST  IRL  KOR  SVN  PRT
------------------------------------------------------------------------------

  AUS    0  462  837  445  746  688  603  772  841  683  827 1018  451  525  488  302  532  515   85  404  297  118  475
  BEL  404    0  605  496  779  622  558  714  682  652  939  705  387  525  271  243  399  500   84  386  245  145  491
  CAN  752  575    0  823 1702 1029 1238 1241 1455 1675 1213 2933  857 1034  364  374 1115 1014  133  425  629  176  846
  CHE  380  491  664    0  876  570  546  569  674  706  788  889  373  514  246  219  388  485   73  345  249  120  440
  DEU  403  661  660  593    0 1811 1277 1911 1567 2130 2137 2430  929 1467  401  352 1077 1455  187  527  484  266  870
  DFS  475  556  791  495  873    0  883 1285 1236 1296 1497 1516  691 1048  425  354  722 1000  140  511  402  202  745
  ESP  454  539  744  430  592  642    0 1053 1030 1252 1009 1459  681  854  319  368  819  830  119  408  454  168  724
  FRA  462  662  701  469  658  592  700    0 1353 1460 1601 2153  770 1266  474  353 1045 1099  131  513  453  165  732
  GBR  690  692 1464  644  794  876  825  748    0 1491 1524 1961  752 1046  470  392  854  981  135  703  466  195  817
  ITA  539  643 1360  624 1081  987  909  718 1246    0 1525 2364  894 1277  366  365  993 1209  162  488  565  233  898
  NLD  692 1043 1069  749 1209 1127  860  841 1264 1257    0 1959  767 1224  568  371  842 1297  172  637  430  224  856
  USA  827  611 2876  772  887  976  919  947 1773 1767 1582    0 1113 1478  533  462 1640 1466  182  546  784  204 1076
  HUN  315  313  744  296  547  494  511  447  599  733  568  992    0  691  270  296  576  805  103  322  398  130  556
  POL  337  413  740  354  766  676  532  650  769  918  907 1188  514    0  301  286  705 1025  159  381  453  211  746
  NZL  390  212  311  204  244  287  257  234  367  290  513  446  204  186    0  206  312  322   41  337  172   60  285
  ZAF  276  207  349  189  250  297  337  248  363  318  339  488  251  210  186    0  303  299   48  236  222   73  307
  JPN  263  215  363  201  246  285  285  250  320  335  305  419  228  224  143  188    0  712  100  323  466  128  533
  CZE  323  371  676  336  852  584  559  627  683  868 1087 1062  673  689  209  219  209    0  125  390  443  193  684
  EST   41   51   60   34   91   68   52   50   64   80  103  109   62   86   18   21   23   69    0   60   66   51  100
  IRL  363  372  400  337  374  420  391  406  753  456  581  505  270  282  275  223  181  295   33    0  192   96  361
  KOR  208  169  562  174  232  272  315  229  348  468  285  876  314  330  118  173  212  309   28  135    0   92  405
  SVN   80  117  130   84  235  160  123  110  148  199  190  156   95  167   45   52   62  139   28   73   58    0  140
  PRT  356  491  851  380  595  639  690  581  752  861  847 1095  530  690  220  293  250  563   63  311  341  111    0
------------------------------------------------------------------------------
HOL
--------
```

```
common bulls below diagonal
common three quarter sib group above diagonal
      AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  NZL  ZAF  JPN  CZE  EST  IRL  KOR  SVN  PRT
----------------------------------------------------------------------------------------------------------------------
AUS     0  462  837  445  746  735  614  776  841  683  853 1018  451  525  488  302  531  515   85  404  296  119  476
BEL   404    0  605  496  779  634  572  717  682  652  947  705  387  525  271  243  398  500   84  386  244  146  492
CAN   752  575    0  823 1702 1107 1245 1256 1455 1675 1244 2933  857 1034  364  374 1114 1014  133  425  624  177  849
CHE   380  491  664    0  876  589  551  571  674  706  796  889  373  514  246  219  388  485   73  345  249  121  440
DEU   403  661  660  593    0 1862 1302 1915 1567 2130 2151 2430  929 1467  401  352 1076 1455  187  527  482  267  873
DFS   475  556  792  495  873    0  947 1395 1295 1310 1573 1610  708 1069  453  381  775 1033  142  529  414  203  756
ESP   462  562  752  436  628  666    0 1088 1051 1269 1052 1478  691  873  328  370  825  846  123  421  455  173  741
FRA   462  662  701  469  659  593  740    0 1366 1462 1723 2192  772 1269  478  354 1057 1104  132  518  453  166  737
GBR   690  693 1465  644  795  877  857  749    0 1491 1553 1962  752 1046  470  392  853  981  135  705  465  196  819
ITA   539  643 1360  624 1081  988  937  718 1247    0 1533 2364  894 1277  366  365  992 1209  162  488  559  234  900
NLD   696 1050 1076  750 1211 1128  897  865 1277 1258    0 2087  776 1233  581  381  875 1302  173  644  430  225  863
USA   827  611 2876  772  887  978  934  982 1773 1767 1624    0 1113 1478  533  462 1639 1466  182  547  777  205 1079
HUN   315  313  744  296  547  495  521  447  599  733  568  992    0  691  270  296  576  805  103  322  394  131  557
POL   337  413  740  354  766  676  554  650  769  918  908 1188  514    0  301  286  705 1025  159  381  450  212  749
NZL   390  212  311  204  244  287  264  234  367  290  515  446  204  186    0  206  312  322   41  337  172   60  285
ZAF   276  207  349  189  250  298  338  248  363  318  341  488  251  210  186    0  302  299   48  236  222   74  308
JPN   263  213  361  200  244  283  285  248  318  333  304  417  227  223  143  187    0  711  100  323  461  129  533
CZE   323  371  676  336  852  584  578  627  683  868 1088 1062  673  689  209  219  208    0  125  390  441  194  685
EST    41   51   60   34   91   68   56   50   64   80  103  109   62   86   18   21   23   69    0   60   66   51  101
IRL   363  372  400  337  374  420  408  406  755  456  584  505  270  282  275  223  181  295   33    0  191   97  361
KOR   207  168  558  174  232  272  314  225  346  465  285  868  311  328  118  172  209  308   28  135    0   91  402
SVN    81  118  131   85  236  161  129  111  149  200  191  157   96  168   45   52   63  140   28   74   58    0  141
PRT   356  492  851  380  595  642  706  581  754  863  852 1098  533  691  220  293  248  564   63  311  339  111    0
----------------------------------------------------------------------------------------------------------------------
HOL
--------
common bulls below diagonal
common three quarter sib group above diagonal
      AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  ZAF  JPN  CZE  EST  IRL  KOR  SVN  PRT
----------------------------------------------------------------------------------------------------------------------
AUS     0  465  837  445  746  735  600  776  841  683  853 1018  451  525  302  532  515   85  403  297  119  476
BEL   403    0  605  495  777  633  555  721  682  654  970  714  387  525  242  403  500   84  383  242  146  491
CAN   752  571    0  823 1702 1107 1235 1256 1455 1675 1244 2933  857 1034  374 1116 1014  133  425  628  177  848
CHE   380  490  664    0  876  589  543  571  674  706  796  889  373  514  219  389  485   73  345  249  121  440
DEU   403  660  660  593    0 1862 1268 1915 1567 2130 2151 2430  929 1467  352 1078 1455  187  527  483  267  872
DFS   475  556  792  495  873    0  919 1395 1295 1310 1573 1610  708 1069  381  776 1033  142  529  414  203  755
ESP   452  532  741  426  583  636    0 1058 1025 1247 1018 1453  680  850  365  817  827  119  406  452  168  724
FRA   462  661  701  469  659  593  690    0 1366 1462 1723 2192  772 1269  354 1059 1104  132  518  456  166  736
GBR   690  689 1465  644  795  877  821  749    0 1491 1553 1962  752 1046  392  855  981  135  702  466  196  819
ITA   539  643 1360  624 1081  988  901  718 1247    0 1533 2364  894 1277  365  994 1209  162  488  564  234  899
NLD   696 1062 1076  750 1211 1128  855  865 1277 1258    0 2087  776 1233  381  877 1302  173  644  433  225  862
USA   827  608 2876  772  887  978  914  982 1773 1767 1624    0 1113 1478  462 1641 1466  182  547  782  205 1078
HUN   315  312  744  296  547  495  509  447  599  733  568  992    0  691  296  576  805  103  322  397  131  556
POL   337  413  740  354  766  676  528  650  769  918  908 1188  514    0  286  705 1025  159  381  452  212  748
ZAF   276  207  349  189  250  298  334  248  363  318  341  488  251  210    0  303  299   48  236  222   74  308
JPN   265  216  364  202  246  285  285  252  323  335  309  422  228  224  189    0  712  100  323  466  129  533
CZE   323  371  676  336  852  584  555  627  683  868 1088 1062  673  689  219  210    0  125  390  443  194  685
EST    41   51   60   34   91   68   52   50   64   80  103  109   62   86   21   23   69    0   60   66   51  101
IRL   363  371  400  337  374  420  388  406  752  456  584  505  270  282  223  181  295   33    0  192   97  361
KOR   208  169  562  174  232  272  314  229  348  468  288  876  314  330  173  212  309   28  135    0   93  405
SVN    81  118  131   85  236  161  122  111  149  200  191  157   96  168   52   63  140   28   74   59    0  141
PRT   356  490  851  380  595  642  687  581  752  861  850 1095  530  690  293  251  563   63  311  341  111    0
----------------------------------------------------------------------------------------------------------------------
HOL
--------
common bulls below diagonal
common three quarter sib group above diagonal
      AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  NZL  ZAF  JPN  CZE  EST  IRL  KOR  SVN  PRT
----------------------------------------------------------------------------------------------------------------------
AUS     0  462  837  445  746  735  603  776  841  683  853 1018  451  525  488  302  532  515   85  404  297  117  476
BEL   404    0  605  496  779  634  558  717  682  652  947  705  387  525  271  243  400  500   84  386  245  144  492
CAN   752  575    0  823 1702 1107 1237 1256 1455 1676 1244 2933  857 1034  364  374 1116 1014  133  425  629  174  848
CHE   380  491  664    0  876  589  545  571  674  706  796  889  373  514  246  219  389  485   73  345  249  118  440
DEU   403  661  660  593    0 1862 1276 1915 1567 2130 2151 2430  929 1467  401  352 1078 1455  187  527  484  263  872
DFS   475  556  792  495  873    0  924 1395 1295 1310 1573 1610  708 1069  453  381  776 1033  142  529  415  200  755
```

```
  ESP  454  539  743  429  591  641    0 1064 1029 1251 1023 1458  680  853  319  367  818  829  119  407  453  168  725
  FRA  462  662  701  469  659  593  699    0 1366 1463 1723 2192  772 1269  478  354 1059 1104  132  518  457  164  736
  GBR  690  693 1465  644  795  877  826  749    0 1492 1553 1962  752 1046  470  392  855  981  135  705  466  193  819
  ITA  539  643 1360  624 1081  988  908  718 1247    0 1533 2365  894 1278  366  365  994 1209  162  488  565  232  899
  NLD  696 1050 1076  750 1211 1128  861  865 1277 1258    0 2087  776 1233  581  381  877 1302  173  644  435  221  862
  USA  827  611 2876  772  887  977  918  982 1773 1767 1624    0 1113 1478  533  462 1641 1466  182  547  784  202 1078
  HUN  315  313  744  296  547  495  510  447  599  733  568  992    0  691  270  296  576  805  103  322  398  129  556
  POL  337  413  740  354  766  676  531  650  769  918  908 1188  514    0  301  286  705 1025  159  381  453  209  748
  NZL  390  212  311  204  244  287  257  234  367  290  515  446  204  186    0  206  312  322   41  337  172   60  285
  ZAF  276  207  349  189  250  298  336  248  363  318  341  488  251  210  186    0  303  299   48  236  222   73  308
  JPN  264  216  364  202  246  285  285  251  322  335  308  421  228  224  143  189    0  712  100  323  466  128  533
  CZE  323  371  676  336  852  584  558  627  683  868 1088 1062  673  689  209  219  209    0  125  390  443  191  685
  EST   41   51   60   34   91   68   52   50   64   80  103  109   62   86   18   21   23   69    0   60   66   50  101
  IRL  363  372  400  337  374  420  390  406  755  456  584  505  270  282  275  223  181  295   33    0  192   96  361
  KOR  208  169  562  174  232  272  314  229  348  468  288  876  314  330  118  173  212  309   28  135    0   92  405
  SVN   81  117  131   85  233  160  124  111  149  199  190  156   95  167   45   52   63  140   28   74   59    0  140
  PRT  356  491  851  380  595  642  689  581  752  861  850 1095  530  690  220  293  251  563   63  311  341  111    0
  ---------------------------------------------------------------------------------------------------------------------
HOL
--------
common bulls below diagonal
common three quarter sib group above diagonal
       AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  ZAF  JPN  CZE  EST  IRL  KOR  SVN  PRT
  ---------------------------------------------------------------------------------------------------------------------
  AUS    0  469  837  445  746  735  600  776  841  683  853 1018  439  525  302  524  515   85  403  298  117  476
  BEL  405    0  610  497  783  638  558  728  688  655  978  720  383  528  245  406  502   84  388  246  144  492
  CAN  752  575    0  823 1702 1107 1236 1256 1455 1676 1244 2933  843 1034  374 1108 1014  133  425  630  174  848
  CHE  380  492  664    0  876  589  544  571  674  706  796  889  368  514  219  389  485   73  345  250  118  440
  DEU  403  661  660  593    0 1862 1269 1915 1567 2130 2151 2430  920 1467  352 1076 1455  187  527  486  263  872
  DFS  475  557  792  495  873    0  920 1395 1295 1310 1573 1610  694 1069  381  770 1033  142  529  416  200  755
  ESP  452  535  742  427  585  637    0 1059 1025 1248 1019 1454  671  851  365  807  828  119  406  454  167  724
  FRA  462  663  701  469  659  593  691    0 1366 1463 1723 2192  755 1269  354 1046 1104  132  518  458  164  736
  GBR  690  693 1465  644  795  877  822  749    0 1492 1553 1962  738 1046  392  850  981  135  702  467  193  819
  ITA  539  643 1360  624 1081  988  903  718 1247    0 1533 2365  891 1278  365  992 1209  162  488  567  232  899
  NLD  696 1073 1076  750 1211 1128  857  865 1277 1258    0 2087  759 1233  381  871 1302  173  644  436  221  862
  USA  827  612 2876  772  887  978  915  982 1773 1767 1624    0 1084 1478  462 1621 1466  182  547  786  202 1078
  HUN  303  304  730  292  540  486  495  439  583  728  555  966    0  686  288  567  793  103  316  397  129  554
  POL  337  413  740  354  766  676  529  650  769  918  908 1188  510    0  286  703 1025  159  381  453  209  748
  ZAF  276  207  349  189  250  298  334  248  363  318  341  488  240  210    0  300  299   48  236  223   73  308
  JPN  264  216  364  202  246  285  285  251  322  335  308  421  222  224  189    0  711   99  321  468  128  533
  CZE  323  371  676  336  852  584  556  627  683  868 1088 1062  662  689  219  209    0  125  390  444  191  685
  EST   41   51   60   34   91   68   52   50   64   80  103  109   62   86   21   23   69    0   60   66   50  101
  IRL  363  372  400  337  374  420  389  406  752  456  584  505  262  282  223  181  295   33    0  193   96  361
  KOR  208  169  562  174  232  272  314  229  348  468  288  879  312  330  173  212  309   28  135    0   92  405
  SVN   81  117  131   85  233  160  122  111  149  199  190  156   95  167   52   63  140   28   74   59    0  140
  PRT  356  491  851  380  595  642  688  581  752  861  850 1095  527  690  293  251  563   63  311  341  111    0
  ---------------------------------------------------------------------------------------------------------------------
HOL
--------
common bulls below diagonal
common three quarter sib group above diagonal
       AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  POL  NZL  JPN  CZE  EST  IRL  KOR  SVN  PRT  ZAF  HUN
  ---------------------------------------------------------------------------------------------------------------------
  AUS    0  455  836  429  743  610  605  774  705  681  699  738  422  481  336  398   84  337  179  117  393  161  296
  BEL  403    0  597  471  767  578  559  702  602  648  832  601  440  266  298  416   84  326  164  144  420  142  275
  CAN  751  570    0  787 1696  950 1238 1254 1275 1673 1092 2520  929  359  812  883  132  359  449  174  729  223  685
  CHE  376  467  634    0  793  526  540  557  620  685  669  777  428  240  306  394   72  298  173  116  372  130  279
  DEU  402  659  659  541    0 1721 1279 1891 1412 2128 2010 2120 1340  394  853 1256  186  456  358  263  764  210  716
  DFS  439  518  761  453  840    0  820 1165 1051 1252 1353 1214  912  364  535  818  136  415  269  196  630  209  503
  ESP  455  543  745  427  596  593    0 1070  920 1255  927 1288  756  320  637  724  118  338  323  169  630  216  520
  FRA  462  659  701  460  644  554  709    0 1082 1459 1325 1496 1107  469  722  922  130  404  311  164  612  188  568
  GBR  604  627 1307  588  743  773  718  641    0 1419 1255 1588  901  362  599  800  124  511  316  191  676  218  538
  ITA  539  643 1359  608 1081  945  915  718 1191    0 1471 2200 1189  360  854 1102  161  440  419  232  802  240  738
  NLD  605  906  960  637 1154 1030  785  748 1045 1217    0 1477 1072  456  622 1114  167  507  289  218  711  209  562
  USA  657  572 2604  691  835  877  812  716 1552 1720 1178    0 1282  359 1081 1207  172  421  543  199  873  253  814
  POL  282  349  681  290  678  597  440  564  675  849  800 1067    0  222  578  889  147  297  352  199  646  183  548
  NZL  387  210  309  201  243  256  259  234  299  289  416  317  142    0  196  231   40  272  103   59  217  102  150
  JPN  225  188  324  183  224  254  243  221  274  310  266  363  201  119    0  542   87  218  310  116  397  159  403
  CZE  271  315  598  271  747  500  462  498  564  788  970  894  613  159  187    0  117  296  316  184  575  199  605
```

```
   EST    41    51    60    34    91    65    52    50    61    80    99   106    77    18    23    64     0    53    57    50    93    40    91
   IRL   317   333   357   300   347   359   338   340   525   420   488   430   230   232   157   238    33     0   111    94   289   124   212
   KOR   135   126   406   130   173   194   211   175   229   346   195   615   273    77   155   223    25    83     0    80   280   119   273
   SVN    81   117   131    84   233   158   125   111   147   199   189   156   157    45    59   136    28    74    54     0   134    64   120
   PRT   297   414   708   314   517   530   569   483   608   764   693   888   604   168   208   474    58   252   244   105     0   198   408
   ZAF   153   127   206   108   146   182   186   149   192   205   179   255   153    92   117   148    19   116    83    45   188     0   167
   HUN   222   219   604   223   414   367   357   338   421   588   407   740   420   113   176   504    55   185   213    88   397   145     0
         ------------------------------------------------------------------------------------------------------------------------------------
HOL
--------
common bulls below diagonal
common three quarter sib group above diagonal
         AUS   BEL   CAN   CHE   DEU   DFS   ESP   FRA   GBR   ITA   NLD   USA   HUN   POL   NZL   JPN   CZE   EST   IRL   KOR   SVN   PRT
         ------------------------------------------------------------------------------------------------------------------------------------
   AUS     0   469   837   445   746   735   600   653   841   683   853  1015   451   524   488   532   515    85   404   298    91   476
   BEL   405     0   608   495   782   636   561   672   686   653   976   715   390   527   275   406   502    84   387   246   113   491
   CAN   752   575     0   823  1702  1107  1228  1097  1455  1675  1244  2918   857  1033   364  1116  1014   133   425   632   149   848
   CHE   380   492   664     0   876   589   546   536   674   706   796   885   373   512   246   389   485    73   345   250    93   440
   DEU   403   660   660   593     0  1862  1279  1798  1567  2130  2151  2423   929  1463   401  1078  1455   187   527   486   229   872
   DFS   475   557   792   495   873     0   923  1232  1295  1310  1573  1608   708  1066   453   776  1033   142   528   417   167   754
   ESP   456   545   745   430   598   646     0   991  1031  1257  1030  1454   684   858   324   815   834   119   412   456   139   732
   FRA   445   637   668   455   611   585   701     0  1229  1413  1442  1767   727  1187   399   905  1058   129   473   429   140   696
   GBR   690   693  1465   644   795   877   834   737     0  1491  1553  1956   752  1045   470   855   981   135   704   467   160   817
   ITA   539   643  1360   624  1081   988   915   710  1247     0  1533  2358   894  1277   366   994  1209   162   488   568   200   899
   NLD   696  1073  1076   750  1211  1128   871   796  1277  1258     0  2081   776  1231   581   877  1302   173   644   436   182   862
   USA   824   610  2852   767   880   975   918   824  1765  1760  1617     0  1110  1473   532  1637  1461   181   544   788   171  1075
   HUN   315   313   744   296   547   495   512   444   599   733   568   990     0   690   270   576   805   103   322   398   112   556
   POL   337   413   740   354   766   676   535   618   769   918   908  1184   514     0   301   704  1025   159   381   453   185   748
   NZL   390   212   311   204   244   287   260   228   367   290   515   444   204   186     0   312   322    41   337   174    49   285
   JPN   264   215   363   202   246   285   285   251   322   335   308   421   228   224   143     0   712   100   323   469   104   533
   CZE   323   371   676   336   852   584   563   611   683   868  1088  1057   673   689   209   210     0   125   390   444   162   684
   EST    41    51    60    34    91    68    52    50    64    80   103   109    62    86    18    23    69     0    60    66    47   101
   IRL   363   372   400   337   374   420   396   402   755   456   584   504   270   282   275   181   295    33     0   193    73   361
   KOR   208   169   562   174   232   272   316   226   348   468   288   879   314   330   118   212   309    28   135     0    79   405
   SVN    63    90   113    69   207   132   102    94   122   171   156   134    81   147    38    47   118    24    59    51     0   113
   PRT   356   491   851   380   595   642   695   572   752   861   850  1088   530   690   220   250   563    63   311   341    91     0
         ------------------------------------------------------------------------------------------------------------------------------------
HOL
--------
common bulls below diagonal
common three quarter sib group above diagonal
         AUS   BEL   CAN   CHE   DEU   DFS   ESP   FRA   GBR   ITA   NLD   USA   HUN   POL   NZL   JPN   CZE   EST   IRL   SVN   PRT
         ------------------------------------------------------------------------------------------------------------------------------------
   AUS     0   469   837   445   746   735   606   776   841   683   853  1018   451   525   488   532   515    85   391    92   476
   BEL   405     0   610   497   783   638   565   728   688   655   978   720   390   528   275   407   502    84   376   114   492
   CAN   752   575     0   823  1702  1107  1239  1256  1455  1675  1244  2933   857  1034   364  1116  1014   133   411   150   848
   CHE   380   492   664     0   876   589   547   571   674   706   796   889   373   514   246   389   485    73   336    95   440
   DEU   403   661   660   593     0  1862  1282  1915  1567  2130  2151  2430   929  1467   401  1078  1455   187   510   230   872
   DFS   475   557   792   495   873     0   930  1395  1295  1310  1573  1610   708  1069   453   776  1033   142   505   168   755
   ESP   456   545   745   430   598   646     0  1072  1037  1257  1033  1465   684   860   325   821   835   119   399   140   732
   FRA   462   663   701   469   659   593   709     0  1366  1462  1723  2192   772  1269   478  1059  1104   132   489   141   736
   GBR   690   691  1464   644   793   876   831   748     0  1491  1553  1962   752  1046   470   855   981   135   667   162   819
   ITA   539   643  1360   624  1081   988   915   718  1245     0  1533  2364   894  1277   366   994  1209   162   480   202   899
   NLD   696  1073  1076   750  1211  1128   871   865  1275  1258     0  2087   776  1233   581   877  1302   173   608   183   862
   USA   827   612  2876   772   887   978   924   982  1773  1767  1624     0  1113  1478   533  1641  1466   182   521   173  1078
   HUN   315   313   744   296   547   495   512   447   599   733   568   992     0   691   270   576   805   103   311   113   556
   POL   337   413   740   354   766   676   535   650   769   918   908  1188   514     0   301   705  1025   159   370   186   748
   NZL   390   212   311   204   244   287   261   234   367   290   515   446   204   186     0   312   322    41   323    49   285
   JPN   264   215   363   202   246   285   285   252   322   335   308   421   228   224   143     0   712   100   309   105   533
   CZE   323   371   676   336   852   584   563   627   682   868  1088  1062   673   689   209   210     0   125   375   164   685
   EST    41    51    60    34    91    68    52    50    64    80   103   109    62    86    18    23    69     0    59    47   101
   IRL   361   371   399   335   372   419   393   401   731   454   576   499   268   282   271   181   294    33     0    74   350
   SVN    64    91   114    70   207   133   103    95   123   173   158   135    82   148    38    48   119    24    60     0   114
   PRT   356   492   851   380   595   642   696   581   752   861   851  1095   531   690   220   250   563    63   311    91     0
         ------------------------------------------------------------------------------------------------------------------------------------
HOL
--------
common bulls below diagonal
common three quarter sib group above diagonal
```

```
        AUS  BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  HUN  POL  JPN  CZE  EST  IRL  SVN  PRT
      -----------------------------------------------------------------------------------------------------
 AUS     0  417  742  396  682  671  528  581  741  599  746  908  397  468  480  471   75  359   75  444
 BEL   345    0  602  492  776  631  562  652  679  649  929  698  379  522  393  499   84  373  113  493
 CAN   650  574    0  823 1702 1107 1240 1080 1455 1675 1213 2925  843 1033 1099 1014  133  411  149  856
 CHE   321  489  664    0  876  589  548  520  674  706  785  886  368  512  387  485   73  336   93  445
 DEU   343  660  660  593    0 1862 1285 1778 1567 2130 2128 2430  920 1462 1073 1455  187  510  229  879
 DFS   405  555  792  495  873    0  933 1210 1295 1310 1545 1596  694 1066  765 1033  142  505  167  763
 ESP   381  551  746  432  602  650    0  973 1038 1260 1018 1463  675  861  810  836  120  400  139  741
 FRA   366  616  642  430  586  560  673    0 1206 1398 1396 1738  713 1177  885 1047  129  448  140  697
 GBR   579  690 1464  644  793  876  836  694    0 1491 1528 1955  738 1045  843  981  135  664  160  824
 ITA   436  643 1360  624 1081  988  920  691 1245    0 1519 2361  891 1277  990 1209  162  480  200  904
 NLD   563 1014 1029  728 1191 1105  848  735 1237 1238    0 1977  752 1220  839 1291  172  602  182  859
 USA   688  607 2876  772  887  978  924  779 1772 1767 1414    0 1084 1476 1588 1464  182  519  171 1087
 HUN   257  304  730  292  540  486  499  426  583  539  728  966    0  685  566  793  103  306  112  558
 POL   283  412  740  354  766  676  537  607  769  918  900 1188  510    0  702 1025  159  370  185  754
 JPN   236  215  363  201  246  285  286  244  320  335  304  419  222  224    0  709   99  305  104  538
 CZE   277  370  676  336  852  584  565  592  682  868 1071 1061  662  689  209    0  125  375  162  688
 EST    35   51   60   34   91   68   53   50   64   80  102  109   62   86   23   69    0   59   47  101
 IRL   325  371  399  335  372  419  395  373  728  454  566  499  261  282  181  294   33    0   73  352
 SVN    54   90  113   69  207  132  102   94  122  171  156  134   81  147   47  118   24   59    0  114
 PRT   319  495  854  384  599  648  706  574  759  866  844 1103  533  696  250  568   63  312   92    0
      -----------------------------------------------------------------------------------------------------

HOL
--------
common bulls below diagonal
common three quarter sib group above diagonal
        BEL  CAN  CHE  DEU  DFS  ESP  FRA  GBR  ITA  NLD  USA  CZE  IRL  KOR  SVN  PRT  EST  HUN  POL
      --------------------------------------------------------------------------------------------------

 BEL     0  557  399  622  584  504  612  624  514  774  640  402  348  149   97  408   51  273  304
 CAN   554    0  677 1388 1011 1126 1050 1359 1411 1024 2736  863  395  389  130  714   83  683  647
 CHE   400  555    0  645  471  447  449  555  561  583  712  362  271  152   79  343   51  270  279
 DEU   553  594  450    0 1419 1070 1407 1226 1495 1652 1900 1120  399  300  178  655  123  677  849
 DFS   539  789  407  772    0  843 1205 1283  948 1312 1589  825  502  239  139  625   88  508  625
 ESP   499  677  336  494  602    0  921  937 1006  876 1334  711  362  284  120  613   79  516  538
 FRA   598  640  366  505  560  648    0 1204 1005 1201 1737  891  447  274  120  592   80  566  776
 GBR   654 1391  513  665  874  733  695    0 1145 1263 1946  809  659  278  136  682   87  545  631
 ITA   525 1198  499  788  784  713  585  995    0 1092 1793  898  355  350  159  675  107  670  748
 NLD   844  927  548 1006 1024  721  693 1047  975    0 1499 1078  523  256  148  684  110  555  707
 USA   587 2761  610  752  977  789  779 1770 1483 1149    0 1225  518  464  149  890  106  827  884
 CZE   312  586  252  688  490  460  483  556  662  940  883    0  299  267  136  555   72  601  625
 IRL   357  396  261  306  419  352  373  722  353  498  499  232    0   99   59  287   34  214  215
 KOR   116  363  117  155  178  193  162  206  302  178  531  189   76    0   65  239   34  237  254
 SVN    79  101   59  161  113   89   82  109  141  128  117  101   48   45    0   99   29   96  139
 PRT   405  702  293  486  525  554  479  600  652  667  885  456  249  214   77    0   58  403  452
 EST    30   37   20   50   39   31   30   42   49   61   48   38   19   14   12   34    0   61   93
 HUN   218  599  215  404  368  356  336  417  557  402  735  496  184  185   70  391   32    0  425
 POL   232  474  192  404  397  311  371  468  544  488  661  395  174  181  110  410   44  322    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  457  610  302  464  627  534  831  638  370  239  320  158  456  295  513  111   64  232  198  368
 CHE   458    0  723  261  410  636  623  733  843  369  252  293  173  644  270  512   94   61  242  187  372
 DEU   538  511    0  771 1199 1230 1638 1703 1909 1055  661  353  340 1238  527 1074  226  150  595  231 1093
 DFS   241  205  321    0  425  627  530  789  686  437  220  276  132  324  263  415   85   60  225  198  419
 FRA   437  338  460  173    0  795  979  940 1138  697  527  271  274  772  406  740  134  100  470  177  857
 GBR   655  606  668  352  506    0 1233 1411 1911  742  490  597  317 1054  487  967  161  109  477  321  790
 ITA   539  548  815  361  544 1045    0 1206 1958  926  668  354  405 1358  556 1078  192  132  631  214  977
 NLD   907  696 1033  504  582 1168 1037    0 1711 1039  489  513  286  880  496  927  184  138  482  391  919
 USA   575  741  754  343  554 1760 1557 1294    0 1131  885  473  542 2105  654 1388  172  136  740  321 1152
 CZE   288  258  661  231  401  515  677  907  830    0  443  249  307  733  419  656  161   96  518  173  771
 JPN   152  152  189  107  182  231  264  225  310  163    0  155  284  624  279  537   95   67  340  127  475
 IRL   330  295  282  206  245  656  346  486  461  193  116    0   99  285  175  346   68   39  165  220  222
 KOR   121  130  173   77  170  228  339  193  615  218  152   75    0  416  252  319   75   51  259   95  339
 CAN   478  564  581  250  508 1132 1181  875 2330  541  277  307  390    0  505  936  147   98  584  196  772
```

```
   PRT   291   229   387   193   355   429   532   466   679   345   165   153   216   511     0   445   107    73   315   137   500
   ESP   515   402   486   273   525   783   754   782   866   414   207   349   208   616   387     0   139    96   462   217   647
   SVN    87    69   209    58    92   122   169   157   134   118    46    54    50   113    84   102     0    44   107    49   177
   EST    41    28    70    25    43    54    68    85    73    55    21    25    25    53    51    45    23     0    78    31   127
   HUN   184   188   355   148   291   370   508   347   663   429   150   139   204   549   316   313    79    49     0   113   484
   NZL   168   169   182   128   135   268   195   359   279   128    95   185    76   202   117   187    38    16    89     0   143
   POL   294   262   590   253   471   610   728   702   993   538   178   185   265   648   484   383   144    70   383   114     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	139	85	94	44	148	237	126	16	12
CAN	144	0	84	120	48	74	399	137	13	17
DFS	63	73	0	95	57	88	144	118	20	31
GBR	92	123	90	0	50	75	150	103	15	30
ITA	43	46	56	50	0	36	64	57	14	16
NZL	149	75	67	76	32	0	148	101	16	16
USA	233	399	111	157	68	155	0	243	31	30
ZAF	128	135	101	101	57	97	248	0	25	22
NLD	12	8	14	12	11	13	32	20	0	4
CHE	10	15	30	27	17	14	30	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	139	85	94	44	148	237	119	16	20
CAN	144	0	84	120	48	74	399	126	13	23
DFS	63	73	0	95	57	88	144	109	20	42
GBR	92	123	90	0	50	75	150	98	15	38
ITA	43	46	56	50	0	36	64	57	14	24
NZL	149	75	67	76	32	0	148	92	16	23
USA	233	399	111	157	68	155	0	223	31	38
ZAF	122	126	95	97	57	89	230	0	25	35
NLD	12	8	14	12	11	13	32	20	0	8
CHE	17	21	40	35	24	20	38	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	139	85	94	44	148	119	16	237	24
CAN	144	0	84	120	48	74	126	13	399	27
DFS	63	73	0	95	57	88	109	20	144	45
GBR	92	123	90	0	50	75	98	15	150	41
ITA	43	46	56	50	0	36	57	14	64	27
NZL	149	75	67	76	32	0	92	16	148	27
ZAF	122	126	95	97	57	89	0	25	223	39
NLD	12	8	14	12	11	13	20	0	31	10
USA	233	399	111	157	68	155	230	32	0	42
CHE	20	23	43	38	26	24	37	7	42	0

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

	AUS	CAN	DFS	GBR	ITA	USA	ZAF	NLD	CHE
AUS	0	139	80	93	44	237	125	4	24
CAN	144	0	81	120	48	399	137	5	27
DFS	58	69	0	91	57	141	115	9	44
GBR	91	123	86	0	50	150	103	9	41

```
  ITA    43    46    56    50     0    64    57     5    27
  USA   233   399   107   157    68     0   242    14    42
  ZAF   127   135    98   101    57   247     0    10    39
  NLD     1     3     8     7     4    13     8     0     5
  CHE    20    23    42    38    26    42    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   139    85    94    44   148   237   126    16    24
  CAN   144     0    84   120    48    74   399   137    13    27
  DFS    63    73     0    95    57    88   144   118    20    45
  GBR    92   123    90     0    50    75   150   103    15    41
  ITA    43    46    56    50     0    36    64    57    14    27
  NZL   149    75    67    76    32     0   148   101    16    27
  USA   233   399   111   157    68   155     0   243    31    42
  ZAF   128   135   101   101    57    97   248     0    25    39
  NLD    12     8    14    12    11    13    32    20     0    10
  CHE    20    23    43    38    26    24    42    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   139    80    94    44   148   237   126    16    24
  CAN   144     0    74   120    48    74   399   137    13    27
  DFS    55    60     0    92    52    81   134   111    18    44
  GBR    92   123    84     0    50    75   150   103    15    41
  ITA    43    46    49    50     0    36    64    57    14    27
  NZL   149    75    59    76    32     0   148   101    16    27
  USA   233   399    99   157    68   155     0   243    31    42
  ZAF   128   135    91   101    57    97   248     0    25    39
  NLD    12     8    12    12    11    13    32    20     0    10
  CHE    20    23    42    38    26    24    42    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   139    85    94    44   148   237   126    16    24
  CAN   144     0    84   120    48    74   399   137    13    27
  DFS    63    73     0    95    57    88   144   118    20    45
  GBR    92   123    90     0    50    75   150   103    15    41
  ITA    43    46    56    50     0    36    64    57    14    27
  NZL   149    75    67    76    32     0   148   101    16    27
  USA   233   399   111   157    68   155     0   243    31    42
  ZAF   128   135   101   101    57    97   248     0    25    39
  NLD    12     8    14    12    11    13    32    20     0    10
  CHE    20    23    43    38    26    24    42    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   139    77    44    98    16   237    24
  CAN   144     0    74    48   112    13   399    27
  DFS    53    60     0    52    81    18   134    44
  ITA    43    46    49     0    51    14    64    27
  ZAF    97   106    67    49     0    22   189    39
  NLD    12     8    12    11    15     0    31    10
```

```
  USA   233   399   99   68  184   32    0   42
  CHE    20    23   42   26   37    7   42    0
  -----------------------------------------------------------------------------

JER
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
        AUS   CAN   DFS   GBR   ITA   USA   ZAF   NLD   CHE
 -----------------------------------------------------------------------------
  AUS     0   139    82    93    44   237   125    16    24
  CAN   144     0    84   120    48   399   137    13    27
  DFS    61    73     0    93    57   144   117    20    45
  GBR    91   123    88     0    50   150   103    15    41
  ITA    43    46    56    50     0    64    57    14    27
  USA   233   399   111   157    68     0   242    31    42
  ZAF   127   135   100   101    57   247     0    25    39
  NLD    12     8    14    12    11    32    20     0    10
  CHE    20    23    43    38    26    42    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   139    85    94    44   148   237   126    16    24
  CAN   144     0    84   120    48    74   399   137    13    27
  DFS    63    73     0    95    57    88   144   118    20    45
  GBR    92   123    90     0    50    75   150   103    15    41
  ITA    43    46    56    50     0    36    64    57    14    27
  NZL   149    75    67    76    32     0   148   101    16    27
  USA   233   399   111   157    68   155     0   243    31    42
  ZAF   128   135   101   101    57    97   248     0    25    39
  NLD    12     8    14    12    11    13    32    20     0    10
  CHE    20    23    43    38    26    24    42    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   139    77    94    44   148   237   126    16    24
  CAN   144     0    68   120    48    74   399   137    13    27
  DFS    53    58     0    84    52    75   127   105    18    44
  GBR    92   123    80     0    50    75   150   103    15    41
  ITA    43    46    49    50     0    36    64    57    14    27
  NZL   149    75    54    76    32     0   148   101    16    27
  USA   233   399    94   157    68   155     0   243    31    42
  ZAF   128   135    89   101    57    97   248     0    25    39
  NLD    12     8    12    12    11    13    32    20     0    10
  CHE    20    23    42    38    26    24    42    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   139    85    94    44   148   237   126    16    24
  CAN   144     0    84   120    48    74   399   137    13    27
  DFS    63    73     0    95    57    88   144   118    20    45
  GBR    92   123    90     0    50    75   150   103    15    41
  ITA    43    46    56    50     0    36    64    57    14    27
  NZL   149    75    67    76    32     0   148   101    16    27
  USA   233   399   111   157    68   155     0   243    31    42
  ZAF   128   135   101   101    57    97   248     0    25    39
  NLD    12     8    14    12    11    13    32    20     0    10
  CHE    20    23    43    38    26    24    42    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  139   83   93   44  237  126   16   24
  CAN   144    0   84  119   48  396  137   13   27
  DFS    62   73    0   93   57  144  118   20   45
  GBR    91  122   88    0   50  150  103   15   41
  ITA    43   46   56   50    0   64   57   14   27
  USA   233  397  111  157   68    0  242   31   42
  ZAF   128  135  101  101   57  247    0   25   39
  NLD    12    8   14   12   11   32   20    0   10
  CHE    20   23   43   38   26   42   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  139   85   94   44  148  237  126   16   24
  CAN   144    0   84  120   48   74  399  137   13   27
  DFS    63   73    0   95   57   88  144  118   20   45
  GBR    92  123   90    0   50   75  150  103   15   41
  ITA    43   46   56   50    0   36   64   57   14   27
  NZL   149   75   67   76   32    0  148  101   16   27
  USA   233  399  111  157   68  155    0  243   31   42
  ZAF   128  135  101  101   57   97  248    0   25   39
  NLD    12    8   14   12   11   13   32   20    0   10
  CHE    20   23   43   38   26   24   42   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  139   82   93   44  237  118   16   24
  CAN   144    0   84  120   48  399  126   13   27
  DFS    61   73    0   93   57  144  108   20   45
  GBR    91  123   88    0   50  150   98   15   41
  ITA    43   46   56   50    0   64   57   14   27
  USA   233  399  111  157   68    0  222   31   42
  ZAF   121  126   94   97   57  229    0   25   39
  NLD    12    8   14   12   11   32   20    0   10
  CHE    20   23   43   38   26   42   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  139   70  148  116   16  237   24
  CAN   144    0   64   74  123   13  399   27
  DFS    48   55    0   67   93   18  120   44
  NZL   149   75   49    0   87   16  148   27
  ZAF   117  120   77   80    0   25  218   39
  NLD    12    8   12   13   20    0   31   10
  USA   233  399   89  155  217   32    0   42
  CHE    20   23   42   24   37    7   42    0
--------------------------------------------------------------------------------
JER
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
```

```
          AUS   CAN   DFS   GBR   ITA   NZL   USA   NLD   CHE
    ----------------------------------------------------------------------------------
    AUS     0   139    85    35    44   148   237    16    20
    CAN   144     0    84    38    48    74   399    13    23
    DFS    63    73     0    32    57    88   144    20    42
    GBR    40    43    30     0    14    37    37     4     3
    ITA    43    46    56    15     0    36    64    14    24
    NZL   149    75    67    41    32     0   148    16    23
    USA   233   399   111    40    68   155     0    31    38
    NLD    12     8    14     5    11    13    32     0     8
    CHE    17    21    40     4    24    20    38     6     0
    ----------------------------------------------------------------------------------
JER
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
          AUS   CAN   DFS   GBR   NZL   USA   NLD   CHE
    ----------------------------------------------------------------------------------
    AUS     0   139    82    94   148   237    16    20
    CAN   144     0    78   119    74   396    13    23
    DFS    61    71     0    86    81   137    20    42
    GBR    92   122    85     0    72   150    15    38
    NZL   149    75    61    73     0   148    16    23
    USA   233   397   106   157   155     0    31    38
    NLD    12     8    14    12    13    32     0     8
    CHE    17    21    40    35    20    38     6     0
    ----------------------------------------------------------------------------------
JER
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
          AUS   CAN   DFS   GBR   ITA   USA   NLD   CHE
    ----------------------------------------------------------------------------------
    AUS     0   125    73    83    40   212    15    19
    CAN   129     0    84   119    48   399    13    23
    DFS    53    73     0    93    57   144    20    42
    GBR    81   122    88     0    50   150    15    38
    ITA    38    46    56    50     0    64    14    24
    USA   201   399   111   157    68     0    31    38
    NLD    11     8    14    12    11    32     0     8
    CHE    16    21    40    35    24    38     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   127    61     4    33   139     3     0
    DEU     9     7     0    30     1     8     4     1     8     0
    DFS    30   128    20     0    43    75    56    70    29     0
    GBR     8    59     1    40     0     0    24    49     1     0
    NOR     8     4     7    53     0     0     7     0    18     0
    NZL    20    31     4    53    21     6     0    21     2     3
    USA    13   133     1    66    44     0    20     0     2     0
    NLD     8     3     8    28     1    18     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   127    61    33   139     3     0     1
  DEU     9     7     0    30     1     4     1     8     0     3
  DFS    30   128    20     0    43    54    70    27     0    33
  GBR     8    59     1    40     0    24    49     1     0     0
  NZL    20    31     4    51    21     0    21     2     3     2
  USA    13   133     1    66    44    20     0     2     0     0
  NLD     8     3     8    26     1     2     2     0     0     8
  CAM     2     0     0     0     0     3     0     0     0     0
  NOR     3     1     2    19     0     2     0     8     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   127    61     1    33   137     3     0
  DEU     9     7     0    30     1     3     4     1     8     0
  DFS    30   128    20     0    43    49    54    70    27     0
  GBR     8    59     1    40     0     0    24    48     1     0
  NOR     3     1     2    31     0     0     3     0    13     0
  NZL    20    31     4    51    21     3     0    21     2     3
  USA    13   132     1    66    43     0    20     0     2     0
  NLD     8     3     8    26     1    13     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   127    61   139     3     0     1
  DEU     9     7     0    30     1     1     8     0     3
  DFS    30   128    20     0    43    70    26     0    40
  GBR     8    59     1    40     0    49     1     0     0
  USA    13   133     1    66    44     0     2     0     0
  NLD     8     3     8    25     1     2     0     0     9
  CAM     2     0     0     0     0     0     0     0     0
  NOR     4     1     2    24     0     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   127    61     4    33   139     3     0
  DEU     9     7     0    30     1     9     4     1     8     0
  DFS    30   128    20     0    43    84    53    70    28     0
  GBR     8    59     1    40     0     0    24    49     1     0
  NOR     8     4     8    60     0     0     7     0    18     0
  NZL    20    31     4    48    21     6     0    21     2     3
  USA    13   133     1    66    44     0    20     0     2     0
  NLD     8     3     8    27     1    18     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   127    61    33   139     3     0     1
```

```
 DEU     9     7     0    30     1     4     1     8     0     3
 DFS    30   128    20     0    43    54    70    28     0    33
 GBR     8    59     1    40     0    24    49     1     0     0
 NZL    20    31     4    51    21     0    21     2     3     2
 USA    13   133     1    66    44    20     0     2     0     0
 NLD     8     3     8    27     1     2     2     0     0     8
 CAM     2     0     0     0     0     3     0     0     0     0
 NOR     3     1     2    19     0     2     0     8     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   127    61     4    33   139     3     0
 DEU     9     7     0    30     1     9     4     1     8     0
 DFS    30   128    20     0    43    87    56    70    29     0
 GBR     8    59     1    40     0     0    24    49     1     0
 NOR     8     4     8    62     0     0     7     0    18     0
 NZL    20    31     4    53    21     6     0    21     2     3
 USA    13   133     1    66    44    20     0     2     0
 NLD     8     3     8    28     1    18     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   126     4     3   139     0
 DEU     9     7     0    30     9     8     1     0
 DFS    30   127    20     0    84    26    70     0
 NOR     8     4     8    60     0    18     0     0
 NLD     8     3     8    25    18     0     2     0
 USA    13   133     1    66     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   127    61     4   139     3     0
 DEU     6     5     0    22     1     7     1     8     0
 DFS    30   128    15     0    43    84    70    27     0
 GBR     8    59     1    40     0     0    49     1     0
 NOR     8     4     6    60     0     0     0    18     0
 USA    13   133     1    66    44     0     0     2     0
 NLD     8     3     8    26     1    18     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   127    61     4    33   139     3     0
 DEU     9     7     0    30     1     9     4     1     8     0
 DFS    30   128    20     0    43    87    56    70    27     0
 GBR     8    59     1    40     0     0    24    49     1     0
 NOR     8     4     8    62     0     0     7     0    18     0
```

```
 NZL    20    31     4    53    21     6     0    21     2     3
 USA    13   133     1    66    44     0    20     0     2     0
 NLD     8     3     8    26     1    18     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   127    61     4    33   139     3     0
 DEU     9     7     0    30     1     9     4     1     8     0
 DFS    30   128    20     0    43    84    54    70    27     0
 GBR     8    59     1    40     0     0    24    49     1     0
 NOR     8     4     8    60     0     0     7     0    18     0
 NZL    20    31     4    50    21     6     0    21     2     3
 USA    13   133     1    66    44     0    20     0     2     0
 NLD     8     3     8    26     1    18     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   127    61     4    33   139     3     0
 DEU     9     7     0    30     1     9     4     1     8     0
 DFS    30   128    20     0    43    77    56    70    29     0
 GBR     8    59     1    40     0     0    24    49     1     0
 NOR     8     4     8    55     0     0     7     0    18     0
 NZL    20    31     4    53    21     6     0    21     2     3
 USA    13   133     1    66    44     0    20     0     2     0
 NLD     8     3     8    28     1    18     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   127    61     4   136     3     0
 DEU     9     7     0    30     1     9     1     8     0
 DFS    30   128    20     0    43    87    70    29     0
 GBR     8    59     1    40     0     0    49     1     0
 NOR     8     4     8    62     0     0     0    18     0
 USA    13   132     1    66    44     0     0     2     0
 NLD     8     3     8    28     1    18     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   127    61     4    33   139     3     0
 DEU     9     7     0    30     1     9     4     1     8     0
 DFS    30   128    20     0    43    84    54    70    28     0
 GBR     8    59     1    40     0     0    24    49     1     0
 NOR     8     4     8    60     0     0     7     0    18     0
 NZL    20    31     4    51    21     6     0    21     2     3
 USA    13   133     1    66    44     0    20     0     2     0
```

```
 NLD    8    3    8   27    1   18    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  127   61    4  137    3    0
 DEU    9    7    0   30    1    9    1    8    0
 DFS   30  128   20    0   43   81   70   29    0
 GBR    8   59    1   40    0    0   48    1    0
 NOR    8    4    8   57    0    0    0   18    0
 USA   13  132    1   66   43    0    0    2    0
 NLD    8    3    8   28    1   18    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  121    4   33    3  139    0
 DEU    9    7    0   27    9    4    8    1    0
 DFS   27  121   20    0   76   49   26   65    0
 NOR    8    4    8   55    0    7   18    0    0
 NZL   20   31    4   47    6    0    1   21    3
 NLD    8    3    8   25   18    1    0    2    0
 USA   13  133    1   62    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  127   58    4   33  139    3    0
 DEU    9    7    0   30    1    9    4    1    8    0
 DFS   30  128   20    0   43   93   56   70   29    0
 GBR    7   56    1   40    0    0   21   47    1    0
 NOR    8    4    8   68    0    0    7    0   18    0
 NZL   20   31    4   53   18    6    0   21    2    3
 USA   13  133    1   66   42    0   20    0    2    0
 NLD    8    3    8   28    1   18    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  127   58    4   33  136    3    0
 DEU    9    7    0   30    1    9    4    1    8    0
 DFS   30  128   20    0   43   87   56   70   29    0
 GBR    7   56    1   40    0    0   21   47    1    0
 NOR    8    4    8   62    0    0    7    0   18    0
 NZL   20   31    4   53   18    6    0   21    2    3
 USA   13  132    1   66   42    0   20    0    2    0
 NLD    8    3    8   28    1   18    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   25   11   47   9   14   13   9   3
   CAN   25   0   7   127   58   4   139   3   0
   DEU   11   7   0   31   1   9   1   8   0
   DFS   36   128   21   0   43   87   70   29   0
   GBR   8   56   1   40   0   0   47   1   0
   NOR   10   4   8   62   0   0   0   18   0
   USA   13   133   1   66   42   0   0   2   0
   NLD   9   3   8   28   1   18   2   0   0
   CAM   3   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