INTRODUCTION

The latest genomic routine international evaluation for conformation traits took place
as scheduled at the Interbull Centre. Data from twenty (22) 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.

Holstein data were included in this evaluation.

BEL, CAN, DEU, ESP, FRA, AUS, DFS, GBR, ITA, NLD, POL submitted GEBVs.

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ang: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
bcs: BEL, CAN, DEU,    , FRA,    ,    , GBR, ITA, NLD,
bde: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
cwi: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
fan: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
ftl: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
ftp: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
fua: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
loc: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD,
ocs: BEL, CAN, DEU, ESP, FRA, AUS,    , GBR, ITA, NLD, POL
ofl: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
ous: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
ran: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
rlr: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
rls: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
rtp: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
ruh: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
rwi: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
sta: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
ude: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
usu: BEL, CAN, DEU, ESP, FRA,    , DFS, GBR, ITA, NLD, POL
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CHANGES IN NATIONAL PROCEDURES

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

DFS (HOL)   -New method of calculating reliabilities based on model reliabilities
BEL (HOL)   -Genomic evaluations for conformation traits have slightly changed and are performed
            separately for each trait. Evaluations are based on a single-step GBLUP modified to
            combine all available information following a Bayesian approach. Except for bcs trait,
            the respective MACE breeding values for each genomic evaluation are used. The
            computation of genomic reliability has slightly changed and is now only based on the
            genetic variance used for the genomic evaluation and the predicted error variance
            obtained from the inverse of the left-hand-side of the ssGBLUP

ESP (HOL)   Annual update of the reference population and elimination of high number of duplicate
            genotypes. Change of base

POL (HOL)   GEBVs are now calculated based on the Eurogenomic reference population

INTERBULL CHANGES COMPARED TO THE DECEMBER ROUTINE RUN

No changes in Interbull procedures

DATA AND METHOD OF ANALYSIS

Eleven Holstein populations sent GEBV data for up to 38 traits, while
classical EBVs for the same traits were used in the analyses. Young bull
GEBVs from the GEBV providers have been converted to the scales of all
countries participating in classical MACE. A bull will get a MACE EBV or
a GMACE EBV but not both.
From those eleven countries, National GEBVs of bulls less than seven years of age and with no
classical MACE proofs were included for the breeding value prediction
with a further requirement of either a MACE-PA or a GMACE-PA (for young
genomic bulls with young genomic sires) being available.

SCIENTIFIC LITERATURE

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

VanRaden, P.M. and Sullivan, P.G. 2010. International genomic evaluation methods for dairy cattle.
Gen. Sel. Evol. 42:7

Sullivan, P.G. and Jakobsen, J.H. 2012. Robust GMACE for young bulls methodology. Interbull
Bulletin 45, Article 1.

Sullivan, P.G. 2012a. GMACE reliability approximation. Report to the GMACE working group of
Interbull. GMACE_rels 2013

Sullivan, P.G. 2012b. GMACE variance estimation. Report to the GMACE working group of Interbull.
GMACE_vce 2013

Sullivan, P.G. 2012c. GMACE Weighting Factors. Report to the GMACE working group of Interbull.
GMACE_gedcs 2013

Jakobsen, J.H. and Sullivan, P.G. 2013. Trait specific computation of shared reference population.
Reference sharing Nov 2013

NEXT ROUTINE INTERNATIONAL EVALUATION

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

NEXT TEST INTERNATIONAL EVALUATION

Dates for next routine 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 minimising the need to resort to
conversions.

At the same time, all recipients of Interbull results are expected to honour
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.

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Table 1.  National evaluation dates in GMACE run December 2015
-------------------------------------------------------------
Country  Date
-------------------------------------------------------------
BEL      20151201
CAN      20151201
DEU      20151201
DFS      20151103
ESP      20151116
FRA      20151204
GBR      20151201
ITA      20151104
NLD      20151201
POL      20151015
=============================================================


Table 2.
--------------------------------------------------------
Number of bulls in reference population for        sta
--------------------------------------------------------
BEL  2505.0
CAN    818.0 25327.0
DEU    850.0  1494.0 31158.0
DFS    810.0  1611.0 29380.0 31130.0
ESP    790.0  1497.0 28791.0 29446.0 30120.0
FRA    875.0  1816.0 26231.0 27006.0 26943.0 28857.0
GBR    719.0 23876.0  1344.0  1443.0  1326.0  1614.0 24027.0
ITA    678.0 23131.0  1116.0  1096.0  1053.0  1266.0 22986.0 23419.0
NLD    900.0  1848.0 27122.0 27779.0 27048.0 24686.0  1652.0  1306.0 29468.0
POL    181.0   136.0  2493.0  2618.0  2622.0  2558.0   132.0   137.0   215.0  2739.0


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Number of bulls in reference population for        cwi
--------------------------------------------------------
BEL  2505.0
CAN    818.0 25323.0
DEU    849.0  1494.0 29945.0
DFS    809.0  1611.0 28301.0 30044.0
ESP    789.0  1497.0 27664.0 28416.0 28991.0
FRA    874.0  1816.0 25106.0 25972.0 25839.0 27725.0
GBR    719.0 23873.0  1344.0  1443.0  1326.0  1614.0 24024.0
ITA    678.0 23128.0  1116.0  1096.0  1053.0  1266.0 22984.0 23416.0
NLD    899.0  1848.0 25936.0 26716.0 25939.0 23578.0  1652.0  1306.0 28279.0
POL    181.0   136.0  2493.0  2618.0  2622.0  2558.0   132.0   137.0   215.0  2739.0


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Number of bulls in reference population for        bde
--------------------------------------------------------
BEL  2488.0
CAN    818.0 25327.0
DEU    850.0  1494.0 30600.0
DFS    810.0  1611.0 28936.0 30683.0
ESP    790.0  1497.0 28310.0 29049.0 29637.0
FRA    875.0  1816.0 25747.0 26602.0 26477.0 28372.0
GBR    719.0 23876.0  1344.0  1443.0  1326.0  1614.0 24027.0
ITA    678.0 23131.0  1116.0  1096.0  1053.0  1266.0 22986.0 23419.0
NLD    900.0  1848.0 26564.0 27334.0 26565.0 24201.0  1652.0  1306.0 28907.0
POL    181.0   136.0  2493.0  2618.0  2622.0  2558.0   132.0   137.0   215.0  2739.0
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Number of bulls in reference population for        ang
----------------------------------------------------------
BEL   2454.0
CAN    816.0 25312.0
DEU    841.0  1489.0 27392.0
DFS    802.0  1607.0 25816.0 27557.0
ESP    781.0  1492.0 25457.0 26247.0 26779.0
FRA    866.0  1811.0 22916.0 23818.0 23661.0 25531.0
GBR    718.0 23864.0  1339.0  1439.0  1321.0  1609.0 24015.0
ITA    676.0 23121.0  1111.0  1092.0  1048.0  1261.0 22977.0 23407.0
NLD    878.0  1841.0 23389.0 24235.0 23732.0 21391.0  1646.0  1300.0 25409.0
POL    179.0   136.0  2490.0  2615.0  2619.0  2555.0   132.0   137.0   212.0  2736.0


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Number of bulls in reference population for        ran
----------------------------------------------------------
BEL   2506.0
CAN    818.0 25327.0
DEU    850.0  1494.0 31039.0
DFS    810.0  1611.0 29261.0 31009.0
ESP    790.0  1497.0 28694.0 29347.0 30021.0
FRA    875.0  1816.0 26112.0 26887.0 26846.0 28738.0
GBR    719.0 23876.0  1344.0  1443.0  1326.0  1614.0 24027.0
ITA    678.0 23131.0  1116.0  1096.0  1053.0  1266.0 22986.0 23419.0
NLD    900.0  1848.0 27003.0 27660.0 26951.0 24567.0  1652.0  1306.0 29349.0
POL    181.0   136.0  2493.0  2618.0  2622.0  2558.0   132.0   137.0   215.0  2739.0


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Number of bulls in reference population for        rwi
----------------------------------------------------------
BEL   2488.0
CAN    818.0 25327.0
DEU    850.0  1494.0 31103.0
DFS    810.0  1611.0 29328.0 31078.0
ESP    790.0  1497.0 28754.0 29412.0 30083.0
FRA    875.0  1816.0 26177.0 26955.0 26906.0 28803.0
GBR    719.0 23876.0  1344.0  1443.0  1326.0  1614.0 24027.0
ITA    678.0 23131.0  1116.0  1096.0  1053.0  1266.0 22986.0 23419.0
NLD    900.0  1848.0 27067.0 27727.0 27011.0 24632.0  1652.0  1306.0 29413.0
POL    181.0   136.0  2493.0  2618.0  2622.0  2558.0   132.0   137.0   215.0  2739.0


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Number of bulls in reference population for        rls
----------------------------------------------------------
BEL   2506.0
CAN    818.0 25327.0
DEU    850.0  1494.0 31159.0
DFS    810.0  1611.0 29381.0 31131.0
ESP    790.0  1497.0 28791.0 29446.0 30120.0
FRA    875.0  1816.0 26232.0 27007.0 26943.0 28858.0
GBR    719.0 23876.0  1344.0  1443.0  1326.0  1614.0 24027.0
ITA    678.0 23131.0  1116.0  1096.0  1053.0  1266.0 22986.0 23419.0
NLD    900.0  1848.0 27123.0 27780.0 27048.0 24687.0  1652.0  1306.0 29469.0
POL    181.0   136.0  2493.0  2618.0  2622.0  2558.0   132.0   137.0   215.0  2739.0


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Number of bulls in reference population for        rlr
----------------------------------------------------------
BEL   2475.0
CAN    816.0 24479.0
DEU    844.0  1486.0 29060.0
DFS    804.0  1603.0 27471.0 29210.0
ESP    784.0  1489.0 26847.0 27619.0 28169.0
FRA    869.0  1808.0 24289.0 25182.0 25029.0 26855.0
GBR    718.0 23045.0  1336.0  1435.0  1318.0  1606.0 23195.0
ITA    677.0 22291.0  1108.0  1088.0  1045.0  1258.0 22161.0 22578.0
NLD    881.0  1838.0 25089.0 25897.0 25143.0 22788.0  1643.0  1297.0 27121.0
POL    180.0   136.0  2481.0  2613.0  2609.0  2545.0   132.0   137.0   214.0  2726.0
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---------------------------------------------------------
Number of bulls in reference population for        fan
---------------------------------------------------------
BEL  2486.0
CAN   816.0 25323.0
DEU   849.0  1494.0 28971.0
DFS   810.0  1611.0 27606.0 29339.0
ESP   789.0  1497.0 26982.0 27746.0 28307.0
FRA   874.0  1816.0 24452.0 25328.0 25191.0 27073.0
GBR   718.0 23873.0  1344.0  1443.0  1326.0  1614.0 24024.0
ITA   677.0 23130.0  1116.0  1096.0  1053.0  1266.0 22985.0 23418.0
NLD   886.0  1846.0 25212.0 26016.0 25250.0 22914.0  1651.0  1305.0 27242.0
POL   180.0   136.0  2492.0  2618.0  2621.0  2557.0   132.0   137.0   214.0  2738.0


---------------------------------------------------------
Number of bulls in reference population for        fua
---------------------------------------------------------
BEL  2506.0
CAN   818.0 25326.0
DEU   850.0  1494.0 30341.0
DFS   810.0  1611.0 28692.0 30437.0
ESP   790.0  1497.0 28039.0 28789.0 29366.0
FRA   875.0  1816.0 25497.0 26362.0 26211.0 28121.0
GBR   719.0 23876.0  1344.0  1443.0  1326.0  1614.0 24027.0
ITA   678.0 23130.0  1116.0  1096.0  1053.0  1266.0 22986.0 23418.0
NLD   900.0  1848.0 26323.0 27102.0 26308.0 23963.0  1652.0  1306.0 28666.0
POL   181.0   136.0  2493.0  2618.0  2622.0  2558.0   132.0   137.0   215.0  2739.0


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Number of bulls in reference population for        ruh
---------------------------------------------------------
BEL  2506.0
CAN   818.0 25326.0
DEU   850.0  1494.0 30016.0
DFS   810.0  1611.0 28360.0 30078.0
ESP   790.0  1497.0 27731.0 28448.0 29029.0
FRA   875.0  1816.0 25176.0 26037.0 25907.0 27800.0
GBR   719.0 23875.0  1344.0  1443.0  1326.0  1614.0 24026.0
ITA   678.0 23131.0  1116.0  1096.0  1053.0  1266.0 22986.0 23419.0
NLD   900.0  1848.0 25989.0 26765.0 25993.0 23635.0  1652.0  1306.0 28331.0
POL   181.0   136.0  2493.0  2618.0  2622.0  2558.0   132.0   137.0   215.0  2739.0


---------------------------------------------------------
Number of bulls in reference population for        usu
---------------------------------------------------------
BEL  2506.0
CAN   818.0 25327.0
DEU   850.0  1494.0 31157.0
DFS   810.0  1611.0 29379.0 31129.0
ESP   790.0  1497.0 28789.0 29444.0 30118.0
FRA   875.0  1816.0 26230.0 27005.0 26941.0 28856.0
GBR   719.0 23876.0  1344.0  1443.0  1326.0  1614.0 24027.0
ITA   678.0 23131.0  1116.0  1096.0  1053.0  1266.0 22986.0 23419.0
NLD   900.0  1848.0 27121.0 27778.0 27046.0 24685.0  1652.0  1306.0 29467.0
POL   181.0   136.0  2493.0  2618.0  2622.0  2558.0   132.0   137.0   215.0  2739.0


---------------------------------------------------------
Number of bulls in reference population for        ude
---------------------------------------------------------
BEL  2489.0
CAN   816.0 25323.0
DEU   850.0  1494.0 31156.0
DFS   810.0  1611.0 29378.0 31128.0
ESP   790.0  1497.0 28788.0 29443.0 30117.0
FRA   875.0  1816.0 26230.0 27005.0 26941.0 28856.0
GBR   718.0 23873.0  1344.0  1443.0  1326.0  1614.0 24024.0
ITA   677.0 23130.0  1116.0  1096.0  1053.0  1266.0 22985.0 23418.0
NLD   887.0  1846.0 27120.0 27777.0 27045.0 24685.0  1651.0  1305.0 29159.0
POL   181.0   136.0  2493.0  2618.0  2622.0  2558.0   132.0   137.0   215.0  2739.0
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----------------------------------------------------------
Number of bulls in reference population for        ftp
----------------------------------------------------------
BEL   2506.0
CAN    818.0 25327.0
DEU    850.0  1494.0 31111.0
DFS    810.0  1611.0 29333.0 31083.0
ESP    790.0  1497.0 28761.0 29416.0 30090.0
FRA    875.0  1816.0 26184.0 26959.0 26913.0 28810.0
GBR    719.0 23876.0  1344.0  1443.0  1326.0  1614.0 24027.0
ITA    678.0 23131.0  1116.0  1096.0  1053.0  1266.0 22986.0 23419.0
NLD    900.0  1848.0 27075.0 27732.0 27018.0 24639.0  1652.0  1306.0 29421.0
POL    181.0   136.0  2493.0  2618.0  2622.0  2558.0   132.0   137.0   215.0  2739.0


----------------------------------------------------------
Number of bulls in reference population for        ftl
----------------------------------------------------------
BEL   2489.0
CAN    816.0 25323.0
DEU    850.0  1494.0 31155.0
DFS    810.0  1611.0 29377.0 31127.0
ESP    790.0  1497.0 28788.0 29443.0 30117.0
FRA    875.0  1816.0 26229.0 27004.0 26941.0 28855.0
GBR    718.0 23873.0  1344.0  1443.0  1326.0  1614.0 24024.0
ITA    677.0 23130.0  1116.0  1096.0  1053.0  1266.0 22985.0 23418.0
NLD    887.0  1846.0 27119.0 27776.0 27045.0 24684.0  1651.0  1305.0 29158.0
POL    181.0   136.0  2493.0  2618.0  2622.0  2558.0   132.0   137.0   215.0  2739.0


----------------------------------------------------------
Number of bulls in reference population for        rtp
----------------------------------------------------------
BEL   2484.0
CAN    818.0 23433.0
DEU    849.0  1488.0 28789.0
DFS    809.0  1606.0 27253.0 28911.0
ESP    789.0  1491.0 26639.0 27364.0 27881.0
FRA    874.0  1810.0 24121.0 24988.0 24799.0 26640.0
GBR    719.0 22024.0  1338.0  1438.0  1320.0  1608.0 22173.0
ITA    678.0 21336.0  1111.0  1092.0  1048.0  1261.0 21204.0 21593.0
NLD    899.0  1826.0 25036.0 25866.0 25140.0 22823.0  1629.0  1284.0 27224.0
POL    180.0   136.0  2244.0  2344.0  2322.0  2258.0   132.0   137.0   215.0  2426.0


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Number of bulls in reference population for        ocs
----------------------------------------------------------
AUS   2142.0
BEL    227.0   2487.0
CAN    428.0    818.0 25314.0
DEU    381.0    849.0  1494.0 30528.0
ESP    364.0    789.0  1497.0 28169.0 29498.0
FRA    374.0    874.0  1816.0 25613.0 26329.0 28232.0
GBR    414.0    719.0 23863.0  1344.0  1326.0  1614.0 24014.0
ITA    304.0    678.0 23119.0  1116.0  1053.0  1266.0 22974.0 23407.0
NLD    476.0    899.0  1848.0 26519.0 26446.0 24086.0  1652.0  1306.0 28861.0
POL    107.0    181.0   136.0  2493.0  2622.0  2558.0   132.0   137.0   215.0  2739.0


----------------------------------------------------------
Number of bulls in reference population for        ous
----------------------------------------------------------
BEL   2482.0
CAN    818.0 25326.0
DEU    850.0  1494.0 31159.0
DFS    810.0  1611.0 29381.0 31131.0
ESP    790.0  1497.0 28791.0 29446.0 30120.0
FRA    875.0  1816.0 26232.0 27007.0 26943.0 28857.0
GBR    719.0 23875.0  1344.0  1443.0  1326.0  1614.0 24026.0
ITA    678.0 23131.0  1116.0  1096.0  1053.0  1266.0 22986.0 23419.0
NLD    900.0  1848.0 27123.0 27780.0 27048.0 24687.0  1652.0  1306.0 29468.0
POL    181.0   136.0  2493.0  2618.0  2622.0  2558.0   132.0   137.0   215.0  2739.0
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---------------------------------------------------------
Number of bulls in reference population for        ofl
---------------------------------------------------------
BEL   2464.0
CAN    816.0 25197.0
DEU    849.0  1494.0 30520.0
DFS    809.0  1611.0 28756.0 30503.0
ESP    789.0  1497.0 28160.0 28822.0 29489.0
FRA    874.0  1816.0 25606.0 26386.0 26321.0 28219.0
GBR    718.0 23747.0  1344.0  1443.0  1326.0  1614.0 23898.0
ITA    677.0 23018.0  1116.0  1096.0  1053.0  1266.0 22873.0 23305.0
NLD    886.0  1846.0 26512.0 27172.0 26438.0 24080.0  1651.0  1305.0 28526.0
POL    181.0   136.0  2493.0  2618.0  2622.0  2558.0   132.0   137.0   215.0  2739.0


---------------------------------------------------------
Number of bulls in reference population for        loc
---------------------------------------------------------
BEL   2442.0
CAN    814.0 22486.0
DEU    844.0  1470.0 25096.0
DFS    805.0  1588.0 23838.0 25243.0
ESP    784.0  1474.0 23236.0 23915.0 24341.0
FRA    869.0  1789.0 20782.0 21506.0 21323.0 22993.0
GBR    716.0 21074.0  1320.0  1420.0  1303.0  1587.0 21223.0
ITA    673.0 20496.0  1097.0  1078.0  1035.0  1248.0 20378.0 20736.0
NLD    880.0  1826.0 23940.0 24763.0 24077.0 21754.0  1631.0  1286.0 25881.0


---------------------------------------------------------
Number of bulls in reference population for        bcs
---------------------------------------------------------
BEL   2234.0
DEU    836.0 22218.0
FRA    861.0 17914.0 19832.0
GBR    711.0  1309.0  1575.0 19740.0
ITA    669.0  1086.0  1236.0 18893.0 19243.0
NLD    870.0 21078.0 18748.0  1612.0  1267.0 22885.0
CAN    809.0  1458.0  1776.0 19606.0 19019.0  1806.0 20694.0
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