INTERBULL breeding values calculated December 2014

This newsletter is primarily written for VikingGenetics staff and breeding advisors in Denmark, Sweden and Finland, but can also be of interest for some dairy farmers.

Table of content

International breeding values for the traits and breeds shown in Table 1 have been published 2.12.2014.

Table 1. Traits and breeds for which international breeding values are published.

Trait:	**International breeding values for the breeds:**
Yield	Red breeds, Holstein and Jersey
Conformation	Red breeds, Holstein and Jersey
Udder health	Red breeds, Holstein and Jersey
Longevity	Red breeds, Holstein and Jersey
Calving – maternal and direct	Red breeds and Holstein
Female fertility	Red breeds, Holstein and Jersey
Milking speed	Red breeds, Holstein and Jersey
Temperament	Red breeds and Holstein

You can find Interbull breeding values for all bulls with international breeding values from the following web sites:
Denmark: www.landbrugsinfo.dk/INTERBULL (→ ”Søgning på Interbull indekser”)
Sweden: http://www.sweebv.info (→ Interbullresultat)
Finland: www.faba.fi (Sonnihaut → Interbull-arvostelut)

On the page you can search within breed or country. You can also search with the herdbook number or the name of the bull. Click on the herdbook number of the bull and view a graphical representation of the bulls breeding values.

You can sort the bulls by different breeding values by clicking on the top line of the table.

Yield

In tables 2-5 is a comparison of the genetic level of yield for bulls from different countries. The analysis includes bulls born in 2008 or later, that have more than 60 daughters (Tables 2, 3 and 4) or 40 daughters (Table 5) in the genetic evaluation.

Table 2. Genetic level for yield traits, Red breeds. Bulls born in 2008 or later.

Country	No. of bulls	Milkindex	Fatindex	Proteinindex	Y-index	Y-index STD
Australia	31	94,3	96,1	92,4	93,5	9,1
Canada	28	90,3	89,9	85,4	86,2	7,1
Germany	20	98,6	104,5	99,1	101,3	7,9
Denmark	102	99,5	105,1	102,3	104	8,1
Estonia	28	104,0	98,9	99,1	98,1	7,6
Finland	265	103,9	101,6	102,6	102,0	8,0
Norway	214	94,9	94,1	95,5	95,1	8,8
New Zealand	35	89,3	94,1	89,0	90,9	9,2
Sweden	191	98,7	101,4	101	101,6	7,5
USA	16	85,4	80,0	77,8	77,1	13,4

Table 3.Genetic level for yield traits, Holstein. Bulls born in 2008 or later.

Country	No. of bulls	Milkindex	Fatindex	Proteinindex	Y-index	Y-index STD
Australia	62	96,7	98,0	96,9	97,5	7,0
Belgium	17	108,3	109,6	110,3	110,4	7,0
Canada	413	105,1	103,8	100,9	101,2	8,2
Switzerland	34	99,0	100,1	96,3	97,3	8,7
Czech Republic	51	104,4	100,4	100,9	100,0	8,4
Germany	828	104,3	101,8	101,9	101,4	8,5
Denmark	437	103,7	103,8	105,4	105,1	8,9
Spain	153	104,3	99,6	99,0	98,2	9,1
Estonia	52	100,4	103,8	98,8	100,5	8,8
Finland	86	102,4	102,7	102,7	102,7	6,7
France	678	107,8	102,3	106,0	104,2	7,2
UK	133	103,5	102,7	100,1	100,5	10,3
Hungary	8	104,5	103,9	104,4	104,1	6,7
Ireland	85	79,6	92,1	84,4	88,4	11,4
Israel	84	95,8	99,0	94,3	95,8	8,1
Italy	596	102,9	99,2	98,0	97,5	8,0
Japan	45	114,4	108,0	109,9	108,2	7,5
Lithuania	9	87,9	90,7	87,8	89,1	9,9
Luxembourg	9	98,8	105,3	99,9	102,2	8,2
Holland	693	103,6	103,0	103,7	103,4	9,2
New Zealand	465	80,7	95,6	89,3	93,5	8,9
Poland	371	98,0	97,4	97,3	97,2	7,6
Slovenia	17	92,4	91,1	87,9	88,4	5,4
Sweden	102	103,3	103,5	105,0	104,7	8,0
USA	2391	106,4	104,1	102,4	102,3	8,3

Table 4.Genetic level for yield traits, Jersey. Bulls born in 2008 or later.

Country	No. of bulls	Milkindex	Fatindex	Proteinindex	Y-index	Y-index STD
Australia	18	104,4	89,1	102,9	95,6	7,1
Canada	10	99,8	87,5	95,7	90,5	8,3
Denmark	99	99,7	103,6	102,6	104,1	7,9
New Zealand	347	95,6	91,7	97,1	94,9	7,6
USA	266	114,6	101,2	110,3	104,5	9,6

In table 5 bulls are divided according to whether they are marked as Red Holstein or Holstein in Interbull.

In the Nordic test day model Red Holstein and Holstein are calculated simultaneously, but when published in Denmark, Red Holstein is on a separate base. To translate breeding values for bulls from NAV's Holstein base to Red Holstein base approximately 12, 6, 11 and 11 units should be added to Milk, Fat, Protein and Y- index.

Table 5.
Genetic level of yield traits in NAV index units on Red Holstein base. Bulls born in 2008 or later.

Country	No. of bulls	Milkindex	Fatindex	Proteinindex	Y-index	Y-index STD
Holstein on Red Holstein base						
Canada	680	116,7	108,7	110,9	111,1	8,3
Germany	1501	114,8	106,6	111,1	110,7	9,0
Denmark	706	115,0	108,8	115,1	114,8	8,9
Holland	1172	114,9	107,4	113,6	113,1	9,2
USA	3778	117,9	109,0	112,5	112,2	8,4
Red Holstein on Red Holstein base						
Belgium	13	108,2	104,3	113,7	111,4	7,5
Switzerland	129	99,1	92,6	96,8	95,1	9,3
Czech Republic	9	103,4	95,4	103,7	100,9	5,3
Germany	271	107,7	97,6	104,7	101,7	8,3
Denmark	14	109,3	101,3	109,8	106,8	9,7
Spain	6	109,2	99,7	103,0	101	4,9
Italy	42	106,9	95,8	102,1	99,0	10,0
Holland	234	104,9	100,3	107,9	105,9	8,7

International comparison for yield among most important countries shows that:

- Red breeds: Denmark, Finland and Sweden have similar genetic level, while the genetic levels of Norway and Canada is much lower
- Holstein: Denmark, Sweden, Finland, France, USA and Holland have the highest genetic level
- Jersey: Denmark has similar genetic level as USA and higher genetic level than New Zealand
- Red Holstein: Denmark and Holland has higher genetic level for yield than the red and white in Germany. As expected the genetic level for yield for Red Holstein is significantly lower than for the Holstein populations that Red Holstein is normally compared to.

Conformation

The international genetic evaluation is done for 16 linear traits for Holstein, Red breeds and Jersey. In addition, body condition score and locomotion is included in this trait group.

Breeding values for body

EBV for body is calculated from the 6 linear traits that are part of the international genetic evaluation. The composite NAV breeding value for body also includes topline. There is no international genetic evaluation of topline.

We calculate international breeding value for body based on a regression of NAV breeding values for the 6 linear international traits on NAV EBV for body for Danish, Swedish and Finnish bulls born in 2004-05. The estimated regression coefficients are used to calculate international breeding value for body for foreign bulls. This method is used to ensure the same relative weight between traits in NAV and international composite traits.

Breeding values for feet and legs

EBV for feet and legs is calculated from the 3 linear traits that are part of the international genetic evaluation. The composite NAV breeding values for feet and legs also includes hock quality and bone quality. There is no international genetic evaluation for these two traits.

We calculate international breeding value for feet and legs based on a regression of NAV breeding values for the 3 linear international traits on NAV EBV for feet and legs for Danish, Swedish and Finnish bulls born in 2004-05. The estimated regression coefficients are used to calculate international breeding value for feet and legs for foreign bulls.

Breeding values for udder

The international genetic evaluation for udder includes 7 traits. The Nordic genetic evaluation for udder also includes teat thickness and udder balance. There is no international evaluation for these two traits.

We calculate international breeding value for udder based on a regression of NAV breeding values for the 7 linear international traits on NAV EBV for udder for Danish, Swedish and Finnish bulls born in 2004-05. The estimated regression coefficients are used to calculate international breeding value for udder for foreign bulls.

Genetic level of composite conformation traits

In tables 6-8 is a comparison of genetic level of composite conformation traits for bulls from different countries. The calculation includes bulls that have at least 25 daughters in genetic evaluation.

Table 6.Genetic level for conformation traits, Red breeds. Bulls born in 2008 or later.

Country	No. of bulls	Body		Feet&legs		Udder	
		Average	STD	Average	STD	Average	STD
Canada	42	105,9	5,2	102,7	3,5	111,1	7,5
Germany	17	105,3	5,8	105,9	3,5	104,5	8,5
Denmark	85	103,0	7,6	102,9	4,8	101,8	8,1
Finland	168	98,8	7,2	96,7	4,4	100,2	7,7
Norway	106			99,7	3,6	90,9	8,7
Sweden	109	97,3	7,7	98,5	4,5	99,5	8,2
USA	5	110,8	5,1	102,5	2,1	112,2	9,3

Table 7. Genetic level of conformation traits, Holstein. Bulls born in 2008 or later.

		Body		Feet&legs		Udder	
Country	No	Average	STD	Average	STD	Average	STD
Australia	64	106,7	7,5	98,2	4,7	97,2	9,2
Belgium	21	112,5	11,5	100,9	5,6	100,5	11,2
Canada	642	116,2	9,6	101,4	5,6	106,5	10,1
Switzerland	86	115,0	8,9	98,8	6,2	102,8	8,7
Czech Republic	146	109,5	9,0	101,4	4,8	101,3	8,9
Germany	1381	109,0	10,0	100,5	5,9	102,2	9,7
Denmark	662	104,0	10,5	100,8	5,9	102,4	9,5
Spain	266	115,8	9,7	101,0	5,6	105,1	8,2
Estonia	55	103,7	8,2	98,9	5,3	92,1	8,1
Finland	123	101,8	8,8	99,4	5,3	103,5	7,7
France	1189	112,8	10,2	99,6	5,5	101,5	9,2
UK	253	110,1	11,4	100,7	4,4	103,4	10,1
Hungary	29	113,1	11,2	101,3	6,1	103,5	8,7
Ireland	53	99,9	13,0	95,6	4,1	89,7	13,2
Italy	979	113,4	10,3	101,2	5,4	105,8	9,7
Japan	460	112,8	10,2	100,6	5,0	102,3	10,4
Luxembourg	8	103,4	4,8	99,1	7,0	96,8	6,3
Holland	1023	108,9	10,4	101,5	5,8	103,0	9,8
New Zealand	254	91,6	11,0	98,5	8,5	94,8	11,1
Poland	570	106,0	10,3	99,4	5,8	97,1	9,8
Slovenia	27	100,2	8,1	96,4	5,8	92,0	9,1
Sweden	136	100,3	9,6	100,4	5,8	101,0	8,2
USA	2621	111,6	10,2	102,0	5,3	107,9	8,9

Table 8. Genetic level of conformation traits, Jersey. Bulls born in 2008 or later.

		Body		Feet&legs		Udder	
Country	No	Average	STD	Average	STD	Average	STD
Australia	7	103,7	6,6	102,6	11,5	89,7	7,4
Canada	27	111,1	6,9	112,8	7,9	104,7	7,0
Denmark	106	99,0	10,0	102,0	8,2	100,3	9,5
USA	282	111,3	8,6	101,4	6,0	97,9	8,3

International comparison for conformation traits among most important countries show that:

- Red breeds: Denmark has a higher genetic level for body and feet&legs than Sweden and Finland. For udder, Denmark, Sweden and Finland have similar level. Canada has highest level for body and udder. Norway has the lowest level for udder.

- Holstein: Denmark, Sweden and Finland have lower genetic level for body than most other countries. North America, Spain, France and Italy have the highest genetic level for body. Countries with grass based dairy farming like Ireland and New Zealand has considerably lower genetic level for body. For feet&legs there are only small differences between countries. Denmark, Sweden and Finland have an average genetic level for udder. North America, Spain and Italy have the highest genetic level for udder.

- Jersey: Denmark has lower genetic level for the body than USA, but higher for udders

Somatic cell count and udder health

Interbull does two international genetic evaluations – one for somatic cell count and one for udder health. In the first one only somatic cell count is included for all countries. NAV sends breeding values for somatic cell count to Interbull, so Nordic bulls get official breeding values for somatic cell count in countries where this trait is official. In the second evaluation breeding values based on mastitis diagnoses are included. NAV's official breeding value for udder health is used. For countries that do not record mastitis diagnoses, somatic cell count is included in this evaluation.

Index for udder health is published in the Nordic countries, when reliability is 40% or higher. In tables 9-11 is a comparison of genetic level of udder health for bulls from different countries.

Table 9. Genetic level for udder health, Red breeds. Bulls born in 2008 or later.

Country	No. of bulls	Average	STD
Germany	11	97,4	11,0
Denmark	71	97,5	10,9
Estonia	9	95,4	9,1
Finland	205	99,7	9,0
Lithuania	5	96,1	5,2
Norway	107	96,9	7,1
New Zealand	30	93,5	6,0
Sweden	107	101,4	8,0
USA	8	95,6	10,1

Table 10. Genetic level for udder health, Holstein. Bulls born in 2008 or later.

Country	No. of bulls	Average	STD
Australia	121	96,8	6,5
Belgium	18	94,0	9,0
Canada	200	95,9	6,1
Switzerland	50	96,8	6,3
Czech Republic	68	94,6	8,2
Germany	902	95,7	7,9
Denmark	407	101,3	8,3
Spain	142	93,9	7,4
Estonia	49	94,8	7,9
Finland	84	100,9	7,6
France	607	95,0	6,7
UK	140	96,9	8,3
Hungary	15	95,9	4,6
Ireland	96	98,5	7,8
Israel	87	100,3	6,6
Italy	620	95,7	7,6
Japan	244	91,9	7,1
Korea	6	95,0	5,1
Lithuania	9	99,0	12,0
Luxembourg	9	99,6	8,6
Holland	719	96,7	7,8
New Zealand	529	95,8	5,7
Poland	428	94,5	8,4
Slovenia	18	95,1	9,1
Sweden	86	102,6	7,9
USA	2355	99,4	7,7

Table 11. Genetic level for udder health, Jersey. Bulls born in 2008 or later.

Country	No. of bulls	Average	STD
Canada	6	92,1	7,2
Denmark	95	101,3	8,0
USA	301	88,7	7,4

International comparison for udder health among most important countries show that:

- Red breeds: Sweden and Finland have higher genetic level than Norway and Denmark
- Holstein: Denmark, Sweden and Finland have higher genetic level than other major European countries and Canada
- Jersey: Denmark is substantially better than USA

Longevity

In tables 12-14 is a comparison of genetic level of longevity for bulls from different countries. Bulls are included if they have at least 40 daughters in the genetic evaluation.

Table 12. Genetic level for longevity, Red breeds. Bulls born in 2006 or later.

Country	No. of bulls	Average	STD
Australia	44	90,4	7,5
Canada	79	90,5	8,6
Germany	25	92,3	7,6
Denmark	77	93,7	7,2
Finland	259	91,4	13,2
UK	18	82,9	5,8
New Zealand	99	87,2	5,9
Sweden	168	96,8	10,2
USA	41	85,9	8,2

Table 13. Genetic level for longevity, Holstein. Bulls born in 2006 or later.

Country	No. of bulls	Average	STD
Australia	303	88,0	7,7
Østrig	5	84,2	13,8
Belgium	33	93,7	7,3
Canada	1175	90,4	8,8
Switzerland	146	88,2	7,7
Czech Republic	273	92,0	8,9
Germany	2377	91,3	8,7
Denmark	783	96,2	9,2
Spain	428	93,6	6,9
Finland	99	92,3	9,0
France	2317	88,9	7,5
UK	316	94,1	7,3
Hungary	71	91,0	8,6
Ireland	237	92,6	7,1
Israel	222	95,0	6,5
Italy	1432	93,9	7,4
Luxembourg	12	92,0	7,1
Holland	1750	92,2	8,9
New Zealand	1188	91,7	5,7
Slovenia	45	88,9	9,1
Sweden	162	97,5	9,5
USA	5708	96,4	9,7
South Africa	18	90,3	9,2

Table 14. Genetic level for longevity, Jersey. Bulls born in 2006 or later.

Country	No	Average	STD
Australia	79	87,2	5,9
Canada	62	86,5	7,6
Denmark	114	98,2	7,8
UK	8	82,7	5,1
Ireland	12	89,5	6,0
New Zealand	917	89,2	5,3
USA	634	87,9	6,9
South Africa	14	88,0	5,1

International comparison for longevity among most important countries shows that:

- Red breeds: Denmark, Finland and Sweden have higher level than the other countries
- Holstein: The genetic level is very similar across countries, however the Nordic countries are among the best. Canada and France have the lowest level
- Jersey: Denmark has higher genetic level than other populations

Calving – maternal and direct

For Red breeds it has not been possible to obtain sufficient high correlations between countries for still birth so the international evaluation only includes calving ease (maternal and direct) for Red breeds.

In the Holstein group there are international breeding values for both still birth (maternal and direct) and calving ease (maternal and direct), but only for first lactation. In the Nordic countries also information from later lactations and from birth weight is included in calving, maternal and calving, direct.

We have calculated international indices for calving, maternal and calving, direct by performing a regression between NAV breeding values for still birth and calving ease and NAV breeding value for calving for Nordic bulls born in 2001-2006. The calculated regression coefficients are used to calculate a calving index for foreign bulls - same method is used for calving, maternal and calving, direct.

In Tables 15 and 16 the average genetic level for Red breed and Holstein bulls is shown for different countries. Only bulls born in 2008 or later are included. Bulls need to have breeding values for yield to be included.

Table 15.
Genetic level for calving, maternal and calving, direct, Red breeds. Bulls born in 2008 or later.

Country	Calving, direct			Calving, maternal		
	No. of bulls	Average	STD	No. of bulls	Average	STD
Canada	43	97,4	5,9	16	99,3	6,5
Denmark	73	98,6	7,6	82	98,9	8,8
Finland	184	100,8	8,5	182	99,3	8,6
Norway	106	100,6	6,8	106	93,5	7,4
Sweden	119	101,4	6,9	119	103,1	6,8

Table 16.
Genetic level for calving, maternal and calving, direct, Holstein. Bulls born in 2008 or later.

Country	Calving, direct			Calving, maternal		
	No. of bulls	Average	STD	No. of bulls	Average	STD
Australia	129	94,3	6,4	4	107,3	3,4
Austria	5	95,0	6,0	4	100,0	7,4
Belgium	19	100,5	9,3	18	99,1	9,0
Canada	447	94,2	8,0	408	96,8	8,9
Switzerland	51	94,4	7,0	20	100,1	8,4
Germany	928	94,1	7,9	883	98,8	7,5
Denmark	428	100,0	8,1	415	101,7	8,6
Finland	86	101,0	9,5	86	101,2	8,3
France	748	96,2	8,5	673	98,9	8,3
UK	110	95,3	7,8	42	96,8	8,0
Hungary	15	93,6	7,2	8	101,0	7,3
Ireland	100	101,1	6,9	3	107,3	1,5
Israel	8	97,4	5,5	92	99,3	5,9
Italy	623	93,9	7,9	297	99,4	6,9
Luxembourg	9	99,8	5,0	9	103,2	5,5
Holland	707	96,9	7,2	623	98,5	8,1
New Zealand	42	102,4	4,2	9	96,1	10,7
Sweden	88	101,4	9,3	94	101,6	7,5
USA	2632	96,3	6,4	2347	102,0	6,6

International comparison for calving traits among most important countries shows that:

- Red breeds: The Nordic countries and Norway have similar genetic level for calving, direct. For calving, maternal Denmark, Sweden and Finland have a similar level, while Norway is at a lower level

- Holstein: Denmark, Sweden and Finland are among the best countries for both calving, direct and calving, maternal. Ireland and New Zealand has a similar level

Female fertility

NAV calculates breeding values for female fertility based on linear regression between NAV breeding values for female fertility and NAV breeding values for the sub-indices in female fertility. Basis for the regressions are Nordic bulls born in 2001-2005 – see more information below. The estimated regression coefficients are used to calculate international breeding value for female fertility for foreign bulls.

In practice 3 regressions are calculated with different explaining variables (Jersey only 2 and 3):
1: Female fertility = Ability to conceive (R^2, HOL = 0,05) (R^2, Red breeds = 0,35)
2: Female fertility = Days open (R^2, HOL = 0,87) (R^2, Red breeds = 0,85) (R^2, Jer = 0,87)
3: Female fertility = Ability to return to recycle after calving + ability to conceive + Days open (R^2, HOL = 0,96) (R^2, Red breeds = 0,94), (R^2, Jer = 0,94).

R^2 (degree of explanation) indicates the proportion of the variance of the index for female fertility, that the traits in the regression can explain. Since the regression is used on foreign bulls, and the genetic correlations between international and NAV traits are not 1, the observed degree of explanation will be lower.

For each foreign bull we use the regression with the greatest explanatory power given the international sub-indices that are available. The degree of explanation therefore depends largely of the traits being available from the different countries.

Table 17. Genetic level for female fertility, Red breeds. Bulls born in 2008 or later.

Country	No. of bulls	Average	STD
Australia	10	98,0	11,3
Canada	19	94,8	5,1
Germany	12	99,7	6,2
Denmark	59	101,2	9,6
Finland	170	96,9	9,1
Norway	106	104,9	8,3
New Zealand	19	100,1	3,8
Sweden	104	103,9	9,6
USA	7	98,3	2,4

Table 18. Genetic level for female fertility, Holstein. Bulls born in 2008 or later.

Country	No. of bulls	Average	STD
Australia	61	93,5	6,4
Belgium	16	95,6	8,1
Canada	392	94,1	7,6
Switzerland	29	95,2	3,1
Czech Republic	44	96,0	2,1
Germany	733	93,3	7,8
Denmark	401	100,4	8,8
Spain	41	94,9	8,4
Finland	85	102,8	9,2
France	554	92,7	8,1
UK	125	96,0	7,3
Hungary	5	97,4	3,1
Ireland	52	112,6	6,1
Israel	82	100,1	2,4
Italy	555	95,2	5,7
Luxembourg	7	96,1	3,0
Holland	617	96,2	8,0
New Zealand	454	108,5	6,6
Poland	179	94,2	6,7
Sweden	86	105,6	8,6
USA	2269	98,6	8,5

Table 19. Genetic level for female fertility, Jersey. Bulls born in 2008 or later.

Country	No. of bulls	Average	STD
Australia	18	97,6	6,0
Canada	10	96,9	7,8
Denmark	95	101,8	10,9
New Zealand	344	97,7	6,1
USA	256	92,8	8,2

International comparison for female fertility among most important countries shows that:

- Red breeds: Denmark and especially Finland has lower level than Sweden. Norway is at the same level as Sweden
- Holstein: Denmark, Sweden and Finland are among the countries with the highest genetic level. However Ireland and New Zealand have by far the highest genetic levels
- Jersey: Genetic level is higher in Denmark than the other major countries

Milking speed and temperament

In Tables 20-22, the genetic level for bulls from different countries, born in 2008 or later are shown for Holstein, Red breeds and Jersey.

Table 20.
Genetic level for milking speed and temperament, Red breeds. Bulls born in 2008 or later.

Country	Milking speed			Temperament		
	No. of bulls	Average	STD	No. of bulls	Average	STD
Australia	12	95,3	3,1	12	94,4	4,1
Canada	42	94,5	4,8	42	92,0	3,4
Germany	16	105,0	5,1	16	103,9	4,3
Denmark	84	105,0	5,3	51	104,9	7,7
Finland	151	98,5	4,8	148	99,7	5,1
Norway	106	98,1	2,0	104	98,8	2,9
Sweden	98	100,6	5,0	90	102,0	6,8

Table 21. Genetic level for milking speed and temperament, Holstein. Bulls born in 2008 or later.

Country	Milking speed			Temperament		
	No. of bulls	Average	STD	No. of bulls	Average	STD
Australia	111	103,8	3,6	111	103,1	3,6
Belgium	15	92,2	6,2	15	98,9	6,4
Canada	363	96,1	5,3	362	103,6	4,4
Switzerland	44	96,5	5,3	44	102,4	3,8
Germany	642	95,7	5,7	484	101,2	6,4
Denmark	403	99,1	8,9	250	101,2	9,3
Finland	72	100	5,8	71	101,3	6,1
France	538	95,1	6,4	518	106,6	7,0
UK	144	96,5	10,3	142	102,7	7,0
Italy	21	95,1	6,6	14	100,4	6,3
Luxembourg	5	86,1	3,0			
Holland	517	97,2	9,4	469	101,9	8
New Zealand	10	97,4	3,9	10	101,8	4
Slovenia	18	96,4	6,1			
Sweden	87	97,2	5,3	77	100,4	8,7
USA	340	96,3	6,9	331	104,3	5,6

Table 22. Genetic level for milking speed, Jersey. Bulls born in 2007 or later.

Country	No. of bulls	Average	STD
Australien	31	102,2	7,3
Canada	27	92,1	8,9
Danmark	107	103,4	9,8
USA	16	93,5	8,0

International comparison for milking speed and temperament among most important countries show that:

- Red breeds: Denmark has higher genetic level than Sweden, Finland and Norway.
- Holstein: Denmark and Finland are on the top for milking speed. Sweden is average for milking speed. For temperament Denmark, Sweden and Finland are on the same level as other major countries
- Jersey: Denmark has considerably better milking speed than USA and Canada

NTM for Nordic and foreign bulls

NTM index is calculated for all bulls (Nordic and others) that have official breeding values (NAV breeding values or international EBVs) for yield, udder health and conformation.

Interbull NTM is calculated by weighing the Interbull / NAV breeding values for yield, female fertility, calving (maternal and direct), udder health, longevity, feet&legs, udder, milking speed and temperament. The same economic weight factors are used as for NAV breeding values.

Rules for calculation of NTM based partly or entirely on international breeding values are stated below in order of priority.

1. **Bull has NAV breeding value for a trait**

If the bull has NAV breeding value for a specific trait, this is used in the calculation of NTM - no matter if the bull also has international breeding value for that trait.

2. **Bull has no NAV breeding value, but has an international breeding value for a trait**

If the bull does not have NAV breeding value for the trait, the international breeding value is used, provided that Interbull calculates international breeding values for that trait and the bull comes from a country which provides data for that trait.

3. **Bull has no NAV or no international breeding value for a trait**

For traits where no Interbull EBV is available or the bull has no Interbull EBV, and at the same time it is not tested in the Nordic countries, a pedigree index is used. Pedigree index is calculated as ½ (EBV_{sire} -100) +1/4 ($EBV_{maternal\ grand\ sire}$-100) +100. The contributions from the sire and maternal grand sire can be based on either NAV breeding values or international breeding values. If EBV_{sire} or $EBV_{maternal\ grand\ sire}$ are unofficial the pedigree index is set to 100.

Publication rules for NTM

All foreign and Nordic bulls that have Interbull breeding values for yield, udder health and udder get a public Interbull NTM. This NTM is calculated with a lower reliability than an NTM for Nordic proven bulls, where information for all traits is always available.

Genetic level for Interbull NTM

In tables 23-25 genetic level for Interbull NTM for Jersey, Red breeds and Holstein are shown. Bulls included are born in 2008 or later.

Table 23. Genetic level for NTM, Red breeds. Bulls born in 2008 or later.

Country	No. of bulls	Average	STD
Canada	11	-10,3	7,6
Germany	20	1,3	7,4
Denmark	102	3,4	12,6
Finland	265	0,4	8,8
Norway	214	-8,2	8,6
Sweden	191	3,8	8,0
USA	9	-17,0	9,1

Table 24. Genetic level for NTM, Holstein. Bulls born in 2007 or later.

Country	No. of bulls	Average	STD
Australia	27	-2,7	8,4
Belgium	17	3,5	9,4
Canada	275	-5,4	8,7
Switzerland	34	-8,1	7,3
Czech Republic	51	-3,6	7,8
Germany	808	-5,0	8,8
Denmark	423	6,7	9,4
Spain	147	-6,8	8,3
Estonia	45	-5,4	7,7
Finland	86	5,0	9,0
France	552	-3,2	7,8
UK	123	-3,1	9,1
Hungary	8	-0,3	6,4
Ireland	47	-5,7	10,1
Italy	590	-6,1	7,8
Japan	45	2,1	7,6
Luxembourg	9	-1,1	10,2
Holland	646	0,1	8,5
Poland	369	-8,2	7,8
Slovenia	16	-14,1	8,0
Sweden	100	3,6	15,4
USA	1873	2,5	8,2

Table 25. Genetic level for NTM, Jersey. Bulls born in 2007 or later.

Country	No. of bulls	Average	STD
Denmark	99	5,4	8,0
USA	240	-5,3	8,9

International comparison of NTM among most important countries shows that:

- Red breeds: Denmark, Sweden and Finland have the similar genetic level, which is much higher than Canada and Norway
- Holstein: Denmark, Sweden and Finland have the highest level. Holstein from Canada, Italy and Germany are somewhat lower
- Jersey: Denmark's average NTM is more than 10 index points better than USA

Dates of publication of Interbull breeding values in 2015:

Table 26. Dates of publication in 2015

Month	Date
April	1
August	12
December	2

The indices can be found at the national databases in Denmark, Sweden and Finland 2-3 days after they have been published by Interbull.

Changes since last routine run

In the routine evaluation in December 2014 the following changes are done compared to August 2014 routine evaluation:

Yield

- Holstein in Estonia has changes in daughters due to update of database
- RDC in Norway may loose number of EDC for some bulls due to definition of herd in genetic model. But daughters stay the same
- Holstein in Croatia participate for first time
- Holstein in Belgium may loose some bulls due to change in identification in database
- Holstein in Israel has excluded bulls with no records
- All breeds in New Zealand may loose herds or daughters for some bulls due to parentage verification
- Holstein in Slovenia has changed time period for inclusion of data
- All breeds in USA has changed to multitrait model
- Holstein in South Africa has included more data

Calving

- RDC in Norway may loose number of EDC for some bulls due to definition of herd in genetic model. But daughters stay the same

Conformation

- RDC in Norway may loose number of EDC for some bulls due to definition of herd in genetic model. But daughters stay the same. Also change in model for some traits
- All breeds in Denmark, Sweden and Finland changes parameters, model and editing
- Holstein in Slovenia has changed time period for inclusion of data
- All breeds in Germany changes parameters, model and editing
- Holstein from Italy submitted locomotion for the first time – no more indirect traits
- All breeds in New Zealand changes editing for angularity. Some older bulls might loose herds and daughter

Udder health

- Holstein in Estonia has changes in daughters due to update of database
- RDC in Norway may loose number of EDC for some bulls due to definition of herd in genetic model. But daughters stay the same.
- All breeds in Canada participate with mastitis data for the first time
- Holstein in Slovenia has changed time period for inclusion of data
- Holstein in Croatia participate for first time
- All breeds in USA changed software and genetic base
- Holstein in South Africa has included more data

Longevity

- Holstein in South Africa has included more data
- Slovenia changes genetic base, data included and model

Milking speed and temperament

- RDC in Norway may loose number of EDC for some bulls due to definition of herd in genetic model. But daughters stay the same.
- All breeds in Denmark, Sweden and Finland changes parameters, model and editing for temperament
- Slovenia changes genetic base, data included and model

Fertility

- RDC in Norway may loose number of EDC for some bulls due to definition of herd in genetic model. But daughters stay the same.
- France participated for the first time with interval trait – calving to first AI

- All breeds in USA evaluated daughter pregnancy rate using a multi-trait fertility model. Revised the formula to estimate calving to first insemination. Changed the base for all fertility traits.

Regards
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