

## Introduction

---

The latest routine international evaluation for workability traits took place as scheduled at the Interbull Centre. Data from ten (10) countries were included in this evaluation.

International genetic evaluations for workability traits of bulls from Austria-Germany, Canada, Denmark-Finland-Sweden, France, Italy, Netherlands, Norway, New Zealand, Slovenia and Switzerland were computed. Brown Swiss, Holstein, Jersey and Red Dairy Cattle breed data were included in this evaluation.

## Changes in national procedures

---

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

DEU (HOL, RDC) Only data since 01/01/1998 were used for genetic evaluation. Changed of standardization of phenotypic variation within comparison groups

DEA (BSW) Base change

CHE (HOL, BSW) Some changes in phenotypic data causing decrease in number of daughters, EDC and herds.

NZL (ALL) Continuous DNA parentage testing causing decrease in number of daughters, herds and EDC.

## INTERBULL CHANGES COMPARED TO THE DECEMBER 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.

## 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 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 Workability (December Routine Evaluation 2016). Number of records for milking speed by breed

| Country     | BSW  | GUE | HOL   | JER  | RDC   | SIM |
|-------------|------|-----|-------|------|-------|-----|
| AUS         |      |     | 5973  | 1144 | 457   |     |
| BEL         |      |     |       |      |       |     |
| CAN         | 162  |     | 11036 | 569  | 752   |     |
| CHE         | 2457 |     | 2769  |      |       |     |
| CZE         |      |     |       |      |       |     |
| DEA         | 3814 |     |       |      |       |     |
| DEU         |      |     | 17234 |      | 229   |     |
| DFS         |      |     | 11261 | 1817 | 6156  |     |
| ESP         |      |     |       |      |       |     |
| EST         |      |     |       |      |       |     |
| FRA         | 304  |     | 15725 |      |       |     |
| FRM         |      |     |       |      |       |     |
| GBR         |      |     | 4997  |      |       |     |
| HUN         |      |     |       |      |       |     |
| IRL         |      |     |       |      |       |     |
| ISR         |      |     |       |      |       |     |
| ITA         | 1837 |     | 6589  |      |       |     |
| JPN         |      |     |       |      |       |     |
| KOR         |      |     |       |      |       |     |
| LTU         |      |     |       |      |       |     |
| LVA         |      |     |       |      |       |     |
| NLD         | 94   |     | 12189 | 25   |       |     |
| NOR         |      |     |       |      | 3563  |     |
| NZL         |      |     | 5316  | 3479 | 532   |     |
| POL         |      |     |       |      |       |     |
| PRT         |      |     |       |      |       |     |
| SVK         |      |     |       |      |       |     |
| SVN         | 249  |     | 380   |      |       |     |
| URY         |      |     |       |      |       |     |
| USA         |      |     |       |      |       |     |
| ZAF         |      |     |       |      |       |     |
| HRV         |      |     |       |      |       |     |
| FRR         |      |     |       |      |       |     |
| No. Records | 8917 |     | 93469 | 7034 | 11689 |     |
| Pub. Proofs | 7597 | 0   | 82239 | 6581 | 11255 | 0   |

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

| BSW | msp  |       |       |       |      |       |      |
|-----|------|-------|-------|-------|------|-------|------|
|     | CAN  | CHE   | DEA   | ITA   | NLD  | SVN   | FRA  |
| CAN | 7.21 |       |       |       |      |       |      |
| CHE | 0.92 | 15.84 |       |       |      |       |      |
| DEA | 0.90 | 0.97  | 11.70 |       |      |       |      |
| ITA | 0.89 | 0.95  | 0.93  | 18.04 |      |       |      |
| NLD | 0.93 | 0.94  | 0.94  | 0.91  | 6.12 |       |      |
| SVN | 0.88 | 0.89  | 0.90  | 0.95  | 0.87 | 25.36 |      |
| FRA | 0.93 | 0.92  | 0.86  | 0.89  | 0.95 | 0.86  | 0.89 |

| HOL | msp  |       |       |       |      |      |      |      |       |      |      |
|-----|------|-------|-------|-------|------|------|------|------|-------|------|------|
|     | CAN  | CHE   | DEU   | DFS   | FRA  | NLD  | AUS  | GBR  | SVN   | NZL  | ITA  |
| CAN | 7.58 |       |       |       |      |      |      |      |       |      |      |
| CHE | 0.88 | 12.11 |       |       |      |      |      |      |       |      |      |
| DEU | 0.90 | 0.97  | 11.47 |       |      |      |      |      |       |      |      |
| DFS | 0.94 | 0.94  | 0.97  | 14.60 |      |      |      |      |       |      |      |
| FRA | 0.93 | 0.96  | 0.96  | 0.97  | 1.09 |      |      |      |       |      |      |
| NLD | 0.95 | 0.97  | 0.96  | 0.98  | 0.98 | 5.60 |      |      |       |      |      |
| AUS | 0.89 | 0.88  | 0.87  | 0.89  | 0.91 | 0.91 | 3.57 |      |       |      |      |
| GBR | 0.85 | 0.85  | 0.85  | 0.85  | 0.85 | 0.85 | 0.86 | 0.15 |       |      |      |
| SVN | 0.86 | 0.86  | 0.85  | 0.86  | 0.86 | 0.85 | 0.86 | 0.86 | 22.64 |      |      |
| NZL | 0.91 | 0.89  | 0.87  | 0.87  | 0.92 | 0.92 | 0.94 | 0.85 | 0.87  | 0.37 |      |
| ITA | 0.94 | 0.93  | 0.92  | 0.95  | 0.96 | 0.95 | 0.91 | 0.85 | 0.85  | 0.91 | 7.29 |

| HOL | tem  |       |       |       |      |      |      |      |      |      |  |
|-----|------|-------|-------|-------|------|------|------|------|------|------|--|
|     | CAN  | CHE   | DEU   | DFS   | FRA  | NLD  | AUS  | GBR  | NZL  | ITA  |  |
| CAN | 6.90 |       |       |       |      |      |      |      |      |      |  |
| CHE | 0.70 | 11.07 |       |       |      |      |      |      |      |      |  |
| DEU | 0.85 | 0.78  | 12.16 |       |      |      |      |      |      |      |  |
| DFS | 0.79 | 0.83  | 0.87  | 13.20 |      |      |      |      |      |      |  |
| FRA | 0.72 | 0.90  | 0.81  | 0.92  | 0.99 |      |      |      |      |      |  |
| NLD | 0.85 | 0.72  | 0.87  | 0.87  | 0.82 | 4.97 |      |      |      |      |  |
| AUS | 0.70 | 0.70  | 0.70  | 0.72  | 0.71 | 0.74 | 3.06 |      |      |      |  |
| GBR | 0.70 | 0.79  | 0.72  | 0.81  | 0.86 | 0.71 | 0.70 | 0.14 |      |      |  |
| NZL | 0.70 | 0.71  | 0.71  | 0.70  | 0.70 | 0.72 | 0.75 | 0.70 | 0.34 |      |  |
| ITA | 0.70 | 0.70  | 0.70  | 0.70  | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 7.29 |  |

| JER | msp  |       |      |      |      |
|-----|------|-------|------|------|------|
|     | CAN  | DFS   | NLD  | AUS  | NZL  |
| CAN | 8.47 |       |      |      |      |
| DFS | 0.90 | 14.42 |      |      |      |
| NLD | 0.94 | 0.97  | 4.64 |      |      |
| AUS | 0.86 | 0.87  | 0.91 | 3.34 |      |
| NZL | 0.87 | 0.86  | 0.91 | 0.89 | 0.33 |

| RDC | msp  |      |       |       |      |      |
|-----|------|------|-------|-------|------|------|
|     | CAN  | DEU  | DFS   | NOR   | AUS  | NZL  |
| CAN | 6.65 |      |       |       |      |      |
| DEU | 0.90 | 9.43 |       |       |      |      |
| DFS | 0.96 | 0.94 | 13.57 |       |      |      |
| NOR | 0.92 | 0.89 | 0.96  | 15.16 |      |      |
| AUS | 0.88 | 0.87 | 0.88  | 0.86  | 4.38 |      |
| NZL | 0.91 | 0.87 | 0.90  | 0.91  | 0.91 | 0.41 |

| RDC | tem  |      |       |       |      |      |
|-----|------|------|-------|-------|------|------|
|     | CAN  | DEU  | DFS   | NOR   | AUS  | NZL  |
| CAN | 6.46 |      |       |       |      |      |
| DEU | 0.84 | 9.78 |       |       |      |      |
| DFS | 0.78 | 0.82 | 11.17 |       |      |      |
| NOR | 0.78 | 0.72 | 0.92  | 16.63 |      |      |
| AUS | 0.71 | 0.71 | 0.71  | 0.71  | 3.40 |      |
| NZL | 0.71 | 0.71 | 0.73  | 0.72  | 0.76 | 0.40 |

-----  
 ^LAPPENDIX II. Number of common bulls  
 -----

-----  
 BSW  
 -----

common bulls below diagonal  
 common three quarter sib group above diagonal

|     | CAN | CHE | DEA | ITA | NLD | SVN | FRA |
|-----|-----|-----|-----|-----|-----|-----|-----|
| CAN | 0   | 87  | 93  | 89  | 33  | 15  | 63  |
| CHE | 73  | 0   | 471 | 374 | 50  | 36  | 135 |
| DEA | 82  | 389 | 0   | 511 | 73  | 55  | 162 |
| ITA | 77  | 319 | 423 | 0   | 68  | 50  | 143 |
| NLD | 26  | 47  | 63  | 53  | 0   | 22  | 49  |
| SVN | 13  | 36  | 51  | 50  | 21  | 0   | 30  |
| FRA | 57  | 102 | 121 | 114 | 40  | 29  | 0   |

-----  
 HOL  
 -----

common bulls below diagonal  
 common three quarter sib group above diagonal

|     | CAN  | CHE | DEU  | DFS  | FRA  | NLD  | AUS | GBR  | SVN | NZL | ITA  |
|-----|------|-----|------|------|------|------|-----|------|-----|-----|------|
| CAN | 0    | 664 | 1602 | 986  | 1127 | 1004 | 862 | 1213 | 124 | 328 | 1232 |
| CHE | 529  | 0   | 792  | 494  | 456  | 630  | 388 | 542  | 88  | 211 | 531  |
| DEU | 782  | 589 | 0    | 1708 | 1619 | 1936 | 886 | 1373 | 188 | 358 | 1639 |
| DFS | 638  | 399 | 785  | 0    | 1238 | 1388 | 783 | 1118 | 153 | 390 | 1047 |
| FRA | 574  | 377 | 550  | 444  | 0    | 1422 | 838 | 1200 | 116 | 424 | 1218 |
| NLD | 831  | 594 | 1151 | 917  | 660  | 0    | 912 | 1286 | 157 | 504 | 1123 |
| AUS | 702  | 302 | 468  | 387  | 428  | 658  | 0   | 866  | 93  | 551 | 688  |
| GBR | 1203 | 522 | 792  | 691  | 610  | 985  | 605 | 0    | 146 | 408 | 1131 |
| SVN | 98   | 66  | 172  | 123  | 83   | 136  | 65  | 111  | 0   | 43  | 154  |
| NZL | 296  | 174 | 229  | 228  | 199  | 446  | 422 | 313  | 32  | 0   | 312  |
| ITA | 865  | 462 | 800  | 661  | 514  | 778  | 431 | 839  | 125 | 242 | 0    |

-----  
 HOL  
 -----

common bulls below diagonal  
 common three quarter sib group above diagonal

|     | CAN  | CHE | DEU  | DFS  | FRA  | NLD  | AUS | GBR  | NZL | ITA  |
|-----|------|-----|------|------|------|------|-----|------|-----|------|
| CAN | 0    | 564 | 1317 | 837  | 995  | 970  | 831 | 1179 | 318 | 1224 |
| CHE | 439  | 0   | 552  | 374  | 398  | 494  | 332 | 482  | 183 | 467  |
| DEU | 520  | 367 | 0    | 1261 | 1348 | 1619 | 759 | 1166 | 307 | 1412 |
| DFS | 481  | 298 | 472  | 0    | 1104 | 1159 | 730 | 1016 | 379 | 938  |
| FRA | 566  | 331 | 448  | 393  | 0    | 1337 | 785 | 1144 | 391 | 1207 |
| NLD | 800  | 458 | 836  | 659  | 633  | 0    | 908 | 1281 | 501 | 1121 |
| AUS | 681  | 267 | 352  | 330  | 426  | 654  | 0   | 866  | 551 | 688  |
| GBR | 1176 | 448 | 588  | 554  | 606  | 983  | 604 | 0    | 406 | 1132 |
| NZL | 288  | 153 | 187  | 206  | 197  | 441  | 421 | 311  | 0   | 312  |
| ITA | 857  | 395 | 628  | 560  | 513  | 770  | 431 | 841  | 242 | 0    |

-----  
 JER  
 -----

common bulls below diagonal  
 common three quarter sib group above diagonal

|     | CAN | DFS | NLD | AUS | NZL |
|-----|-----|-----|-----|-----|-----|
| CAN | 0   | 56  | 9   | 144 | 61  |
| DFS | 41  | 0   | 11  | 72  | 73  |
| NLD | 7   | 7   | 0   | 14  | 13  |
| AUS | 141 | 45  | 15  | 0   | 175 |
| NZL | 63  | 50  | 12  | 162 | 0   |

RDC

-----

common bulls below diagonal  
common three quarter sib group above diagonal

|     | CAN | DEU | DFS | NOR | AUS | NZL |
|-----|-----|-----|-----|-----|-----|-----|
| CAN | 0   | 6   | 93  | 4   | 32  | 29  |
| DEU | 6   | 0   | 32  | 8   | 18  | 3   |
| DFS | 90  | 23  | 0   | 98  | 96  | 49  |
| NOR | 4   | 8   | 73  | 0   | 44  | 10  |
| AUS | 29  | 18  | 71  | 36  | 0   | 33  |
| NZL | 26  | 3   | 47  | 9   | 30  | 0   |

RDC

-----

common bulls below diagonal  
common three quarter sib group above diagonal

|     | CAN | DEU | DFS | NOR | AUS | NZL |
|-----|-----|-----|-----|-----|-----|-----|
| CAN | 0   | 4   | 87  | 4   | 32  | 28  |
| DEU | 4   | 0   | 21  | 8   | 17  | 2   |
| DFS | 85  | 16  | 0   | 92  | 96  | 49  |
| NOR | 4   | 8   | 67  | 0   | 41  | 9   |
| AUS | 29  | 17  | 71  | 33  | 0   | 33  |
| NZL | 26  | 2   | 47  | 8   | 30  | 0   |