INTRODUCTION

The latest routine international evaluation for calving traits took place
as scheduled at the Interbull Centre. Data from eighteen (18) countries were
included in this evaluation.

International genetic evaluations for calving traits of bulls from
Australia, Austria-Germany, Belgium, Canada, Denmark-Finland-Sweden,
France, Germany, Hungary, Ireland, Israel, Italy, Netherlands, Norway,
Spain, Switzerland, the United Kingdom, Slovack Republic, Poland and the United States of America were computed.
Brown Swiss, Holstein, and Red Dairy Cattle breed
data were included in this evaluation.

CHANGES IN NATIONAL PROCEDURES

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

DEA (BSW)   Base change
AUS (ALL)   Decrease in information due to pedigree updates and status changes of some bulls which then leads to no
                 longer being qualified for the >10 threshold.
POL (HOL)   Changes in the recording software by the national organisation of milk recording system. Most of the
                 changes were caused by small revisions of herd registration numbers
ITA (HOL)   One year cut-off data, base change. Modified data editing criteria (the contemporary groups filtering criterion
                 applies to hys within parity group (1,2,3+).), applied Snell-trasnformation, changed the statistical model.
                 All traits run with a MT repeatability linear animal model providing to Interbull EBVs for parity 1.
                 New genetic parameters.
USA (ALL)   Drops in information are due to pedigree corrections and herd-year minimum edits
ISR (HOL)   Drops in information due to edits and parentage corrections
CAN (ALL)   Base change
DEU (ALL)   Base change, decrease in information due to update on pedigree information of cross bred calves causing the dam
                 no longer being in the evaluation.
NZL (ALL)   Changed pedigree extract so that Holstein and Friesian breed proportions re-balanced for all animals based
                 on a more realistic assumption of Holstein and Friesian ancestry. Specifically, any HF animals from NZ,
                 Australia or the UK in the pedigree which have one or both parents missing, instead of merely assuming the
                 missing parent(s) to have no Holstein genetics, now assumes a mixture of Holstein and Friesian genetics
                 equal to the average of their herd contemporaries. These changes are also carried down to all progeny in
                 the pedigree. Updated days-in-milk to include all data collected up to 305 days of lactation. Excluded any
                 records where a cow has not calved within 365 days of her last parturition.
CHE (BSW, HOL)   Improvements in recording of pedigree validity and handling of animals with uncertain parentage on the
                 database as well as the recomputation of breed percentages for all animals born after 01.01.1990 led to
                 (great) changes in all pedigrees and in consequences in all genetic evaluation results.
NOR (RDC)   Evaluating calving ease (mce, dce) in a multitrait evaluation together with stillbirth, calf size and
                 gestation length. Change in heritability
NLD (ALL)   Base change, Heritability corrected for MCE

INTERBULL CHANGES COMPARED TO THE PREVIOUS ROUTINE RUN

Post-processing Windows:

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

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

The weight assigned to the magnitude of the changes tested by each country has also been revised. The new weight will allow post-processed correlations
to take more in consideration the value of the new estimated ones even when no changes are applied by the countries.
The new weights are as follows:
No changes   :: 2
Small changes:: 1
Big changes :: 0

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

DATA AND METHOD OF ANALYSIS

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

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

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

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

SCIENTIFIC LITERATURE

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

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

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

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

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

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

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

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

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

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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
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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
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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 calving (April Routine Evaluation 2023).
Number of records for direct calving ease by breed
---------------------------------------------------------------------------------------
Country       BSW         GUE         HOL         JER         RDC         SIM
---------------------------------------------------------------------------------------
AUS                                   6695
BEL                                   1277
CAN           169                     13427                   530
CHE           1676                    2223
CZE
DEA           3619
DEU                                   20395                   298
DFS                                   11218                   6688
ESP                                   1943
EST
FRA           403                     13309
FRM
GBR                                   3261
HUN                                   1765
IRL                                   2386                    63
ISR                                   582
ITA                                   8971
JPN
KOR
LTU
LVA
NLD           186                     15637                   84
NOR                                                           3959
NZL                                   7542                    1107
POL                                   7024
PRT
SVK                                   709
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SVN
URY
USA              553                  37294
ZAF
HRV
CAM
========================================================================
No.Records      6606                  155658              12729
Pub. Proofs     6941          0       132124        0     12955        0
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^LAPPENDIX I. Sire standard deviations in diagonal and genetic correlations below diagonal
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--------------------------------------------------------------------------------
BSW    dce
--------------------------------------------------------------------------------
        DEA    NLD    USA    CHE    CAN    FRA
DEA    9.28
NLD    0.85   5.91
USA    0.65   0.84   0.13
CHE    0.85   0.93   0.81   10.56
CAN    0.78   0.94   0.90   0.92   7.83
FRA    0.74   0.86   0.81   0.83   0.86   0.76


--------------------------------------------------------------------------------
BSW    mce
--------------------------------------------------------------------------------
        DEA    NLD    USA    CHE    CAN    FRA
DEA    9.72
NLD    0.61   4.31
USA    0.74   0.72   0.15
CHE    0.71   0.65   0.85   13.04
CAN    0.36   0.75   0.84   0.71   6.03
FRA    0.82   0.72   0.91   0.91   0.77   1.03


--------------------------------------------------------------------------------
HOL    dce
--------------------------------------------------------------------------------
        AUS    CAN    CHE    DFS    FRA    ISR    ITA    NLD    USA    GBR    HUN    DEU    BEL    IRL    NZL    SVK    ESP    POL
AUS    0.04
CAN    0.76   7.24
CHE    0.74   0.93   8.98
DFS    0.73   0.92   0.84   11.28
FRA    0.78   0.95   0.92   0.87   0.92
ISR    0.73   0.84   0.69   0.85   0.80   2.71
ITA    0.37   0.44   0.50   0.45   0.48   0.51   4.24
NLD    0.83   0.97   0.91   0.93   0.92   0.85   0.44   7.54
USA    0.72   0.91   0.87   0.85   0.91   0.80   0.45   0.87   0.13
GBR    0.74   0.80   0.70   0.70   0.75   0.71   0.34   0.83   0.68   0.07
HUN    0.47   0.55   0.46   0.41   0.57   0.57   0.21   0.52   0.52   0.50   1.26
DEU    0.80   0.94   0.89   0.89   0.94   0.81   0.40   0.93   0.86   0.75   0.58   12.54
BEL    0.56   0.61   0.66   0.65   0.65   0.48   0.30   0.65   0.64   0.41   0.56   0.61   9.13
IRL    0.77   0.86   0.82   0.83   0.85   0.79   0.36   0.89   0.82   0.66   0.49   0.80   0.57   0.09
NZL    0.78   0.77   0.72   0.78   0.75   0.69   0.29   0.80   0.74   0.61   0.35   0.77   0.50   0.81   2.99
SVK    0.41   0.29   0.27   0.27   0.27   0.30   0.20   0.25   0.27   0.29   0.31   0.26   0.28   0.27   0.22   13.11
ESP    0.63   0.85   0.81   0.72   0.84   0.67   0.43   0.83   0.80   0.59   0.57   0.83   0.60   0.75   0.66   0.26   11.60
POL    0.41   0.49   0.45   0.52   0.50   0.43   0.18   0.45   0.46   0.44   0.27   0.45   0.33   0.49   0.28   0.28   0.32   14.18


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HOL    mce
--------------------------------------------------------------------------------
        CAN    CHE    DFS    FRA    ISR    ITA    NLD    USA    GBR    HUN    DEU    BEL    SVK    ESP    POL
CAN    7.04
CHE    0.84   11.59
DFS    0.83   0.67   11.68
FRA    0.90   0.94   0.76   1.28
ISR    0.85   0.68   0.80   0.78   2.63
ITA    0.31   0.24   0.42   0.29   0.46   7.02
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NLD    0.78    0.68    0.79    0.76    0.71    0.42    4.51
USA    0.92    0.90    0.77    0.95    0.86    0.29    0.75    0.15
GBR    0.56    0.60    0.46    0.65    0.49    0.33    0.43    0.59    0.04
HUN    0.39    0.33    0.38    0.37    0.46    0.22    0.37    0.38    0.34    1.28
DEU    0.84    0.70    0.90    0.77    0.77    0.43    0.83    0.79    0.51    0.43   12.36
BEL    0.64    0.67    0.66    0.70    0.53    0.34    0.75    0.66    0.47    0.41    0.70   10.07
SVK    0.27    0.29    0.26    0.28    0.41    0.23    0.22    0.27    0.47    0.28    0.26    0.42   15.72
ESP    0.75    0.62    0.82    0.69    0.73    0.34    0.80    0.70    0.46    0.50    0.82    0.59    0.28   12.31
POL    0.49    0.44    0.51    0.47    0.46    0.31    0.46    0.50    0.34    0.26    0.53    0.48    0.26    0.44   15.60


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HOL    dsb
-----------------------------------------------------------------------------------------

         AUS     CAN     CHE     DFS     FRA     ISR     ITA     NLD     USA     HUN     DEU     POL
AUS    0.04
CAN    0.60    7.80
CHE    0.21    0.66   17.37
DFS    0.64    0.88    0.64   11.22
FRA    0.44    0.75    0.63    0.67    0.77
ISR    0.83    0.71    0.35    0.72    0.51    1.64
ITA    0.42    0.55    0.48    0.50    0.47    0.53    6.91
NLD    0.31    0.79    0.75    0.72    0.67    0.46    0.47    4.59
USA    0.35    0.72    0.64    0.62    0.68    0.37    0.42    0.62    0.07
HUN    0.59    0.43    0.19    0.44    0.25    0.65    0.33    0.19    0.27    1.10
DEU    0.51    0.91    0.74    0.86    0.68    0.65    0.55    0.82    0.68    0.43   12.21
POL    0.32    0.58    0.58    0.63    0.48    0.39    0.35    0.56    0.49    0.18    0.63   16.54


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HOL    msb
-----------------------------------------------------------------------------------------

         CAN     CHE     DFS     FRA     ISR     ITA     NLD     USA     HUN     DEU     POL
CAN    6.18
CHE    0.78   16.69
DFS    0.95    0.76   10.60
FRA    0.86    0.79    0.84    0.93
ISR    0.88    0.73    0.86    0.77    1.73
ITA    0.67    0.51    0.70    0.52    0.65    6.66
NLD    0.93    0.75    0.95    0.79    0.83    0.73    4.40
USA    0.88    0.80    0.85    0.84    0.81    0.56    0.78    0.12
HUN    0.18    0.27    0.20    0.22    0.48    0.42    0.17    0.27    1.22
DEU    0.95    0.79    0.97    0.82    0.86    0.73    0.95    0.83    0.19   12.63
POL    0.84    0.75    0.81    0.74    0.82    0.61    0.77    0.75    0.19    0.80   14.07


-----------------------------------------------------------------------------------------
RDC    dce
-----------------------------------------------------------------------------------------

         CAN     DFS     NOR     NLD     DEU     IRL     NZL
CAN    6.84
DFS    0.89   10.80
NOR    0.75    0.90   11.63
NLD    0.95    0.90    0.88    5.18
DEU    0.92    0.88    0.84    0.92   13.63
IRL    0.82    0.81    0.86    0.86    0.79    0.07
NZL    0.72    0.66    0.63    0.76    0.72    0.73    2.78


-----------------------------------------------------------------------------------------
RDC    mce
-----------------------------------------------------------------------------------------

         CAN     DFS     NOR     DEU
CAN    7.09
DFS    0.73   11.56
NOR    0.57    0.77   13.41
DEU    0.82    0.86    0.62   12.05

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^LAPPENDIX II. Number of common bulls
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BSW
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   common bulls below diagonal
   common three quarter sib group above diagonal
         DEA  NLD  USA  CHE  CAN  FRA
   ------------------------------------------------------------------------------
   DEA     0  121  184  425   98  201
   NLD   112    0   46   84   20   56
   USA   141   41    0  156  107   73
   CHE   356   77  123    0   88  123
   CAN    85   18   98   74    0   58
   FRA   152   44   57   90   50    0
   ------------------------------------------------------------------------------
BSW

--------
   common bulls below diagonal
   common three quarter sib group above diagonal
         DEA  NLD  USA  CHE  CAN  FRA
   ------------------------------------------------------------------------------
   DEA     0  110  105  490   36  165
   NLD   103    0   34   73   16   52
   USA    95   31    0  100   31   50
   CHE   396   72   86    0   33  114
   CAN    32   13   29   28    0   24
   FRA   125   45   44   84   21    0
   ------------------------------------------------------------------------------
BSW
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BSW
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GUE
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GUE
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GUE
--------
GUE
--------
HOL
--------
   common bulls below diagonal
   common three quarter sib group above diagonal
         AUS  CAN  CHE  DFS  FRA  ISR  ITA  NLD  USA  GBR  HUN  DEU  BEL  IRL  NZL  SVK  ESP  POL
   ------------------------------------------------------------------------------
   AUS     0 1380  419 1039 1095   87 1066 1190 1725  753  446 1353  506  482  946  194  482  782
   CAN  1327    0  673 1345 1486  111 1870 1506 3774  940  698 2396  622  443  691  297  774 1375
   CHE   363  585    0  403  486   32  524  572  709  350  196  826  361  220  244  109  281  471
   DFS   689 1050  339    0 1430  108 1333 1597 1844  823  526 2102  582  458  710  248  533 1092
   FRA   788 1123  427  831    0   89 1648 1720 2216  913  671 2274  697  482  736  300  679 1415
   ISR    56   75   17   76   54    0  109  128  158   81   54  120   52   67   84   33   55  106
   ITA   807 1600  456  996 1052   73    0 1571 2639 1069  702 2470  639  477  652  314  790 1477
   NLD   908 1309  534 1069 1026   91 1178    0 2340 1048  561 2914  774  614  966  333  588 1519
   USA  1627 4081  619 1264 1302  146 2071 1744    0 1321  843 3302  666  578  980  371  863 1961
   GBR   559  771  302  479  502   45  735  683  962    0  380 1228  438  453  447  178  429  828
   HUN   273  554  131  333  410   34  508  313  656  214    0  833  281  235  328  174  340  493
   DEU  1036 1901  751 1433 1376   92 1710 2435 2462  779  543    0  874  623  844  501  859 2153
   BEL   469  597  354  513  716   27  641  792  618  388  209  903    0  318  345  157  358  560
   IRL   426  395  202  371  432   44  405  521  540  404  184  541  297    0  545  113  219  369
   NZL   837  620  209  477  497   62  522  799  924  282  198  667  294  488    0  168  306  455
   SVK    93  207   47  131  193   16  209  213  259   78  110  395   87   46  101    0  153  263
   ESP   330  518  207  390  518   26  550  445  553  288  217  495  324  174  214   61    0  611
   POL   649 1305  377  892 1077   82 1240 1413 2076  686  370 1955  520  310  378  180  419    0
   ------------------------------------------------------------------------------
HOL
--------
   common bulls below diagonal
   common three quarter sib group above diagonal
         CAN  CHE  DFS  FRA  ISR  ITA  NLD  USA  GBR  HUN  DEU  BEL  SVK  ESP  POL
   ------------------------------------------------------------------------------
   CAN     0  635 1241 1229   98 1497 1238 2484  845  650 2062  554  264  649 1178
   CHE   538    0  527  541   46  560  656  688  403  243  871  391  120  302  479
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    DFS 1083  478    0 1586  118 1382 1993 1834  835  631 2598  633  249  523 1297
    FRA  918  477  922    0   98 1430 1805 1921  758  690 2369  708  263  602 1412
    ISR   61   23   81   55    0  106  131  154   93   62  130   49   30   55  106
    ITA 1263  482 1140  906   70    0 1455 2197  854  674 2157  590  263  624 1320
    NLD 1173  623 1659 1178   97 1227    0 2024  924  661 3027  789  308  546 1506
    USA 2501  602 1475 1101  139 1801 1654    0 1080  852 2997  614  316  704 1817
    GBR  923  383  850  762   66  937 1005 1265    0  402 1029  442  169  398  696
    HUN  545  178  432  426   40  519  450  719  367    0  901  301  175  327  502
    DEU 1534  780 1797 1303   97 1511 2555 2144 1098  602    0  833  377  720 2136
    BEL  550  387  597  728   27  587  855  563  496  239  860    0  149  344  524
    SVK  182   48  135  147   12  184  200  225  106  118  274   80    0  138  217
    ESP  466  238  414  481   22  493  457  508  367  243  461  316   66    0  496
    POL 1039  368 1084  976   78 1097 1354 1846  740  368 1827  463  159  347    0
    ----------------------------------------------------------------------------
HOL
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
        AUS  CAN  CHE  DFS  FRA  ISR  ITA  NLD  USA  HUN  DEU  POL
    ----------------------------------------------------------------------------
    AUS    0 1335  408 1042  968   87 1073 1333 1600  318 1351  773
    CAN 1317    0  648 1300 1340  107 1900 1734 3454  488 2384 1364
    CHE  355  563    0  395  478   31  522  608  652  128  803  460
    DFS  694 1054  334    0 1292  110 1356 1729 1706  411 2115 1089
    FRA  737 1061  420  794    0   78 1601 1717 1785  485 2185 1399
    ISR   56   74   17   76   51    0  111  131  154   35  122  103
    ITA  829 1668  461 1036 1060   79    0 1796 2571  510 2499 1531
    NLD 1148 1703  586 1315 1295  102 1550    0 2390  468 3229 1600
    USA 1537 3851  560 1210 1083  143 2092 2076    0  575 3074 1898
    HUN  199  382   89  256  304   26  362  320  429    0  634  303
    DEU 1041 1908  724 1439 1358   92 1791 2913 2334  419    0 2149
    POL  647 1312  370  898 1082   82 1334 1539 2048  224 1976    0
    ----------------------------------------------------------------------------
HOL
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
        CAN  CHE  DFS  FRA  ISR  ITA  NLD  USA  HUN  DEU  POL
    ----------------------------------------------------------------------------
    CAN    0  632 1240 1158   97 1618 1267 2284  469 2011 1126
    CHE  535    0  534  534   46  602  661  650  179  850  450
    DFS 1111  485    0 1494  119 1534 2042 1640  510 2601 1263
    FRA  892  473  916    0   93 1552 1717 1556  522 2233 1353
    ISR   61   23   82   53    0  110  133  149   45  128  103
    ITA 1364  527 1268  958   78    0 1653 2260  533 2459 1417
    NLD 1237  632 1744 1168   98 1406    0 1822  519 2979 1435
    USA 2391  568 1473  998  138 1932 1599    0  580 2603 1654
    HUN  387  134  348  320   27  395  370  508    0  708  307
    DEU 1477  749 1809 1224   94 1677 2527 1961  464    0 1986
    POL  998  337 1056  923   77 1146 1283 1697  209 1646    0
    ----------------------------------------------------------------------------
JER
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JER
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JER
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JER
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RDC
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
        CAN  DFS  NOR  NLD  DEU  IRL  NZL
    ----------------------------------------------------------------------------
    CAN    0  170    6    5   11    4   60
    DFS  175    0  153   58   87   19  126
    NOR    5  127    0   46   29   54   39
    NLD    5   56   45    0   26   12   21
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  DEU   11   80   28   25    0    6   21
  IRL    4   15   53   12    6    0   13
  NZL   61  110   38   21   21   13    0
 --------------------------------------------------------------------------
RDC
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
       CAN  DFS  NOR  DEU
 --------------------------------------------------------------------------
  CAN    0  112    4    9
  DFS  111    0  136   54
  NOR    4  109    0   16
  DEU    9   46   15    0
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RDC
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RDC
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SIM
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SIM
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SIM
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SIM
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