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


DEA (BSW)          Base change
BEL (HOL)          Changes in type of proofs for some bulls is due to the program used to determine the type pf proof.
AUS (ALL)          Drops of information due to data clean up such as pedigree changes or status changes leading to a good number of bulls no longer being
                   qualified. Decreases in EDC are also due to rounding.
ITA (HOL)          Base change, 1 year cutoff of data
DEU (ALL)          Decrease in infromation due to pedigree and phenotype corrections, Base change
CHE (ALL)          Base change. Decrease in information due to manual edits in the database
POL (HOL)          Decrease in information due to data editings
CAN (HOL)          Base change
GBR (ALL)          Drop in information due to data clean up
USA (ALL)          Pedigree corrections and herd-year minimum edits causing drops in information
FRA (ALL)          Quite a lot of publication rules changed in relation with setting up of the single step EBV.


INTERBULL CHANGES COMPARED TO THE PREVIOUS ROUTINE RUN
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Post-processing Windows:
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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
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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
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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 calving (April Routine Evaluation 2022).
Number of records for direct calving ease by breed

Country   BSW   GUE   HOL   JER   RDC   SIM

AUS   6583
BEL   1214
CAN   165   13180   514
CHE   1615   2142
CZE
DEA   3538
DEU   19979   283
DFS   10692   6486
ESP   2307
EST
FRA   374   12856
FRM
GBR   3168
HUN   1765
IRL   2284   58
ISR   538
ITA   9231
JPN
KOR
LTU
LVA
NLD   170   15337   82
NOR   3868
NZL   7542   1107
POL   6555
PRT
SVK   697
SVN
URY
USA   520   36716
ZAF
HRV
CAM
===
No.Records   6382   152786   12398
Pub. Proofs   6785   0   124250   0   12864   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

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NLD     0.87    5.50
USA     0.67    0.84    0.13
CHE     0.86    0.93    0.82   10.52
CAN     0.79    0.94    0.91    0.92    7.57
FRA     0.75    0.87    0.82    0.83    0.86    0.76

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BSW     mce
------------------------------------------------------------------------------------
        DEA     NLD     USA     CHE     CAN     FRA
DEA     9.76
NLD     0.62    4.66
USA     0.77    0.77    0.15
CHE     0.75    0.71    0.87   12.99
CAN     0.39    0.79    0.84    0.73    6.02
FRA     0.83    0.77    0.92    0.92    0.79    1.02

------------------------------------------------------------------------------------
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    6.94
CHE     0.72    0.92    9.07
DFS     0.74    0.92    0.84   11.57
FRA     0.78    0.95    0.92    0.88    0.92
ISR     0.70    0.83    0.67    0.84    0.79    2.74
ITA     0.54    0.64    0.64    0.64    0.67    0.67    7.15
NLD     0.84    0.97    0.90    0.93    0.93    0.85    0.68    7.05
USA     0.73    0.91    0.88    0.86    0.91    0.79    0.62    0.87    0.13
GBR     0.75    0.79    0.68    0.68    0.74    0.70    0.54    0.83    0.69    0.07
HUN     0.51    0.59    0.47    0.48    0.61    0.60    0.36    0.58    0.57    0.55    1.26
DEU     0.80    0.93    0.89    0.89    0.94    0.80    0.61    0.93    0.86    0.74    0.61   12.66
BEL     0.58    0.63    0.66    0.66    0.67    0.49    0.51    0.66    0.66    0.46    0.60    0.62    9.42
IRL     0.77    0.86    0.81    0.84    0.86    0.77    0.62    0.90    0.82    0.68    0.54    0.80    0.60    0.09
NZL     0.77    0.77    0.74    0.77    0.75    0.68    0.52    0.80    0.74    0.60    0.36    0.77    0.49    0.80    2.99
SVK     0.46    0.37    0.30    0.36    0.36    0.37    0.36    0.37    0.36    0.36    0.40    0.36    0.37    0.35    0.23   13.05
ESP     0.63    0.83    0.77    0.73    0.81    0.66    0.60    0.79    0.79    0.60    0.60    0.81    0.62    0.74    0.64    0.35   11.18
POL     0.47    0.53    0.45    0.56    0.54    0.46    0.38    0.50    0.51    0.49    0.36    0.49    0.41    0.52    0.24    0.38    0.39   14.14

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HOL     mce
------------------------------------------------------------------------------------
        CAN     CHE     DFS     FRA     ISR     ITA     NLD     USA     GBR     HUN     DEU     BEL     SVK     ESP     POL
CAN     6.72
CHE     0.85   11.64
DFS     0.84    0.69   12.04
FRA     0.90    0.95    0.77    1.28
ISR     0.84    0.69    0.81    0.78    2.65
ITA     0.79    0.83    0.63    0.84    0.77    9.06
NLD     0.84    0.74    0.86    0.81    0.72    0.59    5.28
USA     0.92    0.91    0.79    0.95    0.85    0.84    0.80    0.15
GBR     0.61    0.68    0.51    0.71    0.53    0.59    0.54    0.65    0.04
HUN     0.42    0.37    0.44    0.41    0.48    0.35    0.42    0.41    0.38    1.28
DEU     0.84    0.71    0.91    0.77    0.76    0.66    0.85    0.79    0.55    0.45   12.46
BEL     0.66    0.70    0.69    0.73    0.56    0.61    0.79    0.68    0.51    0.45    0.74   10.33
SVK     0.32    0.34    0.33    0.34    0.45    0.33    0.32    0.32    0.52    0.33    0.32    0.43   15.71
ESP     0.72    0.59    0.78    0.67    0.70    0.51    0.74    0.68    0.50    0.51    0.78    0.61    0.33   11.76
POL     0.51    0.48    0.54    0.50    0.50    0.48    0.49    0.52    0.42    0.32    0.54    0.50    0.33    0.46   15.61

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HOL     dsb
------------------------------------------------------------------------------------
        AUS     CAN     CHE     DFS     FRA     ISR     ITA     NLD     USA     HUN     DEU     POL
AUS     0.04
CAN     0.61    7.77
CHE     0.26    0.65   17.62
DFS     0.66    0.88    0.61   12.49
FRA     0.46    0.75    0.62    0.65    0.76
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ISR    0.82    0.73    0.40    0.75    0.51    1.67
ITA    0.62    0.53    0.30    0.54    0.37    0.71    7.14
NLD    0.34    0.79    0.73    0.71    0.68    0.50    0.28    4.57
USA    0.36    0.69    0.62    0.59    0.67    0.38    0.31    0.61    0.07
HUN    0.59    0.45    0.23    0.46    0.27    0.64    0.38    0.23    0.29    1.10
DEU    0.51    0.90    0.71    0.86    0.68    0.68    0.43    0.82    0.66    0.44   12.30
POL    0.31    0.57    0.58    0.63    0.50    0.38    0.29    0.57    0.50    0.21    0.63   16.58
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HOL    msb
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        CAN     CHE     DFS     FRA     ISR     ITA     NLD     USA     HUN     DEU     POL
CAN     5.94
CHE     0.78   16.88
DFS     0.96    0.77   11.54
FRA     0.86    0.80    0.85    0.93
ISR     0.88    0.75    0.85    0.78    1.73
ITA     0.47    0.62    0.41    0.53    0.62    9.07
NLD     0.93    0.75    0.95    0.80    0.81    0.37    4.21
USA     0.87    0.80    0.85    0.84    0.80    0.50    0.80    0.12
HUN     0.25    0.31    0.29    0.30    0.50    0.43    0.25    0.32    1.22
DEU     0.95    0.79    0.97    0.83    0.86    0.42    0.95    0.83    0.26   12.72
POL     0.85    0.76    0.82    0.73    0.81    0.35    0.78    0.74    0.26    0.80   14.21
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RDC    dce
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        CAN     DFS     NOR     NLD     DEU     IRL     NZL
CAN     6.80
DFS     0.91   11.32
NOR     0.80    0.92   13.61
NLD     0.95    0.91    0.89    4.95
DEU     0.92    0.88    0.86    0.92   13.61
IRL     0.83    0.82    0.88    0.87    0.79    0.07
NZL     0.73    0.72    0.68    0.78    0.73    0.74    2.78
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------------------------------------------------------------------------------------------
RDC    mce
------------------------------------------------------------------------------------------
        CAN     DFS     NOR     DEU
CAN     6.99
DFS     0.79   12.16
NOR     0.62    0.89   15.66
DEU     0.82    0.86    0.72   12.13
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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  111  181  410   96  183
   NLD  103    0   43   75   19   50
   USA  136   38    0  152  102   67
   CHE  341   69  117    0   86  111
   CAN   83   17   93   73    0   53
   FRA  130   37   49   76   45    0
 ------------------------------------------------------------------------------
BSW
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
        DEA  NLD  USA  CHE  CAN  FRA
 ------------------------------------------------------------------------------
   DEA    0   99  101  467   35  140
   NLD   92    0   31   62   15   46
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  USA    91    28     0    97    31    45
  CHE   375    61    84     0    33    96
  CAN    31    12    29    28     0    24
  FRA   100    40    39    68    21     0
-------------------------------------------------------------------------------
BSW
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BSW
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GUE
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GUE
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GUE
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GUE
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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 1331  403  998 1041   82 1080 1154 1668  724  446 1314  493  467  940  191  528  729
 CAN  1274    0  643 1294 1392   99 1841 1425 3644  893  697 2325  596  433  691  293  866 1269
 CHE   346  558    0  384  454   29  508  541  685  336  196  786  347  213  242  108  305  447
 DFS   657 1009  323    0 1324  101 1335 1529 1780  791  522 2019  559  450  708  241  582 1014
 FRA   723 1002  393  718    0   82 1609 1602 2114  878  649 2130  643  457  702  284  723 1282
 ISR    51   70   16   69   44    0  100  117  135   70   53  109   47   59   84   33   59   89
 ITA   798 1565  444  975  959   68    0 1565 2626 1029  715 2447  619  478  695  308  889 1387
 NLD   870 1227  505 1004  887   82 1134    0 2270 1010  560 2781  731  593  963  327  660 1412
 USA  1566 3937  592 1206 1165  122 2015 1669    0 1259  843 3245  637  566  980  364  973 1790
 GBR   533  725  288  456  460   37  683  646  893    0  380 1183  417  439  446  173  465  757
 HUN   272  554  131  334  384   34  511  313  656  213    0  832  277  234  328  174  385  485
 DEU   995 1826  708 1358 1197   86 1662 2295 2384  734  543    0  835  603  842  495  963 1995
 BEL   455  572  341  489  657   24  617  749  589  367  207  864    0  308  343  154  396  518
 IRL   411  387  197  365  394   38  401  505  531  391  183  525  291    0  537  113  246  349
 NZL   832  620  207  476  445   62  542  797  925  281  198  665  292  480    0  168  343  438
 SVK    91  204   46  125  179   15  200  208  252   75  110  389   83   46  101    0  162  247
 ESP   392  631  250  462  554   30  675  533  684  334  267  613  385  216  259   75    0  653
 POL   591 1194  352  813  920   67 1147 1297 1859  611  363 1782  477  294  362  164  476    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  599 1182 1129   87 1407 1135 2376  786  650 1974  531  259  866 1091
 CHE   504    0  496  475   40  502  598  661  366  238  822  366  114  348  430
 DFS  1020  448    0 1467  110 1334 1849 1767  792  635 2494  608  244  681 1195
 FRA   784  410  768    0   86 1378 1581 1830  685  672 2189  644  245  766 1263
 ISR    55   21   75   42    0   97  118  133   82   62  123   46   28   62   89
 ITA  1140  428 1040  762   62    0 1381 2098  798  694 2109  573  254  858 1191
 NLD  1071  569 1534  946   88 1101    0 1862  835  645 2771  761  298  717 1370
 USA  2377  572 1395  954  118 1595 1510    0  999  853 2917  593  309 1006 1644
 GBR   865  353  807  655   58  873  916 1180    0  401  961  422  166  481  619
 HUN   545  176  437  391   40  527  436  719  365    0  900  298  175  430  495
 DEU  1433  725 1702 1064   92 1359 2311 2036 1032  600    0  804  371 1033 1968
 BEL   528  365  577  647   25  554  821  544  478  237  829    0  146  407  485
 SVK   178   45  128  127   11  174  192  215  102  117  267   77    0  163  205
 ESP   551  264  504  522   27  593  560  622  443  302  575  372   74    0  637
 POL   946  321  966  795   61  926 1213 1640  662  359 1650  428  147  384    0
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HOL
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 common bulls below diagonal
 common three quarter sib group above diagonal
       AUS  CAN  CHE  DFS  FRA  ISR  ITA  NLD  USA  HUN  DEU  POL
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 AUS    0 1286  394 1002  906   82 1077 1294 1547  318 1312  719
 CAN 1264    0  620 1253 1250   95 1828 1654 3326  488 2313 1256
 CHE  340  537    0  377  449   28  494  580  630  129  765  435
 DFS  661 1011  318    0 1187  103 1338 1654 1645  408 2033 1011
 FRA  662  942  388  673    0   71 1525 1581 1693  471 2039 1271
 ISR   51   69   16   69   42    0  100  121  131   35  111   86
 ITA  797 1564  430  978  908   68    0 1765 2485  524 2444 1373
 NLD 1106 1618  556 1242 1114   92 1461    0 2321  468 3084 1486
 USA 1478 3709  538 1152  957  119 1932 1999    0  575 3022 1723
 HUN  199  382   89  256  279   26  369  320  429    0  634  297
 DEU  998 1834  684 1362 1166   86 1663 2762 2261  419    0 1989
 POL  591 1201  344  817  921   67 1149 1412 1830  219 1802    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  595 1173 1058   86 1396 1187 2175  469 1918 1041
 CHE  500    0  504  469   40  500  622  623  179  800  406
 DFS 1041  457    0 1368  110 1341 1954 1561  510 2494 1160
 FRA  759  405  758    0   81 1336 1554 1462  505 2048 1217
 ISR   55   21   75   40    0   97  122  128   45  121   87
 ITA 1138  427 1057  741   62    0 1432 1901  528 2073 1139
 NLD 1157  592 1653  956   89 1161    0 1754  519 2834 1311
 USA 2265  540 1382  855  117 1552 1524    0  580 2517 1504
 HUN  387  134  347  292   27  392  370  508    0  708  301
 DEU 1374  700 1703  986   90 1321 2362 1857  464    0 1816
 POL  906  300  947  753   61  879 1153 1512  202 1473    0
 -----------------------------------------------------------------------
JER
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JER
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JER
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JER
--------
RDC
--------
 common bulls below diagonal
 common three quarter sib group above diagonal
       CAN  DFS  NOR  NLD  DEU  IRL  NZL
 -----------------------------------------------------------------------
 CAN    0  163    5    4   11    3   60
 DFS  167    0  133   57   80   18  127
 NOR    4  108    0   45   25   51   39
 NLD    4   55   44    0   26   12   21
 DEU   11   73   24   25    0    6   21
 IRL    3   15   50   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  106    4    9
 DFS  106    0  134   49
 NOR    4  107    0   15
 DEU    9   41   14    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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