

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, DFS, ESP, FRA, GBR, HUN, ITA, NLD, POL submitted GEBVs.

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

CHANGES IN NATIONAL PROCEDURES

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

FRA (HOL)	Drop in reliability due to pedigree updates
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 August 2026

Country	Date

CAN	20260801
DEU	20260811
DFS	20260811
ESP	20260721
FRA	20260812
GBR	20260714
ITA	20260720
NLD	20260812
HUN	20260722
POL	20260610
CZE	20250317
=====	

Table 2.

Number of bulls in reference population for sta

CAN	42435.0
DEU	12282.0 48025.0
DFS	7339.0 40569.0 41598.0
ESP	41746.0 47787.0 41518.0140653.0

FRA	5558.0	36664.0	35997.0	38341.0	38345.0						
GBR	35873.0	13368.0	8390.0	38251.0	6063.0	38813.0					
ITA	36942.0	12352.0	7344.0	38000.0	5095.0	36394.0	38589.0				
NLD	4123.0	35739.0	35142.0	37497.0	33815.0	4469.0	3486.0	37500.0			
HUN	2243.0	8249.0	7803.0	8993.0	7628.0	2466.0	2227.0	7808.0	9043.0		
POL	4883.0	33124.0	32829.0	34712.0	31507.0	5378.0	4406.0	30955.0	7625.0	34717.0	
CZE	2393.0	2872.0	2115.0	4277.0	1957.0	2342.0	2344.0	1729.0	1432.0	2560.0	4324.0

Number of bulls in reference population for cwi

CAN	42435.0										
DEU	12284.0	46807.0									
DFS	7340.0	39476.0	40499.0								
ESP	41746.0	46569.0	40419.0	135388.0							
FRA	5558.0	35471.0	34921.0	37135.0	37139.0						
GBR	35873.0	13371.0	8392.0	38252.0	6063.0	38814.0					
ITA	36942.0	12355.0	7346.0	38000.0	5095.0	36395.0	38589.0				
NLD	4123.0	34546.0	34061.0	36302.0	32648.0	4469.0	3486.0	36305.0			
HUN	2243.0	7712.0	7314.0	8454.0	7117.0	2466.0	2227.0	7269.0	8503.0		
POL	4883.0	31969.0	31787.0	33554.0	30378.0	5378.0	4406.0	29807.0	7085.0	33558.0	
CZE	2393.0	2869.0	2112.0	4274.0	1954.0	2342.0	2344.0	1727.0	1431.0	2557.0	4321.0

Number of bulls in reference population for bde

CAN	42433.0										
DEU	12282.0	46947.0									
DFS	7339.0	39606.0	40631.0								
ESP	41744.0	46709.0	40551.0	136404.0							
FRA	5558.0	35613.0	35053.0	37279.0	37283.0						
GBR	35871.0	13368.0	8390.0	38249.0	6063.0	38811.0					
ITA	36940.0	12352.0	7344.0	37997.0	5095.0	36392.0	38586.0				
NLD	4123.0	34686.0	34192.0	36442.0	32788.0	4469.0	3486.0	36445.0			
HUN	2243.0	7722.0	7323.0	8464.0	7127.0	2466.0	2227.0	7279.0	8513.0		
POL	4883.0	32111.0	31920.0	33696.0	30520.0	5378.0	4406.0	29948.0	7095.0	33700.0	
CZE	2393.0	2870.0	2113.0	4275.0	1955.0	2342.0	2344.0	1727.0	1431.0	2558.0	4322.0

Number of bulls in reference population for ang

CAN	41489.0										
DEU	11818.0	28747.0									
DFS	6890.0	22432.0	23373.0								
ESP	40801.0	28509.0	23293.0	97096.0							
FRA	5128.0	19710.0	19277.0	21351.0	21355.0						
GBR	35434.0	12793.0	7827.0	37286.0	5521.0	37848.0					
ITA	36422.0	12038.0	7040.0	37438.0	4806.0	36035.0	38027.0				
NLD	3671.0	17468.0	17129.0	18743.0	16931.0	3835.0	3183.0	18746.0			
HUN	2220.0	5036.0	4686.0	5491.0	4512.0	2362.0	2210.0	4451.0	5518.0		
POL	4437.0	19399.0	19338.0	20952.0	18931.0	4819.0	4105.0	17333.0	4446.0	20956.0	
CZE	2378.0	2796.0	2048.0	4183.0	1890.0	2330.0	2330.0	1661.0	1388.0	2488.0	4230.0

Number of bulls in reference population for ran

CAN	42433.0										
DEU	12280.0	47927.0									
DFS	7338.0	40472.0	41501.0								
ESP	41744.0	47689.0	41421.0	140383.0							
FRA	5557.0	36568.0	35902.0	38245.0	38249.0						
GBR	35871.0	13366.0	8389.0	38249.0	6062.0	38811.0					
ITA	36940.0	12350.0	7343.0	37998.0	5094.0	36392.0	38587.0				
NLD	4122.0	35643.0	35046.0	37401.0	33720.0	4468.0	3485.0	37404.0			
HUN	2243.0	8249.0	7803.0	8993.0	7628.0	2466.0	2227.0	7808.0	9043.0		
POL	4883.0	33121.0	32826.0	34709.0	31504.0	5378.0	4406.0	30952.0	7625.0	34714.0	
CZE	2393.0	2872.0	2115.0	4277.0	1957.0	2342.0	2344.0	1729.0	1432.0	2560.0	4324.0

Number of bulls in reference population for											rwi

CAN	41611.0										
DEU	12282.0	47465.0									
DFS	7339.0	40079.0	41108.0								
ESP	40922.0	47227.0	41028.0	136208.0							
FRA	5558.0	36104.0	35507.0	37771.0	37775.0						
GBR	35871.0	13368.0	8390.0	38249.0	6063.0	38811.0					
ITA	36940.0	12352.0	7344.0	37997.0	5095.0	36392.0	38586.0				
NLD	4123.0	35204.0	34667.0	36962.0	33280.0	4469.0	3486.0	36965.0			
HUN	2243.0	8240.0	7798.0	8984.0	7619.0	2466.0	2227.0	7799.0	9034.0		
POL	4883.0	32628.0	32394.0	34215.0	31011.0	5378.0	4406.0	30467.0	7616.0	34220.0	
CZE	2393.0	2871.0	2114.0	4276.0	1956.0	2342.0	2344.0	1728.0	1432.0	2559.0	4323.0

Number of bulls in reference population for											rls

CAN	42437.0										
DEU	12283.0	48027.0									
DFS	7339.0	40570.0	41599.0								
ESP	41748.0	47789.0	41519.0	140627.0							
FRA	5558.0	36665.0	35998.0	38342.0	38346.0						
GBR	35875.0	13369.0	8390.0	38253.0	6063.0	38815.0					
ITA	36944.0	12353.0	7344.0	38002.0	5095.0	36396.0	38591.0				
NLD	4124.0	35741.0	35143.0	37499.0	33816.0	4470.0	3487.0	37502.0			
HUN	2243.0	8249.0	7803.0	8993.0	7628.0	2466.0	2227.0	7808.0	9043.0		
POL	4883.0	33124.0	32829.0	34712.0	31507.0	5378.0	4406.0	30955.0	7625.0	34717.0	
CZE	2393.0	2872.0	2115.0	4277.0	1957.0	2342.0	2344.0	1729.0	1432.0	2560.0	4324.0

Number of bulls in reference population for											rlr

CAN	41511.0										
DEU	12277.0	45914.0									
DFS	7332.0	38630.0	39651.0								
ESP	40822.0	45676.0	39571.0	121515.0							
FRA	5550.0	34589.0	34084.0	36196.0	36200.0						
GBR	35042.0	13361.0	8381.0	37082.0	6053.0	37644.0					
ITA	36113.0	12347.0	7337.0	37168.0	5087.0	35565.0	37757.0				
NLD	4113.0	33683.0	33227.0	34993.0	31795.0	4379.0	3478.0	34996.0			
HUN	2239.0	7355.0	6967.0	7830.0	6771.0	2385.0	2225.0	6773.0	7878.0		
POL	4874.0	31104.0	30950.0	32635.0	29522.0	5367.0	4397.0	28946.0	6729.0	32639.0	
CZE	2392.0	2860.0	2103.0	4186.0	1946.0	2340.0	2343.0	1718.0	1425.0	2498.0	4233.0

Number of bulls in reference population for											fan

CAN	42397.0										
DEU	12282.0	44883.0									
DFS	7338.0	37854.0	38863.0								
ESP	41708.0	44645.0	38783.0	120156.0							
FRA	5556.0	33855.0	33338.0	35461.0	35465.0						
GBR	35843.0	13368.0	8389.0	37887.0	6060.0	38449.0					
ITA	36909.0	12353.0	7344.0	37965.0	5093.0	36365.0	38554.0				
NLD	4119.0	32917.0	32453.0	34225.0	31059.0	4386.0	3484.0	34228.0			
HUN	2241.0	7534.0	7144.0	8009.0	6950.0	2388.0	2227.0	6952.0	8057.0		
POL	4881.0	30344.0	30183.0	31926.0	28793.0	5375.0	4404.0	28191.0	6910.0	31930.0	
CZE	2392.0	2864.0	2108.0	4265.0	1950.0	2341.0	2343.0	1723.0	1429.0	2553.0	4312.0

Number of bulls in reference population for											hde

Number of bulls in reference population for											fua

CAN	42432.0										
DEU	12279.0	47198.0									
DFS	7336.0	39853.0	40877.0								

ESP 41745.0 46966.0 40797.0137501.0
FRA 5558.0 35874.0 35303.0 37545.0 37549.0
GBR 35871.0 13366.0 8388.0 38251.0 6063.0 38811.0
ITA 36940.0 12350.0 7342.0 38000.0 5095.0 36392.0 38587.0
NLD 4123.0 34940.0 34438.0 36696.0 33042.0 4469.0 3486.0 36699.0
HUN 2243.0 7714.0 7316.0 8456.0 7119.0 2466.0 2227.0 7271.0 8505.0
POL 4883.0 32321.0 32121.0 33907.0 30730.0 5378.0 4406.0 30155.0 7087.0 33911.0
CZE 2393.0 2871.0 2114.0 4276.0 1956.0 2342.0 2344.0 1728.0 1431.0 2559.0 4323.0

Number of bulls in reference population for ruh

CAN 42430.0
DEU 12278.0 46882.0
DFS 7336.0 39546.0 40548.0
ESP 41743.0 46650.0 40468.0136078.0
FRA 5558.0 35566.0 35003.0 37239.0 37243.0
GBR 35869.0 13364.0 8387.0 38246.0 6063.0 38806.0
ITA 36938.0 12348.0 7341.0 37997.0 5095.0 36389.0 38584.0
NLD 4123.0 34616.0 34127.0 36371.0 32724.0 4469.0 3486.0 36374.0
HUN 2243.0 7726.0 7327.0 8468.0 7131.0 2466.0 2227.0 7283.0 8517.0
POL 4883.0 32456.0 32240.0 34042.0 30865.0 5378.0 4406.0 30289.0 7102.0 34046.0
CZE 2393.0 2871.0 2114.0 4276.0 1956.0 2342.0 2344.0 1728.0 1431.0 2559.0 4323.0

Number of bulls in reference population for ruw

Number of bulls in reference population for usu

CAN 42434.0
DEU 12280.0 48019.0
DFS 7337.0 40569.0 41598.0
ESP 41747.0 47787.0 41518.0140599.0
FRA 5558.0 36666.0 35999.0 38343.0 38347.0
GBR 35873.0 13368.0 8390.0 38254.0 6064.0 38814.0
ITA 36942.0 12352.0 7344.0 38003.0 5096.0 36395.0 38590.0
NLD 4124.0 35742.0 35144.0 37500.0 33817.0 4471.0 3488.0 37503.0
HUN 2243.0 8249.0 7803.0 8993.0 7628.0 2466.0 2227.0 7808.0 9043.0
POL 4883.0 33125.0 32830.0 34713.0 31508.0 5379.0 4407.0 30956.0 7625.0 34718.0
CZE 2393.0 2872.0 2115.0 4277.0 1957.0 2342.0 2344.0 1729.0 1432.0 2560.0 4324.0

Number of bulls in reference population for ude

CAN 42449.0
DEU 12292.0 48052.0
DFS 7342.0 40578.0 41607.0
ESP 41753.0 47813.0 41527.0134281.0
FRA 5558.0 36665.0 35997.0 38342.0 38346.0
GBR 35889.0 13389.0 8398.0 37938.0 6064.0 38512.0
ITA 36960.0 12372.0 7351.0 38021.0 5096.0 36423.0 38620.0
NLD 4121.0 35747.0 35145.0 37066.0 33816.0 4396.0 3491.0 37069.0
HUN 2241.0 8251.0 7803.0 8728.0 7629.0 2390.0 2229.0 7669.0 8778.0
POL 4884.0 33129.0 32832.0 34717.0 31508.0 5383.0 4410.0 30958.0 7626.0 34722.0
CZE 2395.0 2873.0 2116.0 4279.0 1957.0 2344.0 2346.0 1729.0 1432.0 2561.0 4326.0

Number of bulls in reference population for ftp

CAN 42460.0
DEU 12294.0 48009.0
DFS 7343.0 40534.0 41564.0
ESP 41764.0 47770.0 41484.0140443.0
FRA 5558.0 36619.0 35951.0 38296.0 38300.0
GBR 35895.0 13391.0 8399.0 38278.0 6064.0 38852.0
ITA 36966.0 12374.0 7352.0 38028.0 5096.0 36429.0 38627.0
NLD 4124.0 35702.0 35100.0 37464.0 33770.0 4477.0 3492.0 37467.0

HUN	2244.0	8251.0	7803.0	8995.0	7628.0	2469.0	2230.0	7808.0	9045.0		
POL	4884.0	33128.0	32831.0	34716.0	31507.0	5383.0	4410.0	30957.0	7625.0	34721.0	
CZE	2395.0	2873.0	2116.0	4279.0	1957.0	2344.0	2346.0	1729.0	1432.0	2561.0	4326.0

Number of bulls in reference population for ftl

CAN	42415.0										
DEU	12278.0	48012.0									
DFS	7335.0	40562.0	41591.0								
ESP	41728.0	47780.0	41511.0	135654.0							
FRA	5558.0	36663.0	35996.0	38340.0	38344.0						
GBR	35867.0	13364.0	8386.0	38005.0	6063.0	38565.0					
ITA	36936.0	12348.0	7340.0	37994.0	5095.0	36387.0	38581.0				
NLD	4121.0	35737.0	35140.0	37078.0	33814.0	4394.0	3485.0	37081.0			
HUN	2241.0	8248.0	7802.0	8789.0	7628.0	2412.0	2226.0	7681.0	8839.0		
POL	4883.0	33123.0	32828.0	34711.0	31506.0	5378.0	4406.0	30954.0	7625.0	34716.0	
CZE	2393.0	2872.0	2115.0	4277.0	1957.0	2342.0	2344.0	1729.0	1432.0	2560.0	4324.0

Number of bulls in reference population for rtp

CAN	39339.0										
DEU	12287.0	45740.0									
DFS	7336.0	38414.0	39358.0								
ESP	38644.0	45501.0	39278.0	113348.0							
FRA	5552.0	34435.0	33845.0	36057.0	36061.0						
GBR	34041.0	13384.0	8392.0	36421.0	6058.0	36995.0					
ITA	34941.0	12368.0	7346.0	35999.0	5091.0	34584.0	36598.0				
NLD	4100.0	33440.0	32929.0	34999.0	31538.0	4453.0	3468.0	35002.0			
POL	4877.0	31638.0	31394.0	33097.0	30015.0	5376.0	4404.0	29416.0	33101.0		
CZE	2390.0	2857.0	2101.0	4194.0	1942.0	2339.0	2341.0	1713.0	2486.0	4241.0	

Number of bulls in reference population for ocs

AUS	3082.0										
CAN	1238.0	42318.0									
DEU	924.0	12221.0	47252.0								
ESP	3081.0	41644.0	47016.0	137210.0							
FRA	789.0	5551.0	35990.0	37648.0	37652.0						
GBR	1241.0	35786.0	13304.0	38156.0	6059.0	38710.0					
ITA	1179.0	36845.0	12286.0	37900.0	5090.0	36295.0	38470.0				
NLD	804.0	4115.0	35089.0	36838.0	33172.0	4458.0	3474.0	36841.0			
HUN	767.0	2238.0	8246.0	8988.0	7629.0	2460.0	2221.0	7809.0	9038.0		
POL	687.0	4872.0	32467.0	34049.0	30855.0	5369.0	4401.0	30314.0	7625.0	34054.0	
CZE	416.0	2392.0	2870.0	4275.0	1955.0	2341.0	2343.0	1728.0	1432.0	2558.0	4321.0

Number of bulls in reference population for ous

CAN	42352.0										
DEU	12228.0	47911.0									
DFS	7314.0	40541.0	41555.0								
ESP	41680.0	47681.0	41480.0	139554.0							
FRA	5553.0	36651.0	35991.0	38321.0	38325.0						
GBR	35816.0	13310.0	8367.0	38186.0	6060.0	38738.0					
ITA	36875.0	12292.0	7318.0	37933.0	5091.0	36325.0	38501.0				
NLD	4117.0	35723.0	35142.0	37476.0	33805.0	4460.0	3476.0	37479.0			
HUN	2238.0	8246.0	7803.0	8988.0	7629.0	2460.0	2221.0	7809.0	9038.0		
POL	4874.0	33107.0	32823.0	34691.0	31495.0	5370.0	4402.0	30945.0	7625.0	34696.0	
CZE	2392.0	2872.0	2115.0	4277.0	1957.0	2341.0	2343.0	1729.0	1432.0	2560.0	4323.0

Number of bulls in reference population for ofl

CAN	42208.0										
DEU	12235.0	47282.0									
DFS	7318.0	39979.0	40991.0								

ESP 41534.0 47046.0 40916.0128230.0
FRA 5553.0 36010.0 35425.0 37669.0 37673.0
GBR 35697.0 13317.0 8371.0 37732.0 6060.0 38286.0
ITA 36757.0 12299.0 7322.0 37812.0 5091.0 36208.0 38382.0
NLD 4115.0 35109.0 34591.0 36396.0 33191.0 4380.0 3476.0 36399.0
HUN 2236.0 8244.0 7801.0 8720.0 7628.0 2382.0 2221.0 7668.0 8770.0
POL 4874.0 32487.0 32268.0 34070.0 30875.0 5370.0 4402.0 30334.0 7624.0 34075.0
CZE 2392.0 2870.0 2113.0 4275.0 1955.0 2341.0 2343.0 1728.0 1432.0 2558.0 4321.0

Number of bulls in reference population for loc

CAN 37547.0
DEU 12154.0 43112.0
DFS 7252.0 36220.0 37053.0
ESP 36927.0 42877.0 36979.0102714.0
FRA 5496.0 32224.0 31686.0 33754.0 33758.0
GBR 34623.0 13241.0 8316.0 36640.0 6014.0 37190.0
ITA 35387.0 12219.0 7266.0 36424.0 5045.0 35133.0 36989.0
NLD 4076.0 31427.0 30989.0 32609.0 29557.0 4346.0 3446.0 32612.0
CZE 2381.0 2835.0 2081.0 4148.0 1924.0 2332.0 2331.0 1696.0 4194.0
HUN 2230.0 6531.0 6170.0 6993.0 5976.0 2373.0 2216.0 5950.0 1403.0 7041.0
POL 4821.0 28631.0 28454.0 29958.0 27044.0 5324.0 4357.0 26616.0 2446.0 5906.0 29960.0

Number of bulls in reference population for bcs

DEU 36666.0
FRA 26232.0 27618.0
GBR 12970.0 5874.0 35245.0
ITA 12014.0 4994.0 32978.0 34969.0
NLD 25189.0 23590.0 4384.0 3430.0 26822.0
CZE 2820.0 1916.0 2314.0 2317.0 1692.0 4061.0
CAN 12048.0 5414.0 32578.0 33556.0 4018.0 2372.0 37388.0
ESP 36430.0 27614.0 34693.0 34406.0 26819.0 4015.0 36718.0 97979.0
HUN 7284.0 6715.0 2448.0 2211.0 6839.0 1417.0 2228.0 8010.0 8058.0
POL 27047.0 25464.0 5219.0 4316.0 24980.0 2373.0 4734.0 28338.0 6704.0 28342.0