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, DFS, GBR, ITA, NLD, POL and HUN submitted GEBVs.

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

CHANGES IN NATIONAL PROCEDURES

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

CAN (HOL) Base change
CAN (HOL) Some bulls changed from official to unofficial due to change in qualification for publication
FRA (HOL) Base change
FRA (HOL) Some bulls changed from official to unofficial due to change in publication rules from breed societies
ITA (HOL) Base change
ESP (HOL) Base change
DEU (HOL) Base change
NLD (HOL) Base change
NLD (HOL) Drop in information due to introduction of DGV BLUP
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 2026

Country	Date
CAN	20260401
DEU	20260408
DFS	20260204
ESP	20260320
FRA	20260408
GBR	20260312
ITA	20260302
NLD	20260401
HUN	20260318
POL	20260310
CZE	20250317

Table 2.

Number of bulls in reference population for	sta										
CAN	42053.0										
DEU	11915.0	47581.0									
DFS	7121.0	40344.0	41362.0								
ESP	41403.0	47350.0	41131.0	140199.0							
FRA	5554.0	36650.0	36012.0	38320.0	38328.0						
GBR	35573.0	13002.0	8175.0	37932.0	6062.0	38473.0					
ITA	36598.0	11955.0	7110.0	37609.0	5093.0	36069.0	38210.0				
NLD	4123.0	35730.0	35166.0	37490.0	33806.0	4470.0	3486.0	37493.0			
HUN	2243.0	8248.0	7804.0	8992.0	7628.0	2464.0	2226.0	7808.0	9043.0		
POL	4875.0	33119.0	32860.0	34700.0	31501.0	5375.0	4401.0	30955.0	7625.0	34715.0	
CZE	2322.0	2806.0	2072.0	4204.0	1956.0	2277.0	2276.0	1729.0	1431.0	2558.0	4255.0

Number of bulls in reference population for	cwi										
CAN	42052.0										
DEU	11917.0	46365.0									
DFS	7122.0	39246.0	40258.0								
ESP	41402.0	46134.0	40027.0	134936.0							
FRA	5554.0	35459.0	34931.0	37116.0	37124.0						
GBR	35572.0	13005.0	8177.0	37932.0	6062.0	38473.0					
ITA	36597.0	11958.0	7112.0	37608.0	5093.0	36069.0	38209.0				
NLD	4123.0	34539.0	34080.0	36297.0	32641.0	4470.0	3486.0	36300.0			
HUN	2243.0	7711.0	7313.0	8453.0	7117.0	2464.0	2226.0	7269.0	8503.0		
POL	4875.0	31966.0	31813.0	33544.0	30374.0	5375.0	4401.0	29809.0	7085.0	33558.0	
CZE	2322.0	2803.0	2069.0	4201.0	1953.0	2277.0	2276.0	1727.0	1430.0	2555.0	4252.0

Number of bulls in reference population for	bde										
CAN	42053.0										
DEU	11915.0	47022.0									
DFS	7121.0	39832.0	40846.0								
ESP	41403.0	46791.0	40615.0	138086.0							
FRA	5554.0	36118.0	35519.0	37787.0	37795.0						
GBR	35573.0	13002.0	8175.0	37932.0	6062.0	38473.0					
ITA	36598.0	11955.0	7110.0	37609.0	5093.0	36069.0	38210.0				
NLD	4123.0	35171.0	34652.0	36929.0	33273.0	4470.0	3486.0	36932.0			
HUN	2243.0	7736.0	7337.0	8478.0	7142.0	2464.0	2226.0	7294.0	8528.0		
POL	4875.0	32606.0	32392.0	34185.0	31014.0	5375.0	4401.0	30440.0	7110.0	34199.0	
CZE	2322.0	2805.0	2071.0	4203.0	1955.0	2277.0	2276.0	1728.0	1430.0	2557.0	4254.0

Number of bulls in reference population for	ang										
CAN	41104.0										
DEU	11448.0	28308.0									
DFS	6670.0	22203.0	23133.0								
ESP	40455.0	28078.0	22903.0	96660.0							
FRA	5123.0	19706.0	19291.0	21340.0	21348.0						
GBR	35133.0	12425.0	7611.0	36969.0	5519.0	37510.0					
ITA	36076.0	11639.0	6805.0	37045.0	4803.0	35709.0	37646.0				
NLD	3671.0	17470.0	17154.0	18747.0	16933.0	3836.0	3183.0	18750.0			
HUN	2220.0	5035.0	4683.0	5490.0	4512.0	2361.0	2209.0	4451.0	5518.0		
POL	4429.0	19395.0	19362.0	20941.0	18927.0	4815.0	4100.0	17335.0	4446.0	20955.0	
CZE	2306.0	2729.0	2005.0	4109.0	1889.0	2264.0	2261.0	1661.0	1387.0	2486.0	4160.0

Number of bulls in reference population for	ran										
CAN	42051.0										
DEU	11913.0	47483.0									
DFS	7120.0	40247.0	41265.0								
ESP	41401.0	47252.0	41034.0	139929.0							

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FRA  5553.0 36554.0 35917.0 38224.0 38232.0
GBR 35571.0 13000.0  8174.0 37930.0  6061.0 38471.0
ITA 36596.0 11953.0  7109.0 37607.0  5092.0 36067.0 38208.0
NLD  4122.0 35634.0 35070.0 37394.0 33711.0  4469.0  3485.0 37397.0
HUN  2243.0  8248.0  7804.0  8992.0  7628.0  2464.0  2226.0  7808.0  9043.0
POL  4875.0 33116.0 32857.0 34697.0 31498.0  5375.0  4401.0 30952.0  7625.0 34712.0
CZE  2322.0  2806.0  2072.0  4204.0  1956.0  2277.0  2276.0  1729.0  1431.0  2558.0  4255.0

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Number of bulls in reference population for        rwi
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CAN 41231.0
DEU 11915.0 47526.0
DFS  7121.0 40293.0 41311.0
ESP 40581.0 47295.0 41080.0137876.0
FRA  5554.0 36595.0 35961.0 38265.0 38273.0
GBR 35573.0 13002.0  8175.0 37932.0  6062.0 38473.0
ITA 36598.0 11955.0  7110.0 37609.0  5093.0 36069.0 38210.0
NLD  4123.0 35675.0 35115.0 37435.0 33751.0  4470.0  3486.0 37438.0
HUN  2243.0  8239.0  7799.0  8983.0  7619.0  2464.0  2226.0  7799.0  9034.0
POL  4875.0 33109.0 32854.0 34690.0 31491.0  5375.0  4401.0 30945.0  7616.0 34705.0
CZE  2322.0  2806.0  2072.0  4204.0  1956.0  2277.0  2276.0  1729.0  1431.0  2558.0  4255.0

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Number of bulls in reference population for        rls
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CAN 42054.0
DEU 11916.0 47583.0
DFS  7121.0 40345.0 41363.0
ESP 41404.0 47352.0 41132.0140172.0
FRA  5554.0 36651.0 36013.0 38321.0 38329.0
GBR 35574.0 13003.0  8175.0 37933.0  6062.0 38474.0
ITA 36599.0 11956.0  7110.0 37610.0  5093.0 36070.0 38211.0
NLD  4124.0 35732.0 35167.0 37492.0 33807.0  4471.0  3487.0 37495.0
HUN  2243.0  8248.0  7804.0  8992.0  7628.0  2464.0  2226.0  7808.0  9043.0
POL  4875.0 33119.0 32860.0 34700.0 31501.0  5375.0  4401.0 30955.0  7625.0 34715.0
CZE  2322.0  2806.0  2072.0  4204.0  1956.0  2277.0  2276.0  1729.0  1431.0  2558.0  4255.0

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Number of bulls in reference population for        rlr
---------------------------------------------------------
CAN 41129.0
DEU 11910.0 45470.0
DFS  7114.0 38401.0 39411.0
ESP 40479.0 45239.0 39180.0121061.0
FRA  5546.0 34575.0 34095.0 36175.0 36183.0
GBR 34742.0 12995.0  8166.0 36767.0  6052.0 37308.0
ITA 35769.0 11950.0  7103.0 36777.0  5085.0 35240.0 37378.0
NLD  4113.0 33674.0 33247.0 34986.0 31786.0  4381.0  3478.0 34989.0
HUN  2239.0  7354.0  6968.0  7829.0  6771.0  2384.0  2224.0  6773.0  7878.0
POL  4866.0 31099.0 30976.0 32623.0 29516.0  5364.0  4392.0 28946.0  6729.0 32637.0
CZE  2321.0  2794.0  2060.0  4113.0  1945.0  2275.0  2275.0  1718.0  1424.0  2496.0  4164.0

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Number of bulls in reference population for        fan
---------------------------------------------------------
CAN 42019.0
DEU 11915.0 45425.0
DFS  7120.0 38544.0 39543.0
ESP 41369.0 45194.0 39312.0124609.0
FRA  5552.0 34827.0 34268.0 36491.0 36499.0
GBR 35547.0 13003.0  8175.0 37577.0  6060.0 38118.0
ITA 36569.0 11956.0  7110.0 37579.0  5091.0 36044.0 38180.0
NLD  4119.0 33850.0 33373.0 35160.0 31992.0  4389.0  3484.0 35163.0
HUN  2241.0  7558.0  7168.0  8034.0  6975.0  2387.0  2226.0  6977.0  8083.0
POL  4873.0 31290.0 31118.0 32866.0 29738.0  5373.0  4399.0 29132.0  6935.0 32880.0
CZE  2321.0  2803.0  2070.0  4200.0  1954.0  2277.0  2275.0  1727.0  1429.0  2556.0  4251.0

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Number of bulls in reference population for hde

Number of bulls in reference population for fua

CAN 42055.0
DEU 11917.0 46766.0
DFS 7122.0 39626.0 40639.0
ESP 41405.0 46535.0 40408.0137053.0
FRA 5554.0 35860.0 35311.0 37524.0 37532.0
GBR 35575.0 13005.0 8177.0 37935.0 6062.0 38476.0
ITA 36600.0 11958.0 7112.0 37612.0 5093.0 36072.0 38213.0
NLD 4123.0 34931.0 34455.0 36689.0 33033.0 4470.0 3486.0 36692.0
HUN 2243.0 7713.0 7315.0 8455.0 7119.0 2464.0 2226.0 7271.0 8505.0
POL 4875.0 32316.0 32145.0 33895.0 30724.0 5375.0 4401.0 30155.0 7087.0 33909.0
CZE 2322.0 2805.0 2071.0 4203.0 1955.0 2277.0 2276.0 1728.0 1430.0 2557.0 4254.0

Number of bulls in reference population for ruh

CAN 42053.0
DEU 11916.0 46451.0
DFS 7122.0 39319.0 40310.0
ESP 41403.0 46220.0 40079.0135631.0
FRA 5554.0 35553.0 35011.0 37219.0 37227.0
GBR 35573.0 13003.0 8176.0 37930.0 6062.0 38471.0
ITA 36598.0 11956.0 7111.0 37609.0 5093.0 36069.0 38210.0
NLD 4123.0 34608.0 34144.0 36365.0 32716.0 4470.0 3486.0 36368.0
HUN 2243.0 7725.0 7326.0 8467.0 7131.0 2464.0 2226.0 7283.0 8517.0
POL 4875.0 32452.0 32266.0 34031.0 30860.0 5375.0 4401.0 30290.0 7102.0 34045.0
CZE 2322.0 2805.0 2071.0 4203.0 1955.0 2277.0 2276.0 1728.0 1430.0 2557.0 4254.0

Number of bulls in reference population for ruw

Number of bulls in reference population for usu

CAN 42057.0
DEU 11918.0 47587.0
DFS 7123.0 40349.0 41367.0
ESP 41407.0 47356.0 41136.0140151.0
FRA 5554.0 36652.0 36014.0 38322.0 38330.0
GBR 35577.0 13007.0 8179.0 37938.0 6063.0 38479.0
ITA 36602.0 11960.0 7114.0 37615.0 5094.0 36075.0 38216.0
NLD 4124.0 35733.0 35168.0 37493.0 33808.0 4472.0 3488.0 37496.0
HUN 2243.0 8248.0 7804.0 8992.0 7628.0 2464.0 2226.0 7808.0 9043.0
POL 4875.0 33120.0 32861.0 34701.0 31502.0 5376.0 4402.0 30956.0 7625.0 34716.0
CZE 2322.0 2806.0 2072.0 4204.0 1956.0 2277.0 2276.0 1729.0 1431.0 2558.0 4255.0

Number of bulls in reference population for ude

CAN 42069.0
DEU 11927.0 47616.0
DFS 7127.0 40356.0 41375.0
ESP 41409.0 47376.0 41140.0133828.0
FRA 5554.0 36651.0 36012.0 38321.0 38329.0
GBR 35591.0 13026.0 8186.0 37623.0 6063.0 38178.0
ITA 36617.0 11978.0 7120.0 37629.0 5094.0 36100.0 38242.0
NLD 4121.0 35738.0 35169.0 37059.0 33807.0 4398.0 3491.0 37062.0
HUN 2241.0 8250.0 7804.0 8727.0 7629.0 2389.0 2228.0 7669.0 8778.0
POL 4876.0 33124.0 32863.0 34705.0 31502.0 5380.0 4405.0 30958.0 7626.0 34720.0
CZE 2326.0 2808.0 2073.0 4207.0 1956.0 2281.0 2280.0 1729.0 1431.0 2559.0 4259.0

Number of bulls in reference population for ftp

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CAN 42079.0
DEU 11929.0 47573.0
DFS  7128.0 40312.0 41332.0
ESP 41419.0 47333.0 41097.0139989.0
FRA  5554.0 36605.0 35966.0 38275.0 38283.0
GBR 35596.0 13028.0  8187.0 37958.0  6063.0 38513.0
ITA 36622.0 11980.0  7121.0 37635.0  5094.0 36105.0 38248.0
NLD  4124.0 35693.0 35124.0 37457.0 33761.0  4478.0  3492.0 37460.0
HUN  2244.0  8250.0  7804.0  8994.0  7628.0  2467.0  2229.0  7808.0  9045.0
POL  4876.0 33123.0 32862.0 34704.0 31501.0  5380.0  4405.0 30957.0  7625.0 34719.0
CZE  2326.0  2808.0  2073.0  4207.0  1956.0  2281.0  2280.0  1729.0  1431.0  2559.0  4259.0

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Number of bulls in reference population for        ftl
-------------------------------------------------------
CAN 42038.0
DEU 11916.0 47580.0
DFS  7121.0 40342.0 41360.0
ESP 41388.0 47349.0 41129.0135206.0
FRA  5554.0 36649.0 36011.0 38319.0 38327.0
GBR 35571.0 13003.0  8175.0 37689.0  6062.0 38230.0
ITA 36596.0 11956.0  7110.0 37606.0  5093.0 36067.0 38207.0
NLD  4121.0 35728.0 35164.0 37071.0 33805.0  4395.0  3485.0 37074.0
HUN  2241.0  8247.0  7803.0  8788.0  7628.0  2410.0  2225.0  7681.0  8839.0
POL  4875.0 33118.0 32859.0 34699.0 31500.0  5375.0  4401.0 30954.0  7625.0 34714.0
CZE  2322.0  2806.0  2072.0  4204.0  1956.0  2277.0  2276.0  1729.0  1431.0  2558.0  4255.0

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Number of bulls in reference population for        rtp
-------------------------------------------------------
CAN 38959.0
DEU 11922.0 45304.0
DFS  7121.0 38182.0 39116.0
ESP 38300.0 45064.0 38881.0112895.0
FRA  5548.0 34421.0 33852.0 36037.0 36045.0
GBR 33741.0 13021.0  8180.0 36100.0  6057.0 36655.0
ITA 34597.0 11974.0  7115.0 35606.0  5089.0 34259.0 36219.0
NLD  4100.0 33431.0 32944.0 34992.0 31529.0  4454.0  3468.0 34995.0
POL  4869.0 31633.0 31416.0 33086.0 30010.0  5373.0  4399.0 29416.0 33099.0
CZE  2321.0  2792.0  2058.0  4122.0  1941.0  2276.0  2275.0  1713.0  2484.0  4174.0

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Number of bulls in reference population for        ocs
-------------------------------------------------------
AUS  3083.0
CAN  1238.0 41937.0
DEU   924.0 11855.0 46810.0
ESP  3082.0 41299.0 46580.0136756.0
FRA   789.0  5547.0 35977.0 37628.0 37636.0
GBR  1241.0 35483.0 12937.0 37833.0  6058.0 38366.0
ITA  1179.0 36503.0 11890.0 37508.0  5088.0 35967.0 38094.0
NLD   804.0  4115.0 35081.0 36832.0 33164.0  4459.0  3474.0 36835.0
HUN   767.0  2238.0  8245.0  8987.0  7629.0  2458.0  2220.0  7809.0  9038.0
POL   687.0  4864.0 32463.0 34038.0 30850.0  5366.0  4396.0 30315.0  7625.0 34053.0
CZE   416.0  2322.0  2804.0  4202.0  1954.0  2277.0  2276.0  1728.0  1431.0  2556.0  4253.0

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Number of bulls in reference population for        ous
-------------------------------------------------------
CAN 41978.0
DEU 11867.0 47480.0
DFS  7102.0 40321.0 41326.0
ESP 41340.0 47250.0 41099.0139106.0
FRA  5549.0 36637.0 36006.0 38300.0 38308.0
GBR 35518.0 12948.0  8156.0 37867.0  6059.0 38400.0
ITA 36538.0 11901.0  7090.0 37545.0  5089.0 36003.0 38131.0
NLD  4117.0 35714.0 35166.0 37469.0 33796.0  4461.0  3476.0 37472.0
HUN  2238.0  8245.0  7804.0  8987.0  7629.0  2458.0  2220.0  7809.0  9038.0
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POL  4866.0 33102.0 32854.0 34679.0 31489.0  5367.0  4397.0 30945.0  7625.0 34694.0
CZE  2322.0  2806.0  2072.0  4204.0  1956.0  2277.0  2276.0  1729.0  1431.0  2558.0  4255.0

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Number of bulls in reference population for        ofl
-------------------------------------------------------
CAN 41830.0
DEU 11869.0 46841.0
DFS  7102.0 39751.0 40754.0
ESP 41192.0 46611.0 40527.0127779.0
FRA  5549.0 35998.0 35437.0 37650.0 37658.0
GBR 35395.0 12950.0  8156.0 37414.0  6059.0 37947.0
ITA 36416.0 11903.0  7090.0 37421.0  5089.0 35881.0 38007.0
NLD  4115.0 35102.0 34612.0 36391.0 33184.0  4382.0  3476.0 36394.0
HUN  2236.0  8243.0  7802.0  8719.0  7628.0  2381.0  2220.0  7668.0  8770.0
POL  4866.0 32484.0 32296.0 34060.0 30871.0  5367.0  4397.0 30336.0  7624.0 34075.0
CZE  2322.0  2804.0  2070.0  4202.0  1954.0  2277.0  2276.0  1728.0  1431.0  2556.0  4253.0

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Number of bulls in reference population for        loc
-------------------------------------------------------
CAN 37112.0
DEU 11791.0 42671.0
DFS  7049.0 35974.0 36815.0
ESP 36525.0 42444.0 36602.0102204.0
FRA  5495.0 32211.0 31685.0 33740.0 33748.0
GBR 34254.0 12876.0  8108.0 36254.0  6013.0 36784.0
ITA 34984.0 11826.0  7044.0 35969.0  5043.0 34739.0 36552.0
NLD  4076.0 31420.0 30991.0 32604.0 29550.0  4348.0  3446.0 32607.0
CZE  2311.0  2769.0  2038.0  4076.0  1923.0  2268.0  2264.0  1696.0  4126.0
HUN  2230.0  6530.0  6169.0  6992.0  5976.0  2372.0  2215.0  5950.0  1402.0  7041.0
POL  4818.0 28627.0 28464.0 29955.0 27044.0  5323.0  4354.0 26618.0  2444.0  5906.0 29960.0

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Number of bulls in reference population for        bcs
-------------------------------------------------------
DEU 36248.0
FRA 26226.0 27612.0
GBR 12616.0  5871.0 34918.0
ITA 11635.0  4991.0 32669.0 34619.0
NLD 25188.0 23589.0  4383.0  3429.0 26823.0
CZE  2754.0  1915.0  2249.0  2249.0  1692.0  3992.0
CAN 11690.0  5410.0 32286.0 33227.0  4018.0  2301.0 37022.0
ESP 36028.0 27604.0 34393.0 34045.0 26820.0  3941.0 36385.0 97583.0
HUN  7283.0  6715.0  2446.0  2210.0  6839.0  1416.0  2228.0  8009.0  8058.0
POL 27041.0 25459.0  5214.0  4310.0 24979.0  2371.0  4726.0 28327.0  6704.0 28339.0
```