INTRODUCTION

The latest genomic test international evaluation for conformation traits took place as scheduled at the Interbull Centre. Data from twenty-four (24) countries were included in this evaluation.

International genetic evaluations for conformation traits of bulls were computed from:
AUS BEL CAN CHE CZE DEU DFS ESP EST FRA GBR HUN IRL ITA JPN KOR NLD NZL POL PRT SVN USA ZAF LVA
Holstein data were included in this evaluation.

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

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

CHANGES IN NATIONAL PROCEDURES

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

AUS (HOL) Some missing bulls due to the pedigree updates and not having dam or sire
CAN (HOL) Base change
CAN (HOL) Base change
ITA (HOL) Base change
NLD (HOL) Base change
FRA (HOL) Base change
Bulls changed from official to unoffcial due to correction in some genotypes because of incompatible parentage check
Some bulls missing pedigree due to the pedigree update
DEU (HOL) Base change
Submitted GEBVs using single-step methodology
POL (HOL) Change in status of bulls due to having more daughters and assigned new code
BEL (HOL) Participating with MACE data due to very old data and no more qualifying young bulls

INTERBULL CHANGES COMPARED TO THE DECEMBER ROUTINE RUN

No changes in Interbull procedures

DATA AND METHOD OF ANALYSIS

Thirteen 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 thirteen 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.

The parameter-space approach is used for the GMACE genetic evaluations (Sullivan, 2016)

SCIENTIFIC LITERATURE

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

Sullivan, P.G. 2016. Defining a Parameter Space for GMACE. Interbull Bulletin 50, p 85-93.

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 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 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.

Table 1. National evaluation dates in GMACE run April 2025

Country	Date
CAN	20250401
DEU	20250401
DFS	20250204
ESP	20250310
FRA	20250402
GBR	20250304
ITA	20250305
NLD	20250401
HUN	20250312
POL	20250228

CZE 20250317

Table 2.

Number of bulls in reference population for sta

CAN	41195.0										
DEU	10693.0	46901.0									
DFS	6601.0	40282.0	41546.0								
ESP	41134.0	46897.0	41535.0	140863.0							
FRA	5527.0	37424.0	36864.0	39213.0	39220.0						
GBR	34836.0	11652.0	7540.0	37495.0	6016.0	37569.0					
ITA	35835.0	10573.0	6467.0	37266.0	5057.0	35221.0	37289.0				
NLD	4118.0	36602.0	36123.0	38366.0	34677.0	4453.0	3475.0	38371.0			
HUN	2239.0	8230.0	7788.0	8985.0	7624.0	2456.0	2220.0	7806.0	9036.0		
POL	4866.0	33957.0	33752.0	35532.0	32327.0	5319.0	4392.0	31841.0	7622.0	35591.0	
CZE	2111.0	2602.0	1959.0	4021.0	1949.0	2010.0	2065.0	1727.0	1426.0	2554.0	4022.0

Number of bulls in reference population for cwi

CAN	41194.0										
DEU	10696.0	45685.0									
DFS	6602.0	39144.0	40402.0								
ESP	41133.0	45681.0	40391.0	135598.0							
FRA	5528.0	36233.0	35746.0	38008.0	38015.0						
GBR	34835.0	11656.0	7542.0	37495.0	6017.0	37569.0					
ITA	35834.0	10577.0	6469.0	37266.0	5058.0	35221.0	37289.0				
NLD	4118.0	35410.0	34997.0	37172.0	33511.0	4453.0	3475.0	37177.0			
HUN	2239.0	7693.0	7279.0	8446.0	7113.0	2456.0	2220.0	7267.0	8496.0		
POL	4866.0	32803.0	32665.0	34375.0	31199.0	5319.0	4392.0	30694.0	7082.0	34433.0	
CZE	2111.0	2599.0	1956.0	4018.0	1946.0	2010.0	2065.0	1725.0	1425.0	2551.0	4019.0

Number of bulls in reference population for bde

CAN	41195.0										
DEU	10693.0	46342.0									
DFS	6601.0	39752.0	41012.0								
ESP	41134.0	46338.0	41001.0	138750.0							
FRA	5527.0	36892.0	36356.0	38680.0	38687.0						
GBR	34836.0	11652.0	7540.0	37495.0	6016.0	37569.0					
ITA	35835.0	10573.0	6467.0	37266.0	5057.0	35221.0	37289.0				
NLD	4118.0	36043.0	35591.0	37805.0	34144.0	4453.0	3475.0	37810.0			
HUN	2239.0	7718.0	7303.0	8471.0	7138.0	2456.0	2220.0	7292.0	8521.0		
POL	4866.0	33444.0	33266.0	35017.0	31840.0	5319.0	4392.0	31326.0	7107.0	35075.0	
CZE	2111.0	2601.0	1958.0	4020.0	1948.0	2010.0	2065.0	1726.0	1425.0	2553.0	4021.0

Number of bulls in reference population for ang

CAN	40242.0										
DEU	10223.0	27520.0									
DFS	6143.0	21958.0	23131.0								
ESP	40182.0	27516.0	23120.0	97208.0							
FRA	5092.0	20377.0	19973.0	22127.0	22134.0						
GBR	34393.0	11064.0	6963.0	36533.0	5462.0	36607.0					
ITA	35311.0	10253.0	6155.0	36700.0	4762.0	34857.0	36723.0				
NLD	3660.0	18230.0	17926.0	19510.0	17700.0	3807.0	3166.0	19515.0			
HUN	2212.0	4984.0	4605.0	5450.0	4477.0	2346.0	2199.0	4416.0	5478.0		
POL	4414.0	20122.0	20081.0	21661.0	19650.0	4747.0	4085.0	18110.0	4411.0	21719.0	
CZE	2096.0	2519.0	1885.0	3920.0	1876.0	1998.0	2051.0	1652.0	1378.0	2475.0	3921.0

Number of bulls in reference population for ran

CAN	41194.0										
DEU	10692.0	46804.0									

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DFS  6600.0 40185.0 41449.0
ESP 41133.0 46800.0 41438.0140594.0
FRA  5527.0 37329.0 36769.0 39118.0 39125.0
GBR 34835.0 11651.0  7539.0 37494.0  6016.0 37568.0
ITA 35834.0 10572.0  6466.0 37265.0  5057.0 35220.0 37288.0
NLD  4117.0 36506.0 36027.0 38270.0 34582.0  4452.0  3474.0 38275.0
HUN  2239.0  8230.0  7788.0  8985.0  7624.0  2456.0  2220.0  7806.0  9036.0
POL  4866.0 33954.0 33749.0 35529.0 32324.0  5319.0  4392.0 31838.0  7622.0 35588.0
CZE  2111.0  2602.0  1959.0  4021.0  1949.0  2010.0  2065.0  1727.0  1426.0  2554.0  4022.0

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Number of bulls in reference population for        rwi
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CAN 40372.0
DEU 10692.0 46845.0
DFS  6600.0 40229.0 41493.0
ESP 40311.0 46841.0 41482.0138538.0
FRA  5527.0 37369.0 36812.0 39158.0 39165.0
GBR 34835.0 11651.0  7539.0 37494.0  6016.0 37568.0
ITA 35834.0 10572.0  6466.0 37265.0  5057.0 35220.0 37288.0
NLD  4117.0 36546.0 36070.0 38310.0 34622.0  4452.0  3474.0 38315.0
HUN  2239.0  8221.0  7782.0  8976.0  7615.0  2456.0  2220.0  7797.0  9027.0
POL  4866.0 33947.0 33745.0 35522.0 32317.0  5319.0  4392.0 31831.0  7613.0 35581.0
CZE  2111.0  2602.0  1959.0  4021.0  1949.0  2010.0  2065.0  1727.0  1426.0  2554.0  4022.0

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Number of bulls in reference population for        rls
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CAN 41197.0
DEU 10695.0 46904.0
DFS  6601.0 40283.0 41547.0
ESP 41136.0 46900.0 41536.0140837.0
FRA  5528.0 37426.0 36865.0 39215.0 39222.0
GBR 34838.0 11654.0  7540.0 37497.0  6017.0 37571.0
ITA 35837.0 10575.0  6467.0 37268.0  5058.0 35223.0 37291.0
NLD  4118.0 36603.0 36124.0 38367.0 34678.0  4453.0  3475.0 38372.0
HUN  2239.0  8230.0  7788.0  8985.0  7624.0  2456.0  2220.0  7806.0  9036.0
POL  4866.0 33957.0 33752.0 35532.0 32327.0  5319.0  4392.0 31841.0  7622.0 35591.0
CZE  2111.0  2602.0  1959.0  4021.0  1949.0  2010.0  2065.0  1727.0  1426.0  2554.0  4022.0

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Number of bulls in reference population for        rlr
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CAN 40271.0
DEU 10690.0 44791.0
DFS  6594.0 38282.0 39539.0
ESP 40210.0 44787.0 39528.0121594.0
FRA  5520.0 35349.0 34894.0 37068.0 37075.0
GBR 34006.0 11647.0  7531.0 36340.0  6007.0 36413.0
ITA 35006.0 10570.0  6460.0 36435.0  5050.0 34393.0 36458.0
NLD  4108.0 34544.0 34147.0 35860.0 32655.0  4363.0  3467.0 35865.0
HUN  2234.0  7335.0  6927.0  7820.0  6766.0  2374.0  2217.0  6770.0  7869.0
POL  4857.0 31935.0 31812.0 33453.0 30340.0  5309.0  4383.0 29830.0  6725.0 33511.0
CZE  2110.0  2589.0  1946.0  3929.0  1937.0  2009.0  2064.0  1715.0  1418.0  2491.0  3930.0

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Number of bulls in reference population for        fan
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CAN 41162.0
DEU 10695.0 44737.0
DFS  6600.0 38443.0 39689.0
ESP 41101.0 44733.0 39678.0125262.0
FRA  5526.0 35592.0 35085.0 37375.0 37382.0
GBR 34811.0 11655.0  7540.0 37152.0  6015.0 37226.0
ITA 35807.0 10576.0  6467.0 37237.0  5056.0 35197.0 37260.0
NLD  4114.0 34712.0 34291.0 36026.0 32853.0  4371.0  3473.0 36031.0
HUN  2236.0  7540.0  7131.0  8026.0  6971.0  2377.0  2219.0  6975.0  8075.0
POL  4864.0 32118.0 31970.0 33688.0 30554.0  5317.0  4390.0 30008.0  6932.0 33746.0
CZE  2110.0  2599.0  1957.0  4017.0  1947.0  2010.0  2064.0  1725.0  1424.0  2552.0  4018.0
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Number of bulls in reference population for hde

Number of bulls in reference population for fua

CAN 41196.0
DEU 10695.0 46085.0
DFS 6601.0 39532.0 40789.0
ESP 41135.0 46082.0 40779.0137706.0
FRA 5528.0 36635.0 36134.0 38417.0 38424.0
GBR 34837.0 11655.0 7540.0 37496.0 6016.0 37570.0
ITA 35836.0 10576.0 6467.0 37267.0 5057.0 35222.0 37290.0
NLD 4118.0 35803.0 35381.0 37565.0 33904.0 4453.0 3475.0 37570.0
HUN 2239.0 7695.0 7281.0 8448.0 7115.0 2456.0 2220.0 7269.0 8498.0
POL 4866.0 33154.0 33005.0 34726.0 31549.0 5318.0 4391.0 31041.0 7084.0 34784.0
CZE 2111.0 2601.0 1958.0 4020.0 1948.0 2010.0 2065.0 1726.0 1425.0 2553.0 4021.0

Number of bulls in reference population for ruh

CAN 41194.0
DEU 10694.0 45770.0
DFS 6600.0 39220.0 40454.0
ESP 41133.0 45767.0 40444.0136282.0
FRA 5528.0 36328.0 35830.0 38112.0 38119.0
GBR 34835.0 11653.0 7538.0 37491.0 6016.0 37565.0
ITA 35834.0 10574.0 6465.0 37264.0 5057.0 35219.0 37287.0
NLD 4118.0 35480.0 35066.0 37241.0 33587.0 4453.0 3475.0 37246.0
HUN 2239.0 7707.0 7292.0 8460.0 7127.0 2456.0 2220.0 7281.0 8510.0
POL 4866.0 33290.0 33133.0 34862.0 31685.0 5318.0 4391.0 31176.0 7099.0 34920.0
CZE 2111.0 2601.0 1958.0 4020.0 1948.0 2010.0 2065.0 1726.0 1425.0 2553.0 4021.0

Number of bulls in reference population for ruw

Number of bulls in reference population for usu

CAN 41199.0
DEU 10697.0 46906.0
DFS 6602.0 40285.0 41547.0
ESP 41138.0 46903.0 41537.0140803.0
FRA 5528.0 37426.0 36864.0 39214.0 39221.0
GBR 34840.0 11657.0 7541.0 37499.0 6016.0 37573.0
ITA 35839.0 10578.0 6468.0 37270.0 5057.0 35225.0 37293.0
NLD 4118.0 36603.0 36124.0 38367.0 34678.0 4453.0 3475.0 38372.0
HUN 2239.0 8230.0 7788.0 8985.0 7624.0 2456.0 2220.0 7806.0 9036.0
POL 4866.0 33957.0 33751.0 35531.0 32326.0 5318.0 4391.0 31841.0 7622.0 35590.0
CZE 2111.0 2602.0 1959.0 4021.0 1949.0 2010.0 2065.0 1727.0 1426.0 2554.0 4022.0

Number of bulls in reference population for ude

CAN 41200.0
DEU 10701.0 46926.0
DFS 6602.0 40289.0 41553.0
ESP 41139.0 46922.0 41542.0134497.0
FRA 5528.0 37427.0 36866.0 39216.0 39223.0
GBR 34844.0 11671.0 7546.0 37198.0 6019.0 37272.0
ITA 35843.0 10591.0 6472.0 37285.0 5060.0 35239.0 37308.0
NLD 4117.0 36612.0 36128.0 37937.0 34680.0 4382.0 3482.0 37942.0
HUN 2238.0 8233.0 7789.0 8721.0 7626.0 2381.0 2223.0 7668.0 8772.0
POL 4867.0 33963.0 33755.0 35538.0 32330.0 5324.0 4396.0 31846.0 7624.0 35597.0
CZE 2112.0 2603.0 1960.0 4023.0 1950.0 2012.0 2067.0 1728.0 1426.0 2555.0 4024.0

Number of bulls in reference population for ftp

CAN 41210.0
DEU 10703.0 46883.0
DFS 6602.0 40244.0 41508.0
ESP 41149.0 46879.0 41497.0140656.0
FRA 5529.0 37382.0 36820.0 39171.0 39178.0
GBR 34849.0 11673.0 7546.0 37522.0 6020.0 37596.0
ITA 35848.0 10593.0 6472.0 37291.0 5061.0 35244.0 37314.0
NLD 4120.0 36567.0 36083.0 38335.0 34634.0 4463.0 3483.0 38340.0
HUN 2241.0 8233.0 7789.0 8988.0 7625.0 2460.0 2224.0 7807.0 9039.0
POL 4867.0 33962.0 33754.0 35537.0 32329.0 5324.0 4396.0 31845.0 7623.0 35596.0
CZE 2112.0 2603.0 1960.0 4023.0 1950.0 2012.0 2067.0 1728.0 1426.0 2555.0 4024.0

Number of bulls in reference population for ftl

CAN 41179.0
DEU 10694.0 46899.0
DFS 6600.0 40279.0 41541.0
ESP 41118.0 46896.0 41531.0135860.0
FRA 5527.0 37423.0 36862.0 39211.0 39218.0
GBR 34833.0 11653.0 7538.0 37252.0 6015.0 37326.0
ITA 35832.0 10574.0 6465.0 37261.0 5056.0 35217.0 37284.0
NLD 4116.0 36600.0 36121.0 37947.0 34676.0 4378.0 3474.0 37952.0
HUN 2237.0 8229.0 7787.0 8781.0 7624.0 2402.0 2219.0 7679.0 8832.0
POL 4866.0 33956.0 33750.0 35530.0 32325.0 5318.0 4391.0 31840.0 7622.0 35589.0
CZE 2111.0 2602.0 1959.0 4021.0 1949.0 2010.0 2065.0 1727.0 1426.0 2554.0 4022.0

Number of bulls in reference population for rtp

CAN 38092.0
DEU 10697.0 44617.0
DFS 6596.0 38063.0 39240.0
ESP 38032.0 44613.0 39229.0113345.0
FRA 5523.0 35199.0 34659.0 36934.0 36941.0
GBR 32997.0 11667.0 7540.0 35663.0 6014.0 35736.0
ITA 33826.0 10588.0 6467.0 35265.0 5056.0 33401.0 35288.0
NLD 4096.0 34306.0 33851.0 35872.0 32403.0 4439.0 3459.0 35877.0
POL 4860.0 32472.0 32268.0 33919.0 30838.0 5318.0 4390.0 30305.0 33977.0
CZE 2107.0 2587.0 1945.0 3938.0 1935.0 2008.0 2062.0 1712.0 2480.0 3939.0

Number of bulls in reference population for ocs

AUS 3086.0
CAN 1237.0 41094.0
DEU 921.0 10632.0 46129.0
ESP 3085.0 41034.0 46125.0137424.0
FRA 793.0 5522.0 36751.0 38521.0 38528.0
GBR 1262.0 34753.0 11587.0 37400.0 6013.0 37474.0
ITA 1175.0 35752.0 10508.0 37170.0 5053.0 35131.0 37193.0
NLD 809.0 4110.0 35952.0 37707.0 34034.0 4442.0 3463.0 37712.0
HUN 767.0 2234.0 8227.0 8980.0 7625.0 2450.0 2214.0 7807.0 9031.0
POL 692.0 4855.0 33300.0 34869.0 31675.0 5310.0 4387.0 31200.0 7622.0 34928.0
CZE 414.0 2111.0 2600.0 4019.0 1947.0 2010.0 2065.0 1726.0 1426.0 2552.0 4020.0

Number of bulls in reference population for ous

CAN 41131.0
DEU 10642.0 46797.0
DFS 6583.0 40256.0 41511.0
ESP 41071.0 46794.0 41502.0139634.0
FRA 5524.0 37412.0 36858.0 39194.0 39201.0
GBR 34785.0 11596.0 7521.0 37427.0 6013.0 37500.0
ITA 35784.0 10517.0 6448.0 37201.0 5053.0 35162.0 37224.0

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NLD  4112.0 36586.0 36123.0 38345.0 34667.0  4444.0  3465.0 38350.0
HUN  2234.0  8227.0  7787.0  8980.0  7625.0  2450.0  2214.0  7807.0  9031.0
POL  4857.0 33940.0 33745.0 35510.0 32314.0  5310.0  4387.0 31831.0  7622.0 35569.0
CZE  2111.0  2602.0  1959.0  4021.0  1949.0  2010.0  2065.0  1727.0  1426.0  2554.0  4022.0

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Number of bulls in reference population for        ofl
----------------------------------------------------------
CAN 40983.0
DEU 10645.0 46160.0
DFS  6584.0 39665.0 40921.0
ESP 40923.0 46156.0 40911.0128313.0
FRA  5524.0 36772.0 36268.0 38543.0 38550.0
GBR 34662.0 11600.0  7523.0 36987.0  6014.0 37060.0
ITA 35662.0 10521.0  6450.0 37080.0  5054.0 35042.0 37103.0
NLD  4110.0 35973.0 35547.0 37266.0 34054.0  4364.0  3465.0 37271.0
HUN  2231.0  8226.0  7785.0  8712.0  7624.0  2372.0  2214.0  7666.0  8763.0
POL  4857.0 33321.0 33166.0 34891.0 31696.0  5311.0  4388.0 31221.0  7621.0 34950.0
CZE  2111.0  2600.0  1957.0  4019.0  1947.0  2010.0  2065.0  1726.0  1426.0  2552.0  4020.0

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Number of bulls in reference population for        loc
----------------------------------------------------------
CAN 36017.0
DEU 10580.0 42021.0
DFS  6533.0 35862.0 36987.0
ESP 35958.0 42017.0 36977.0102363.0
FRA  5475.0 33016.0 32515.0 34680.0 34687.0
GBR 33207.0 11538.0  7479.0 35508.0  5974.0 35581.0
ITA 33938.0 10455.0  6404.0 35329.0  5014.0 33588.0 35350.0
NLD  4075.0 32301.0 31882.0 33490.0 30430.0  4334.0  3439.0 33495.0
CZE  2102.0  2566.0  1925.0  3894.0  1916.0  2005.0  2055.0  1694.0  3895.0
HUN  2225.0  6512.0  6123.0  6984.0  5972.0  2362.0  2208.0  5948.0  1397.0  7033.0
POL  4813.0 29489.0 29323.0 30825.0 27911.0  5274.0  4350.0 27511.0  2440.0  5903.0 30848.0

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Number of bulls in reference population for        bcs
----------------------------------------------------------
DEU 38527.0
FRA 29709.0 31219.0
GBR 11339.0  5830.0 34013.0
ITA 10332.0  4956.0 31834.0 33740.0
NLD 28935.0 27172.0  4374.0  3423.0 30575.0
CZE  2557.0  1909.0  1992.0  2044.0  1691.0  3767.0
CAN 10470.0  5383.0 31517.0 32460.0  4015.0  2092.0 36158.0
ESP 38523.0 31212.0 33940.0 33720.0 30570.0  3766.0 36098.0101638.0
HUN  7304.0  6747.0  2441.0  2205.0  6877.0  1412.0  2225.0  8042.0  8091.0
POL 28188.0 26597.0  5163.0  4299.0 26179.0  2368.0  4713.0 29476.0  6706.0 29529.0
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