INTERBULL breeding values calculated August 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 11.8.2015.

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	23	93,4	94,5	91,5	92,2	8,0
Canada	29	88,5	89,4	83,4	84,8	7,2
Germany	16	97,4	101,9	97,3	99,2	8,3
Denmark	66	100,3	107,1	104,1	106,1	8,1
Estonia	14	96,1	94,9	92,1	92,4	12,1
Finland	233	104,4	102,0	103,3	102,5	7,8
UK	5	77,2	80,6	72,0	74,4	7,9
Norway	177	96,3	94,8	96,5	95,9	9,7
New Zealand	26	86,9	92,2	86,2	88,5	9,8
Sweden	165	98,8	102,0	101,5	102,2	7,4
USA	10	81,8	73,3	72,3	70,8	14,8

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	120	97,2	98,9	97,8	98,4	7,0
Austria	6	95,8	96,8	92,0	93,2	5,5
Belgium	26	104,9	107,0	107,0	107,4	8,6
Canada	558	104,7	103,4	100,8	101,0	9,0
Switzerland	66	98,3	98,0	94,3	95,0	7,7
Czech Republic	68	103,7	100,0	99,7	99,0	9,4
Germany	1049	104,0	101,8	101,6	101,2	8,8
Denmark	552	102,7	103,1	104,3	104,1	8,6
Spain	197	102,9	99,0	97,4	96,9	8,9
Estonia	70	96,2	101,0	94,9	97,0	9,3
Finland	106	101,1	101,7	101,3	101,4	6,7
France	903	107,4	102,2	105,5	103,8	7,5
UK	199	102,4	102,4	98,9	99,6	10,4
Hungary	10	104,3	104,1	103,7	103,8	6,5
Ireland	118	78,2	91,6	82,9	87,3	12,0
Israel	84	95,3	98,1	93,1	94,7	8,2
Italy	827	101,5	99,1	97,1	97,0	8,1
Japan	95	108,7	104,0	105,3	104,0	7,4
Lithuania	10	87,5	92,7	87,7	89,8	10,6
Luxembourg	9	98,3	105,0	98,8	101,3	9,2
Netherlands	959	102,9	102,4	102,6	102,4	9,6
New Zealand	510	78,9	93,9	87,3	91,7	9,2
Poland	498	98,0	96,9	95,8	95,8	7,6
Slovenia	22	93,1	90,9	87,7	87,9	4,8
Sweden	152	103,1	103,5	105,3	105,1	8,1
USA	3052	106,2	103,6	101,9	101,7	8,2

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	39	103,5	92,2	102,6	97,2	7,8
Canada	18	98,9	84,9	91,6	86,2	9,1
Denmark	129	99,9	102,0	101,7	102,4	8,3
New Zealand	367	94,2	89,0	95,0	92,3	7,7
USA	358	114,7	100,6	110,0	103,9	9,2

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	825	116,3	108,4	110,6	110,8	8,8
Germany	1725	114,6	106,5	110,7	110,4	9,2
Denmark	818	114,2	108,2	114,1	113,9	8,7
Netherlands	1428	114,3	107,1	112,7	112,3	9,5
USA	4491	117,7	108,7	112,0	111,7	8,4
Red Holstein on Red Holstein base						
Belgium	16	108,8	103,4	112,7	110,2	7,0
Switzerland	155	98,1	92,6	95,4	94,2	9,0
Czech Republic	10	102,7	93,6	101,6	98,7	6,0
Germany	305	107,0	97,1	104,0	101,0	8,5
Denmark	16	108,8	100,5	108,3	105,4	9,5
Spain	5	109,2	98,0	102,4	99,8	6,2
Italy	45	106,6	96,1	102,6	99,6	10,4
Netherlands	304	105,0	100,6	107,7	105,9	9,8

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	58	105,8	5,4	101,9	3,2	111,4	7,2
Germany	23	106,1	6,0	105,0	3,2	105,0	7,9
Denmark	119	103,3	8,3	102,5	4,6	102,8	8,9
Finland	231	98,2	7,3	96,4	4,8	100,6	8,4
Norway	142			99,5	3,7	89,6	8,4
Sweden	169	97,3	7,9	98,0	4,6	100,3	8,0
USA	6	110,7	6,0	102,0	2,8	112,0	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	60	106,5	7,6	97,4	3,4	96,9	9,5
Austria	6	110,2	11,9	100,3	3,3	108,2	6,7
Belgium	26	114,7	11,9	99,9	5,3	101,7	11,6
Canada	544	116,5	9,8	100,5	5,6	106,4	10,6
Switzerland	74	115,6	9,4	100,2	6,2	103,9	8,9
Czech Republic	91	110,2	9,3	100,8	5,2	100,5	8,5
Germany	1036	109,2	10,0	99,9	6,0	102,3	10,3
Denmark	537	103,3	11,3	99,7	6,2	103,3	9,4
Spain	219	114,9	10,2	100,2	5,5	104,8	8,4
Estonia	60	103,3	8,6	97,4	4,9	90,6	8,9
Finland	97	100,8	8,9	99,0	5,0	104,2	8,2
France	886	113,4	10,4	98,5	5,4	101,2	9,4
UK	201	109,6	11,6	100,4	4,9	102,8	10,7
Hungary	17	113,5	9,4	100,2	5,5	104,1	8,1
Ireland	42	99,6	14,9	95,5	5,2	92,1	16,5
Italy	856	113,2	10,0	100,5	5,4	105,4	9,5
Japan	435	112,7	9,3	99,7	4,8	101,3	10,4
Luxembourg	8	103,3	5,1	100,1	8,0	97,6	9,9
Netherlands	903	109,5	10,7	101,1	5,9	103,0	10,4
New Zealand	248	91,4	10,8	100,5	8,4	99,3	10,4
Poland	514	105,7	10,1	99,0	5,7	96,6	9,6
Slovenia	20	101,9	8,5	96,3	5,4	95,0	10,1
Sweden	119	97,5	9,6	99,3	5,5	101,5	7,4
USA	2287	112,1	10,1	101,4	5,1	107,9	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	19	105,0	5,8	102,4	7,9	89,6	9,0
Canada	38	109,9	5,7	112,0	7,3	105,1	6,4
Denmark	140	99,0	9,7	101,8	8,6	98,9	9,5
USA	382	110,8	8,2	101,4	6,0	97,5	8,4

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 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

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	11	98,2	7,7
Canada	5	102,6	5,4
Germany	16	96,4	10,3
Denmark	101	98,1	10,2
Estonia	12	93,4	8,5
Finland	279	100,0	8,8
UK	6	95,4	9,2
Lithuania	5	97,8	5,5
Norway	178	96,7	6,6
New Zealand	46	91,9	7,0
Sweden	158	101,2	7,9
USA	13	94,1	7,7

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

Country	No. of bulls	Average	STD
Australia	188	95,6	6,4
Austria	6	94,6	5,7
Belgium	26	94,7	9,2
Canada	311	95,2	6,3
Switzerland	74	95,9	6,2
Czech Republic	85	94,1	8,5
Germany	1117	95,2	7,9
Denmark	528	101,3	8,2
Spain	142	93,1	7,5
Estonia	65	94,0	7,7
Finland	105	100,9	8,3
France	851	94,6	6,6
UK	208	96,1	8,2
Hungary	17	95,6	4,3
Ireland	140	96,6	7,7
Israel	87	99,4	6,5
Italy	855	95,5	7,7
Japan	411	91,0	7,4
Korea	8	92,4	5,9
Lithuania	10	98,4	11,0
Luxembourg	10	98,7	6,4
Netherlands	945	96,2	7,7
New Zealand	544	94,1	6,3
Poland	560	94,3	8,5
Slovenia	23	94,5	8,4
Sweden	121	102,7	7,8
USA	3060	99,2	7,7

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

Country	No. of bulls	Average	STD
Australia	21	89,0	4,1
Canada	12	89,7	6,3
Denmark	126	101,2	7,7
USA	406	87,5	7,5

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	45	88,5	8,0
Canada	72	89,2	9,2
Germany	25	92,2	8,2
Denmark	72	94,4	7,3
Finland	266	88,9	13,2
UK	16	84,4	5,3
New Zealand	91	85,3	5,9
Sweden	148	96,5	9,9
USA	36	84,1	9,5

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

Country	No. of bulls	Average	STD
Australia	136	88,2	7,3
Belgium	24	92,4	6,7
Canada	534	91,1	8,7
Switzerland	62	89,2	7,8
Czech Republic	110	93,5	8,1
Germany	1018	91,8	8,7
Denmark	340	96,2	8,8
Spain	196	93,6	6,7
Finland	51	93,4	8,7
France	1026	90,6	7,7
UK	158	94,9	7,4
Hungary	24	92,4	8,3
Ireland	98	91,0	6,6
Israel	86	94,3	5,3
Italy	618	94,6	7,2
Luxembourg	7	89,9	4,0
Netherlands	786	92,6	9,0
New Zealand	491	90,5	6,2
Poland	447	91,6	7,1
Slovenia	22	90,7	9,9
Sweden	67	96,2	8,8
USA	2501	97,4	9,5

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

Country	No	Average	STD
Australia	77	86,8	5,8
Canada	56	86,3	7,1
Denmark	105	97,3	8,6
UK	10	84,8	7,6
Ireland	13	86,8	6,3
New Zealand	733	87,4	5,5
USA	571	89,0	7,0
South Africa	6	90,1	4,8

International comparison for longevity among most important countries shows that:

- Red breeds: Denmark and Sweden have higher level than the other countries. The level in Finland is lower
- Holstein: The genetic level is quite similar across countries. Canada, Germany and France have the lowest level, while USA has the highest 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	58	96,8	5,8	19	96,4	5,8
Denmark	96	98,1	8,2	113	100,2	8,7
Finland	235	100,6	8,4	234	98,4	8,6
Norway	177	100,7	7,6	177	91,8	6,6
Sweden	174	101,4	6,6	172	103,2	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	196	94,2	6,3	4	106,0	3,2
Austria	6	93,0	4,3	5	99,4	7,2
Belgium	26	98,7	9,0	26	98,9	8,0
Canada	594	94,8	7,9	549	97,0	8,7
Switzerland	75	93,4	5,8	55	97,0	9,0
Germany	1109	94,6	7,7	1010	98,4	7,6
Denmark	539	100,2	7,9	518	101,9	8,7
Finland	106	100,8	8,9	106	101,2	8,8
France	960	96,0	8,2	848	98,5	8,8
UK	159	96,1	8,0	51	96,4	8,1
Hungary	17	93,5	7,2	12	99,4	6,4
Ireland	166	101,2	6,4	8	106,9	6,6
Israel	8	97,4	5,2	92	98,9	5,9
Italy	859	93,9	7,8	418	98,4	6,9
Luxembourg	10	97,8	4,2	9	102,6	5,1
Netherlands	905	97,0	7,2	791	98,1	8,3
New Zealand	546	101,0	5,5	11	94,5	10,1
Sweden	118	101,8	8,5	126	101,5	7,5
USA	3357	96,6	6,7	2964	102,1	6,8

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	23	96,8	9,7
Canada	27	94,9	6,1
Germany	16	92,1	6,7
Denmark	64	98,8	10,0
Finland	230	95,2	8,8
Norway	177	106,2	8,0
New Zealand	26	97,9	4,0
Sweden	174	100,4	9,1
USA	10	95,4	4,9

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

Country	No. of bulls	Average	STD
Australia	117	91,5	7,9
Belgium	25	95,7	8,4
Canada	544	92,1	8,9
Switzerland	66	95,1	3,8
Czech Republic	60	96,0	2,3
Germany	959	92,6	8,2
Denmark	512	98,9	9,2
Spain	99	92,4	7,8
Finland	107	101,7	9,6
France	775	92,0	7,7
UK	187	94,7	8,5
Hungary	5	94,2	10,9
Ireland	66	109,1	6,6
Israel	82	100,5	2,7
Italy	792	94,1	6,5
Luxembourg	9	95,3	4,1
Netherlands	852	95,6	8,4
New Zealand	510	105,9	6,8
Poland	327	93,0	7,2
Sweden	114	102,9	9,2
USA	2951	97,2	9,2

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

Country	No. of bulls	Average	STD
Australia	39	100,2	7,9
Canada	18	95,5	8,8
Denmark	92	100,5	10,8
Ireland	5	99,6	11,5
New Zealand	368	99,7	6,9
USA	352	93,4	9,5

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	26	98,4	4,5	26	97,8	5,0
Canada	58	93,2	6,2	57	90,5	3,9
Germany	23	104,5	3,9	23	102,2	3,0
Denmark	82	104,6	6,6	64	106,0	11,7
Finland	236	98,3	5,6	233	99,2	6,5
Norway	170	98,6	2,0	168	98,6	2,7
New Zealand	30	101,2	6,6	30	96,3	5,5
Sweden	167	100,9	5,0	163	101,1	7,0

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	173	103,6	4,1	173	102,6	4,1
Austria	6	104,1	3,5			
Belgium	23	95,1	6,9	23	99,6	7,8
Canada	466	96,7	5,2	464	103,1	4,6
Switzerland	70	97,4	4,6	70	102,8	3,7
Germany	836	96,5	6,5	605	100,6	7,2
Denmark	474	99,8	11,7	315	100,7	10,8
Finland	100	99,6	5,1	99	100,9	6,7
France	767	96,2	7,1	743	105,8	7,6
UK	200	96,7	10,5	196	100,7	6,9
Ireland	5	95,6	4,5			
Italy	32	95,8	8,5	25	101,1	7,9
Luxembourg	8	93,8	6,3			
Netherlands	724	97,9	9,3	647	101,3	8,3
New Zealand	456	103,0	5,4	456	95,4	4,4
Slovenia	24	95,7	6,9			
Sweden	121	98,1	5,3	114	99,6	8,7
USA	447	97,0	7,7	432	103,3	6,8

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

Country	No. of bulls	Average	STD
Australien	53	102,2	7,0
Canada	32	93,5	8,4
Danmark	112	103,8	10,5
New Zealand	313	99,0	7,4
USA	28	96,9	8,7

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 above 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	-14,2	2,9
Germany	16	-2,5	8,9
Denmark	66	5,1	13,3
Finland	233	1,5	8,8
Norway	142	-7,5	8,9
Sweden	165	4,8	7,8

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

Country	No. of bulls	Average	STD
Australia	51	-4,2	7,3
Austria	6	-8,5	7,6
Belgium	26	1,0	9,9
Canada	424	-5,5	9,4
Switzerland	66	-10,5	6,0
Czech Republic	68	-4,7	8,4
Germany	1017	-5,2	9,5
Denmark	537	5,4	9,1
Spain	158	-9,4	8,0
Estonia	58	-8,7	7,3
Finland	106	3,6	9,1
France	800	-3,5	8,2
UK	185	-4,5	8,8
Hungary	10	-1,1	7,1
Ireland	70	-8,8	10,3
Italy	822	-7,0	8,4
Japan	95	-2,1	7,6
Luxembourg	9	-2,6	9,2
Netherlands	882	-1,0	8,9
Poland	492	-10,1	7,6
Slovenia	22	-14,6	7,2
Sweden	152	0,1	17,6
USA	2449	1,5	8,5

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

Country	No. of bulls	Average	STD
Australia	15	-6,2	5,6
Canada	10	-16,1	8,1
Denmark	129	2,9	7,8
USA	321	-5,9	8,7

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 and Holland. Holstein from Canada, Italy and Germany are somewhat lower
- Jersey: Denmark's average NTM is almost 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 from Spain
- All breeds from Australia have slight reductions in the reliability
- Holstein from Italy have some bulls losing some info
- All breeds from Canada have some bulls that lose daughters/herds/EDCs
- RDC from Norway have some bulls that have fewer EDC although number of daughters stay the same

Calving

- All breeds from Australia have slight reductions in the reliability
- Holstein from Italy have some bulls losing some info
- I All breeds from Canada have some bulls that lose daughters/herds/EDC
- All breeds from Holland have a decrease in reliability/EDC
- Holstein from Belgium have decreases in the number of herds and number of daughters
- RDC from Norway have some bulls that have fewer EDC although number of daughters stay the same

Conformation

- Change of base
  - Holstein from Spain
  - RDC and Jersey from South Africa
- All breeds from Australia have reductions in information
- Holstein from Italy have reductions in information
- Canada have reductions in information
- All breeds from New Zealand have changes due to parentage verifications

Udder health

- Change of base
    - All breeds from Great Britain
    - Holstein from Spain
- Holstein and Jersey from Australia have decrease in information
- All breeds from Canada have decrease in information

Longevity

- All breeds from Italy have some bulls losing some info
- All breeds from Germany have some bulls losing some info
- All breeds from Spain have decreased reliability for some old bulls

Milking speed and temperament

- Holstein and Jersey from Australia have reductions in information
- All breeds from Canada have reduction in information

Fertility

- Change of base
    - Holstein from Spain
- Holstein and Jersey from Australia have pedigree changes
- Red Holstein from Germany have changes for 14 bulls
- All breeds from Nordic countries have implemented new model
- All breeds from France have some bulls changing from official to unofficial, and some reductions in herds/daughters/edc
- All breeds from Italy have some bulls losing some info
- All breeds from Holland have a decrease in reliability/EDC
- All breeds from USA have drop in the number of herds/daughters

Regards

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