INTERBULL breeding values calculated April 2015

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

Table of content

International breeding values for the traits and breeds shown in Table 1 have been published 7.4.2015.

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	17	93,2	93,9	91,2	91,9	7,7
Canada	24	89,8	90,9	85,6	86,8	6,7
Germany	15	97,3	103,7	97,5	100,1	8,4
Denmark	59	99,8	107,0	103,7	105,8	8,3
Estonia	12	99,1	96,3	92,6	92,6	11,9
Finland	197	104,0	101,8	102,8	102,2	7,7
Norway	133	96,5	95,7	97,1	96,7	9,1
New Zealand	25	87,6	93,0	87,3	89,6	9,7
Sweden	129	98,8	102,1	101,8	102,6	7,3
USA	8	81,1	73,5	71,8	70,6	17,7

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	105	97,8	98,9	98,7	99,0	7,0
Belgium	22	105,8	107,7	107,8	108,2	7,7
Canada	485	104,9	103,5	100,8	101,0	8,5
Switzerland	58	98,4	98,3	95,0	95,7	8,0
Czech Republic	59	104,1	100,1	100,2	99,3	9,2
Germany	953	104,2	102,0	102,0	101,5	8,7
Denmark	482	103,2	103,6	104,9	104,7	8,8
Spain	154	103,8	99,2	98,5	97,7	9,1
Estonia	59	96,9	101,2	95,7	97,6	9,4
Finland	94	101,8	102,3	101,9	102,1	6,6
France	823	107,5	102,3	105,8	104,1	7,5
UK	165	102,7	102,3	99,6	100,0	10,4
Hungary	9	104,4	104,4	103,9	104,0	6,6
Ireland	93	79,5	91,3	83,8	87,7	11,5
Israel	84	95,7	98,4	93,8	95,3	8,2
Italy	696	101,9	99,1	97,1	96,9	8,1
Japan	81	109,9	103,8	106,2	104,5	7,4
Lithuania	9	87,1	91,2	87,3	88,9	10,6
Luxembourg	9	98,1	105,0	99,2	101,9	8,9
Holland	847	103,1	102,3	103,1	102,8	10,0
New Zealand	502	79,4	94,2	88,2	92,4	9,1
Poland	429	99,8	96,8	96,5	95,9	7,5
Slovenia	20	93,9	91,9	88,7	88,8	5,0
Sweden	120	102,8	103,2	104,8	104,5	7,9
USA	2718	106,3	103,8	102,2	102,0	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	34	104,2	93,4	103,8	98,4	7,5
Canada	17	99,2	86,5	92,6	87,5	8,6
Denmark	114	100,0	103,3	102,6	103,8	8,0
New Zealand	362	94,5	90,1	95,9	93,5	7,5
USA	315	114,6	101,2	110,2	104,5	9,5

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	761	116,4	108,5	110,7	110,8	8,4
Germany	1628	114,8	106,6	111,1	110,8	9,1
Denmark	750	114,5	108,6	114,6	114,4	8,8
Holland	1316	114,4	107,0	113,1	112,6	9,8
USA	4125	117,8	108,8	112,3	112,0	8,4
Red Holstein on Red Holstein base						
Belgium	15	109,8	104,7	114,6	112,0	7,8
Switzerland	143	98,3	92,2	95,6	94,1	9,3
Czech Republic	10	103,1	94,2	102,2	99,3	5,3
Germany	289	107,2	97,2	104,2	101,2	8,4
Denmark	16	109,0	100,7	109,1	106,1	9,7
Spain	5	109,2	97,4	102,6	99,6	5,4
Italy	44	106,5	95,8	102,4	99,3	10,8
Holland	267	104,9	100,4	108,0	105,9	9,1

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, Canada, Germany, USA and Holland have similar 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	52	106,0	5,5	102,1	3,2	111,5	6,9
Germany	22	106,1	5,9	105,5	3,2	105,4	8,1
Denmark	100	103,3	7,9	102,6	4,7	102,4	8,7
Finland	190	98,7	7,4	96,5	4,5	100,0	7,9
Norway	132			99,7	3,5	90,2	8,5
Sweden	126	97,3	7,8	98,1	4,4	99,6	7,9
USA	5	110,6	5,9	102,5	2,1	110,8	9,7

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	57	106,3	7,5	97,7	3,4	98,1	9,2
Belgium	21	113,5	11,2	100,3	4,9	101,9	12,2
Canada	478	116,8	9,8	101,1	5,7	106,9	10,8
Switzerland	60	115,6	9,0	100,2	5,8	103,7	8,7
Czech Republic	85	110,4	9,6	101,4	5,2	101,2	8,6
Germany	923	109,2	10,0	100,3	5,9	102,7	10,2
Denmark	465	103,5	10,9	100,1	6,1	103,4	9,2
Spain	162	116,4	9,9	100,7	5,7	104,7	8,4
Estonia	53	104,3	8,6	97,8	5,0	91,9	9,2
Finland	83	101,4	8,3	99,1	5,2	104,3	7,8
France	794	113,5	10,5	99,0	5,4	101,8	9,3
UK	169	109,7	11,3	100,8	4,6	103,3	10,7
Hungary	16	113,9	9,6	100,3	5,5	104,9	8,2
Ireland	39	98,6	14,7	96,0	5,4	91,3	15,9
Italy	721	113,4	10,0	100,8	5,3	105,6	9,5
Japan	352	112,9	9,6	100,0	4,8	102,2	10,6
Luxembourg	8	103,3	4,6	99,9	7,7	98,0	10,0
Holland	771	109,1	10,3	101,5	5,8	103,5	10,4
New Zealand	238	91,7	10,9	99,1	8,1	97,1	7,9
Poland	460	105,9	10,3	99,3	5,7	97,4	9,7
Slovenia	20	102,4	8,4	97,3	5,7	95,3	9,4
Sweden	97	98,2	9,6	100,2	5,4	102,5	7,0
USA	2005	112,1	10,1	102,0	5,2	108,2	9,2

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	9	104,8	6,5	102,9	10,1	91,2	6,6
Canada	32	110,4	5,8	113,1	6,6	105,3	7,0
Denmark	119	99,2	10,0	102,0	8,7	99,8	9,4
USA	320	110,9	8,5	101,5	6,2	98,0	8,2

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, Finland and Sweden have similar genetic 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 have the highest genetic level for udder.

- Jersey: Denmark has lower genetic level for the body than USA

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
Australia	8	97,5	8,7
Germany	12	98,8	9,9
Denmark	77	97,6	10,7
Estonia	11	95,6	8,3
Finland	225	100,1	8,8
Lithuania	5	98,4	6,1
Norway	134	96,9	6,5
New Zealand	32	93,1	5,8
Sweden	122	101,2	7,7
USA	10	95,4	8,9

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

Country	No. of bulls	Average	STD
Australia	181	96,0	6,3
Austria	5	95,3	6,3
Belgium	23	94,9	9,3
Canada	253	96,1	6,1
Switzerland	61	96,7	6,2
Czech Republic	79	94,6	8,3
Germany	1024	95,8	7,8
Denmark	464	101,3	8,2
Spain	142	93,7	7,5
Estonia	60	95,0	7,6
Finland	93	100,9	7,9
France	781	95,1	6,5
UK	172	96,4	8,2
Hungary	16	96,0	4,5
Ireland	99	98,3	7,8
Israel	87	100,1	6,5
Italy	724	96,2	7,6
Japan	313	91,7	7,4
Korea	7	94,2	5,6
Lithuania	10	99,9	10,9
Luxembourg	9	99,6	6,1
Holland	845	96,6	7,6
New Zealand	538	95,4	6,0
Poland	491	94,6	8,5
Slovenia	22	95,7	7,8
Sweden	99	102,5	8,1
USA	2697	99,6	7,6

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

Country	No. of bulls	Average	STD
Australia	16	89,2	3,9
Canada	10	89,7	6,5
Denmark	109	100,3	7,7
USA	362	88,4	7,3

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	42	89,3	8,1
Canada	65	89,7	8,8
Germany	22	90,1	8,0
Denmark	59	94,3	7,9
Finland	181	88,4	13,8
UK	14	82,3	5,3
New Zealand	90	85,6	6,0
Sweden	115	96,8	10,2
USA	32	84,8	9,8

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

Country	No. of bulls	Average	STD
Australia	120	88,2	7,5
Belgium	13	91,2	7,8
Canada	503	91,3	8,7
Switzerland	50	89,6	8,2
Czech Republic	109	94,3	8,7
Germany	954	91,2	8,7
Denmark	285	96,5	10,1
Spain	162	93,4	6,9
Finland	33	92,5	8,8
France	961	90,9	7,2
UK	143	95,0	6,7
Hungary	24	93,4	8,2
Ireland	85	92,7	7,6
Israel	86	95,0	5,4
Italy	577	95,0	7,0
Luxembourg	7	90,1	5,0
Holland	713	92,7	9,0
New Zealand	489	91,1	5,7
Poland	410	92,3	6,9
Slovenia	21	88,4	10,7
Sweden	54	95,9	8,6
USA	2326	97,7	9,6
South Africa	6	91,3	10,2

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

Country	No	Average	STD
Australia	67	86,5	5,5
Canada	52	86,6	7,1
Denmark	82	97,2	9,2
UK	9	85,5	8,3
Ireland	12	88,6	6,1
New Zealand	718	88,0	5,4
USA	523	88,6	6,9
South Africa	6	90,1	5,0

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. Canada, Germany and France have the lowest level
- Jersey: Denmark has higher genetic level than other populations

Calving – maternal and direct

For Red breeds Canada, Denmark, Finland, Norway, Sweden and the United States send data to this evaluation. 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	52	96,9	5,8	17	99,1	6,1
Denmark	81	97,7	8,1	93	99,4	8,8
Finland	205	100,6	8,6	203	99,2	8,6
Norway	133	101,0	6,6	133	93,1	6,9
Sweden	133	101,5	6,8	133	103,3	6,7

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	174	94,3	6,5	4	107,8	3,3
Austria	6	92,8	5,3	4	99,8	7,2
Belgium	23	99,0	8,9	22	98,2	8,3
Canada	521	94,4	7,9	480	97,3	8,7
Switzerland	61	93,3	5,9	10	100,6	8,3
Germany	1025	94,7	7,9	921	98,6	7,7
Denmark	470	100,1	8,0	450	101,9	8,7
Finland	94	100,8	9,2	93	101,4	8,4
France	887	96,1	8,4	795	98,8	8,5
UK	132	95,8	7,8	45	96,5	8,2
Hungary	16	93,1	7,1	10	99,8	7,2
Ireland	109	101,1	7,0	5	101,2	9,4
Israel	8	97,5	5,5	92	99,2	5,8
Italy	728	94,0	7,7	356	99,1	6,9
Luxembourg	9	99,3	4,5	9	102,9	5,3
Holland	821	97,2	7,2	694	98,3	8,1
New Zealand	543	101,1	5,5	9	95,7	10,7
Sweden	96	101,4	8,9	103	101,8	7,2
USA	2985	96,7	6,7	2665	102,2	6,7

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

- Red breeds: Finland, Sweden and Norway have similar genetic level for calving, direct. Denmark is a bit lower. 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.

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	17	97,2	10,1
Canada	24	93,5	6,2
Germany	13	93,7	8,7
Denmark	57	98,8	10,7
Finland	186	95,1	8,6
Norway	133	105,3	8,9
New Zealand	25	98,5	3,9
Sweden	136	101,4	9,3
USA	8	95,8	3,4

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

Country	No. of bulls	Average	STD
Australia	100	91,3	7,2
Belgium	19	95,5	7,9
Canada	467	92,5	8,4
Switzerland	57	95,0	3,7
Czech Republic	53	95,7	2,5
Germany	847	92,3	8,1
Denmark	434	98,6	8,9
Spain	41	93,7	8,1
Finland	91	100,7	9,6
France	663	91,7	7,9
UK	156	94,8	8,2
Hungary	5	94,6	9,3
Ireland	55	110,5	6,0
Israel	82	100,5	2,7
Italy	636	93,9	6,5
Luxembourg	9	96,4	3,0
Holland	729	95,1	8,4
New Zealand	501	106,2	6,8
Poland	257	93,1	7,4
Sweden	91	103,1	8,8
USA	2610	96,7	8,9

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

Country	No. of bulls	Average	STD
Australia	32	98,8	8,1
Canada	17	96,1	9,1
Denmark	67	100,5	12,1
New Zealand	362	99,0	6,8
USA	300	93,2	9,2

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 a higher level than 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	24	98,4	4,0	24	97,3	4,5
Canada	52	94,2	4,9	52	90,8	3,4
Germany	20	104,4	5,0	20	102,6	3,6
Denmark	97	104,3	5,8	58	105,3	8,4
Finland	156	98,1	5,3	150	99,4	5,2
Norway	131	97,8	1,9	131	98,0	2,7
New Zealand	29	101,3	6,6	29	96,4	5,6
Sweden	114	99,6	7,1	107	101,5	8,0

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	171	103,3	4,0	171	102,8	4,0
Belgium	20	94,2	7,6	20	99,9	7,8
Canada	419	96,1	5,2	418	103,3	4,4
Switzerland	56	97,7	4,0	56	103,0	3,4
Germany	731	95,8	6,0	547	100,9	6,8
Denmark	448	99,1	9,2	275	100,7	9,9
Finland	74	99,8	5,3	73	101,2	6,1
France	679	95,4	6,6	657	106,2	7,3
UK	168	95,9	10,5	167	101,9	7,1
Italy	28	96,7	7,7	20	101,7	6,5
Luxembourg	7	93,4	6,3			
Holland	631	97,2	9,5	576	101,7	8,2
New Zealand	453	102,6	5,3	453	95,3	4,3
Slovenia	21	95,0	4,8			
Sweden	98	97,0	6,8	92	100,4	9,0
USA	387	96,4	7,2	379	103,6	6,5

Table 22. Genetic level for milking speed, Jersey. Bulls born in 2008 or later.

Country	No. of bulls	Average	STD
Australien	50	102,1	6,4
Canada	29	92,8	8,0
Danmark	118	103,2	9,2
New Zealand	307	98,4	7,2
USA	23	96,8	7,7

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 in top for milking speed. Sweden is average for milking speed. For temperament Denmark, Sweden and Finland are at the same level as many 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	5	-12,4	3,7
Germany	15	-0,9	8,6
Denmark	59	5,3	13,4
Finland	197	1,4	8,3
Norway	132	-6,8	8,7
Sweden	129	5,4	7,7

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

Country	No. of bulls	Average	STD
Australia	45	-2,9	8,1
Belgium	22	2,6	9,2
Canada	348	-5,2	9,1
Switzerland	58	-9,2	6,0
Czech Republic	59	-4,3	8,1
Germany	920	-4,8	9,3
Denmark	469	6,2	9,1
Spain	148	-7,4	8,2
Estonia	54	-8,0	7,7
Finland	94	4,3	9,0
France	703	-2,9	8,2
UK	153	-3,9	9,1
Hungary	9	-0,8	6,4
Ireland	67	-8,0	10,2
Italy	689	-6,6	8,3
Japan	81	-0,8	7,9
Luxembourg	9	-1,1	9,1
Holland	776	-0,3	8,7
Poland	428	-9,6	7,6
Slovenia	20	-13,0	7,0
Sweden	120	2,3	15,9
USA	2140	1,9	8,3

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

Country	No. of bulls	Average	STD
Australia	8	-7,9	4,7
Canada	7	-14,4	8,6
Denmark	114	4,3	7,5
USA	272	-5,4	9,1

International comparison of NTM among most important countries shows that:

- Red breeds: Denmark and Sweden is better than Finland. All Nordic countries are better than Canada and Norway
- Holstein: Denmark, Sweden and Finland have the highest level – closely followed by USA. Holstein from Canada, Italy and Germany are somewhat lower
- Jersey: Denmark's average NTM is 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	7
August	11
December	1

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 April 2015 the following changes are done compared to December 2015 routine evaluation:

Yield

- Change of base
  - Holstein in Australia
  - All breeds in Germany
  - Holstein and Jersey from Italy
  - All breeds in Holland
- Change of model or parameters
  - All breed in Canada
  - Holstein in Japan
- All breeds in Great Britain has corrected pedigree information for dams

Calving

- Change of base
  - Holstein from France
  - Holstein, Red breeds and Jersey from Holland
  - Holstein from Italy
- Holstein and Red breed in Germany changed time inclusion of data

Conformation

- Change of base
  - Holstein from Italy
  - Holstein, Red breeds and Jersey from Holland
- Holstein from France has deleted data before 1991
- Holstein, Red breeds and Jersey from Holland has submitted new traits
- Holstein, Red breeds and Jersey in Germany has modified standardization factors

Udder health

- Change of base
    - All breeds from Holland
    - Holstein from Italy
- All breeds from Canada has modified TD model
- Holstein and Red breeds from Germany has changed to relative EBV with mean of 100 and STD of 12

Longevity

- Change of base
    - Holstein from France
    - Holstein from Italy
    - Holstein, Red breeds and Jersey from Holland
- Adjustment of mean or standard deviation
    - Red breeds and Jersey from USA (STD)
    - Holstein and Red breeds from Germany (Mean and STD)
- Change of model or parameters
    - Holstein from France

Milking speed and temperament

- Change of base
    - Holstein from Italy
    - All breeds from Holland
- Holstein from France has deleted data before 1991

Fertility

- Base change
    - Holstein from Italy
    - All breeds from Holland
- All breeds from Holland has sent data for Heifers ability to conceive for the first time. And replaced non-return rate with conception rate
- Holstein and Red breeds from Germany have changed to relative EBV. For some traits the scale is reversed
- All breeds from NAV has changed model and genetic parameters
- France have sent new trait for “interval between first and last insemination”
- All breeds in USA has included data about heifer ability to conceive, for young with no yield indices

Regards

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