Introduction

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

International genetic evaluations for workability traits of bulls from Austria-Germany, Canada, Denmark-Finland-Sweden, France, Great Britain, Italy, Netherlands, Norway, New Zealand, Slovenia, Japan, Switzerland, Poland, Czech Republic and Spain 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 (ALL)	Base change. MSP - change in trait definition: The current milk speed, defined as a weighted function of measured milk flow rate and subjective
	score of milking speed, is replaced with the milk flow rate. heritability $h\hat{A}^2=0$, 25 An additional fixed effect of calving month is added to
	the evaluation model. A phenotypic pre-adjustment of heterogeneous variances within region*calving_year*milking_frequencies is applied to the
	milk flow rate. Bulls missing: these are bulls which have only the trait "subjective score of milking speed". Bulls having herds/edc decreased:
	this information was based on a combination of "measured milk flow rate and subjective score of milking speed" and is now only "measured milk
	flow rate". TEM: An additional fixed effect of calving month is added to the evaluation model. Drop in information is due to an updated
	data preparation.
NLD (ALL)	Added age at scoring for temperament and month of calving for milking speed.
NOR (RDC)	High quality reliability meant for IB test 4 are now used.

High quality reliability meant for IB test 4 are now used.

ITA (BSW) Base change. Updated data and pedigree editing procedures and fixed effects.

AUS (ALL) Change in information due to data clean up: pedigree changes or changes in status of a bull causing a good number of bulls to be no longer qualified.

JPN (HOL) Small decrease in information due to pedigree's update

FRA (BSW, HOL) Base change

POL (HOL) Small decrease in information due to data edits

SVN (BSW, HOL) Base change

DEA (BSW) Change of base to cow base group instead of the former defined bull base group.

CHE (ALL) Slight changes in number of daughters, number of herds and EDC are due to manual edits in the database.

NZL (ALL) Drops in information due to continuous DNA parentage testing

CAN (ALL) Base change

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

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 Workability (April Routine Evaluation 2021).

Number of records for milking speed by breed

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

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NILD 0.86 0.76 0.89 0.86 0.81 5.49 AUS 0.65 0.67 0.67 0.69 0.69 0.71 0.23 GBR 0.66 0.80 0.69 0.78 0.85 0.70 0.67 0.16 NZL 0.62 0.56 0.74 0.64 0.60 0.72 0.72 0.50 0.36 ITA 0.44 0.39 0.43 0.42 0.39 0.44 0.40 0.42 0.10 6.90 JPN 0.91 0.80 0.91 0.87 0.85 0.93 0.66 0.70 0.63 0.40 2.67 POL 0.54 0.50 0.53 0.51 0.50 0.53 0.51 0.50 0.50 0.19 0.39 0.52 20.53						0.97										
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GBR 0.66 0.80 0.69 0.78 0.85 0.70 0.67 0.16 NZL 0.62 0.56 0.74 0.64 0.60 0.72 0.72 0.50 0.36 TTA 0.44 0.39 0.43 0.42 0.39 0.44 0.40 0.42 0.10 6.90 JPN 0.91 0.80 0.91 0.87 0.85 0.93 0.66 0.70 0.63 0.40 2.67 POL 0.54 0.50 0.53 0.51 0.50 0.53 0.51 0.50 0.19 0.39 0.52 20.53 CAN DFS NLD AUS NZL CHE CAN 8.09 DFS 0.91 13.66 NLD 0.94 0.96 4.77 AUS 0.82 0.82 0.87 0.24 NZL 0.76 0.80 0.87 0.82 0.32 CHE 0.92 0.95 0.96 0.84 0.81 11.59 CAN DEU DFS NOR AUS NZL CAM CAN 7.01								0.23								
NZL									0.16							
ITA										0.36						
JPN 0.91 0.80 0.91 0.87 0.85 0.93 0.66 0.70 0.63 0.40 2.67 POL 0.54 0.50 0.53 0.51 0.50 0.53 0.51 0.50 0.19 0.39 0.52 20.53 JER msp CAN DFS NLD AUS NZL CHE CAN 8.09 DFS 0.91 13.66 NLD 0.94 0.96 4.77 AUS 0.82 0.82 0.87 0.24 NZL 0.76 0.80 0.87 0.82 0.32 CHE 0.92 0.95 0.96 0.84 0.81 11.59 CAN DEU DFS NOR AUS NZL CAM CAN 7.01											6 90					
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CAN DFS NLD AUS NZL CHE CAN 8.09 DFS 0.91 13.66 NLD 0.94 0.96 4.77 AUS 0.82 0.82 0.87 0.24 NZL 0.76 0.80 0.87 0.82 0.32 CHE 0.92 0.95 0.96 0.84 0.81 11.59 CAN DEU DFS NOR AUS NZL CAM CAN 7.01	POL												20.53			
CAN DFS NLD AUS NZL CHE CAN 8.09 DFS 0.91 13.66 NLD 0.94 0.96 4.77 AUS 0.82 0.82 0.87 0.24 NZL 0.76 0.80 0.87 0.82 0.32 CHE 0.92 0.95 0.96 0.84 0.81 11.59 CAN DEU DFS NOR AUS NZL CAM CAN 7.01	JER	msp														
CAN 8.09 DFS 0.91 13.66 NLD 0.94 0.96 4.77 AUS 0.82 0.82 0.87 0.24 NZL 0.76 0.80 0.87 0.82 0.32 CHE 0.92 0.95 0.96 0.84 0.81 11.59 CAN DEU DFS NOR AUS NZL CAM CAN 7.01																
DFS 0.91 13.66 NLD 0.94 0.96 4.77 AUS 0.82 0.82 0.87 0.24 NZL 0.76 0.80 0.87 0.82 0.32 CHE 0.92 0.95 0.96 0.84 0.81 11.59 RDC msp CAN DEU DFS NOR AUS NZL CAM CAN 7.01			DFS	NLD	AUS	NZL	CHE									
NLD 0.94 0.96 4.77 AUS 0.82 0.82 0.87 0.24 NZL 0.76 0.80 0.87 0.82 0.32 CHE 0.92 0.95 0.96 0.84 0.81 11.59 RDC msp CAN DEU DFS NOR AUS NZL CAM CAN 7.01																
AUS 0.82 0.82 0.87 0.24 NZL 0.76 0.80 0.87 0.82 0.32 CHE 0.92 0.95 0.96 0.84 0.81 11.59 RDC msp CAN DEU DFS NOR AUS NZL CAM CAN 7.01																
NZL 0.76 0.80 0.87 0.82 0.32 CHE 0.92 0.95 0.96 0.84 0.81 11.59 RDC msp CAN DEU DFS NOR AUS NZL CAM CAN 7.01	NLD															
CHE 0.92 0.95 0.96 0.84 0.81 11.59 RDC msp CAN DEU DFS NOR AUS NZL CAM CAN 7.01																
RDC msp CAN DEU DFS NOR AUS NZL CAM CAN 7.01																
CAN DEU DFS NOR AUS NZL CAM CAN 7.01	CHE	0.92	0.95	0.96	0.84	0.81	11.59									
CAN 7.01	 RDC	msp														
		CAN	DEU	DFS	NOR	AUS	NZL	CAM								
DEU 0.87 11.34	CAN	7.01														
	DEU	0.87	11.34													

```
0.92 0.90 13.36
           0.74 0.96 14.96
NOR
      0.83
AUS
           0.72 0.79
                      0.78
                           0.27
      0.81
           0.81 0.86
                      0.81 0.86 0.40
NZL
      0.88
           0.69 0.78 0.77 0.72 0.76 7.93
            DEU DFS NOR AUS NZL CAM
      6.39
DEU
      0.80 10.01
      0.71 0.79 11.07
DFS
NOR
      0.72
           0.62 0.91 17.10
                0.67 0.64 0.25
AUS
      0.65
           0.58
      0.62 0.70 0.70 0.63 0.79 0.44
NZL
      0.63 0.61 0.61 0.61 0.53 0.60 7.31
______
^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 0 110 120 110 37 27 72
 CHE 97 0 559 437 59 61 153
 DEA 109 473 0 600 85 84 191
 ITA 98 376 501 0 79 78 170
 NLD 30 58 77 64 0 28 51
 SVN 24 59 79 77 27 0 45
 FRA 64 114 139 131 42 43 0
BSW
_____
GUE
_____
HOL
common bulls below diagonal
common three quarter sib group above diagonal
    CAN CHE DEU DFS FRA NLD AUS GBR SVN NZL ITA JPN ESP CZE POL
 _____
 CAN 0 839 1625 1180 1355 1295 1012 1519 187 386 1483 361 1032 456 1044
 CHE 709 0 842 580 569 761 468 670 121 242 613 136 455 210 416
 DEU 1038 695 0 1637 1601 1951 857 1442 274 364 1577 336 987 634 1431
 DFS 873 492 983 0 1372 1595 880 1262 206 438 1055 212 692 523 968
 FRA 768 472 685 577 0 1668 950 1352 163 468 1196 297 836 541 1121
 NLD 1173 723 1434 1180 860 0 1033 1500 227 578 1202 249 774 645 1112
 AUS 873 380 529 493 518 796 0 990 126 603 672 164 517 324 488
 GBR 1586 641 965 856 757 1230 739 0 197 464 1230 258 793 472 888
 SVN 148 90 258 160 113 200 83 155 0 59 207 76 158 96 207
 NZL 350 203 260 274 233 519 477 360 45 0 281 78 230 162 179
 ITA 1255 538 929 801 637 976 503 1047 179 237 0 360 953 462 1099
 JPN 135 74 110 100 95 110 100 110 35 53 120 0 293 133 317
 ESP 596 323 521 464 530 590 332 550 115 167 606 96 0 342 705
 CZE 199 96 283 186 194 430 106 168 59 64 219 50 153 0 413
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CAN 0 751 1562 935 1222 1244 980 1485 374 1475 361 1025
 CHE 626 0 720 439 517 630 415 618 217 575 135 393
 DEU 872 548 0 1343 1558 1876 841 1366 337 1528 316 1314
 DFS 593 344 639 0 1205 1283 799 1090 410 873 161 773
 FRA 760 429 654 484 0 1563 895 1297 434 1193 297 1106
 NLD 1120 594 1215 782 828 0 1027 1487 571 1192 249 1085
 AUS 851 346 470 399 515 789 0 992 602 671 164 484
 GBR 1553 575 834 637 753 1224 738 0 461 1227 258 876
 NZL 342 184 233 234 231 511 476 359 0 280 78 178
 ITA 1246 503 853 606 636 964 503 1047 237 0 359 1077
 JPN 135 74 108 75 95 109 100 110 53 120 0 312
 POL 944 299 906 498 633 914 323 682 130 839 131 0
______
JER
common bulls below diagonal
common three quarter sib group above diagonal
    CAN DFS NLD AUS NZL CHE
______
 CAN 0 62 10 176 71 25
 DFS 47 0 14 84 78 41
 NLD 7 10 0 16 14 8
 AUS 176 55 16 0 193 27
 NZL 73 56 12 179 0 25
 CHE 23 40 5 25 23 0
JER
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RDC
common bulls below diagonal
common three quarter sib group above diagonal
    CAN DEU DFS NOR AUS NZL CAM
______
 CAN 0 6 137 6 36 33 0
 DEU 6 0 22 7 18 2 0
 DFS 139 14 0 110 117 56 0
 NOR 6 6 87 0 52 11 0
 AUS 33 17 89 43 0 38 8
 NZL 30 2 53 10 35 0 2
 CAM 0 0 0 0 8 2 0
_____
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common bulls below diagonal

common three quarter sib group above diagonal CAN DEU DFS NOR AUS NZL CAM

______ CAN 0 8 120 6 36 32 0 DEU 8 0 36 10 22 5 0 DFS 121 30 0 107 117 56 0 NOR 6 10 83 0 50 10 0 AUS 33 22 89 41 0 38 8 NZL 30 5 53 9 35 0 2 CAM 0 0 0 0 8 2 0

_____ SIM
