INTERBULL breeding values calculated April 2016

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 05.04.2016.

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 on www.nordicebv.info

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 2009 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 2009 or later.

Country	No. of bulls	Milkindex	Fatindex	Proteinindex	Y-index	Y-index STD
Australia	12	92,6	94,0	89,8	90,8	9,4
Canada	24	88,0	87,3	81,3	82,3	8,0
Germany	10	94,8	94,7	91,3	91,9	6,5
Denmark	36	101,6	108,4	105,7	107,6	7,2
Estonia	19	96,3	96,3	93,3	93,8	10,1
Finland	172	104,4	102,6	103,8	103,2	7,9
Norway	176	96,1	94,3	96,0	95,3	9,4
New Zealand	26	88,7	93,0	88,0	89,9	8,4
Sweden	137	99,9	103,1	102,7	103,5	7,2
USA	5	77,8	75,2	67,8	69,0	6,5

Table 3.Genetic level for yield traits, Holstein. Bulls born in 2009 or later.

Country	No. of bulls	Milkindex	Fatindex	Proteinindex	Y-index	Y-index STD
Australia	99	97,2	99,0	98,1	98,6	7,2
Belgium	25	106,6	107,1	106,4	106,6	9,1
Canada	493	106,2	105,1	102,6	102,9	9,5
Switzerland	49	98,2	97,6	93,9	94,5	7,8
Czech Republic	45	103,8	99,6	98,6	97,9	8,7
Germany	657	105,2	103,8	103,3	103,1	8,6
Denmark	414	103,1	103,6	104,5	104,4	8,0
Spain	120	103,1	99,8	97,2	97,1	8,3
Estonia	65	96,6	100,0	95,1	96,8	8,9
Finland	65	101,2	101,0	100,9	100,9	7,5
France	610	107,5	103,4	106,5	105,1	7,4
UK	162	103,7	105,0	100,3	101,5	9,1
Hungary	8	104,9	105,3	102,3	102,9	9,2
Ireland	88	79,1	91,7	83,1	87,3	12,9
Israel	95	96,4	100,6	96,2	97,9	8,4
Italy	672	102,2	100,5	98,3	98,4	8,5
Japan	75	109,2	104,1	105,1	104,0	7,4
Netherlands	748	103,3	103,2	102,9	102,9	9,8
New Zealand	498	79,1	93,8	87,5	91,8	7,9
Poland	401	99,3	99,6	98,0	98,4	7,5
Portugal	5	90,4	90,6	87,0	87,6	12,8
Slovenia	25	93,4	90,5	89,5	89,0	4,6
Sweden	96	102,3	102,9	105,2	104,8	7,5
USA	2706	107,0	104,7	102,9	102,8	8,6

Table 4.Genetic level for yield traits, Jersey. Bulls born in 2009 or later.

Country	No. of bulls	Milkindex	Fatindex	Proteinindex	Y-index	Y-index STD
Australia	33	103,5	95,5	103,1	99,3	5,8
Canada	15	97,5	82,7	89,6	83,8	11,7
Denmark	105	100,8	101,8	102,0	102,4	8,3
New Zealand	345	95,6	89,1	95,9	92,6	6,9
USA	331	115,6	102,0	111,2	105,3	8,6

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 2009 or later.

Country	No. of bulls	Milkindex	Fatindex	Proteinindex	Y-index	Y-index STD
Holstein on Red Holstein base						
Canada	721	117,4	109,8	112,2	112,4	9,4
Germany	1254	116,1	108,1	112,5	112,2	8,9
Denmark	644	114,4	108,9	114,6	114,6	8,4
Holland	1182	114,9	108,6	113,4	113,5	9,5
USA	3891	118,5	110,1	113,1	113,0	8,4
Red Holstein on Red Holstein base						
Belgium	19	110,2	103,8	113,9	111,1	8,4
Switzerland	143	99,5	95,3	97,2	96,4	8,6
Germany	215	108,1	98,4	105,6	102,6	8,6
Denmark	12	104,3	100,9	104,6	103,5	9,7
Spain	6	106,2	100,3	101,2	100,2	6,1
Italy	30	108,6	98,5	105,9	102,9	9,6
Netherlands	277	104,6	101,3	108,1	106,4	9,3

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, Canada, Netherlands, 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: Holland has higher genetic level for yield than the red and white in Germany and Denmark. 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 2009 or later.

Country	No. of bulls	Body		Feet&legs		Udder	
		Average	STD	Average	STD	Average	STD
Canada	48	106,6	5,2	102,6	3,4	112,1	7,0
Germany	18	108,3	6,5	105,3	3,2	106,1	7,2
Denmark	84	103,1	9,1	102,1	4,6	103,5	8,8
Finland	170	97,7	7,5	96,8	4,7	101,9	8,0
Norway	176			99,3	4,3	89,5	8,6
Sweden	138	97,8	7,8	98,1	4,6	100,6	7,3
USA	7	110,9	7,1	101,6	4,6	114,3	9,9

Table 7. Genetic level of conformation traits, Holstein. Bulls born in 2009 or later.

		Body		Feet&legs		Udder	
Country	No	Average	STD	Average	STD	Average	STD
Australia	54	107,4	8,1	98,3	3,6	98,1	10,7
Belgium	24	112,9	11,0	99,9	5,3	106,1	10,2
Canada	471	117,1	9,9	100,7	5,6	109,0	9,6
Switzerland	53	115,1	9,9	101,0	6,0	105,0	9,8
Czech Republic	55	109,4	9,1	100,9	5,7	101,2	8,2
Germany	705	109,8	10,3	100,6	6,2	104,6	10,5
Denmark	414	102,5	11,7	100,1	6,2	104,2	9,9
Spain	131	113,5	10,7	100,6	5,4	106,2	8,3
Estonia	57	103,5	7,8	97,1	4,7	90,5	9,9
Finland	60	100,5	8,4	99,1	5,6	105,9	8,6
France	556	112,8	10,0	99,0	5,3	102,7	9,6
UK	155	110,5	10,8	100,7	4,9	104,0	9,9
Hungary	9	108,1	4,8	101,4	6,1	108,3	8,5
Ireland	32	96,6	15,9	96,5	5,7	92,5	20,7
Italy	688	112,4	9,8	101,1	4,9	105,9	9,4
Japan	347	112,8	9,7	99,3	4,7	101,7	9,9
Luxembourg	5	109,6	7,3	100,8	6,1	108,2	5,6
Netherlands	701	110,0	11,0	101,9	6,0	105,1	10,7
New Zealand	451	87,2	10,3	101,8	9,2	99,8	12,9
Poland	417	106,2	10,1	99,2	4,9	96,8	9,2
Portugal	6	107,7	2,9	97,7	6,4	93,5	8,3
Slovenia	22	103,0	8,5	97,6	5,0	94,9	9,8
Sweden	88	98,1	8,9	98,6	6,1	101,7	7,4
USA	1957	112,8	10,0	102,0	5,2	109,6	9,1

Table 8. Genetic level of conformation traits, Jersey. Bulls born in 2009 or later.

		Body		Feet&legs		Udder	
Country	No	Average	STD	Average	STD	Average	STD
Australia	22	102,2	6,2	98,6	5,4	84,9	6,8
Canada	35	111,1	6,7	111,1	8,4	100,8	7,6
Denmark	121	100,1	8,9	101,2	7,3	100,7	10,5
USA	311	110,4	7,1	102,8	7,6	94,2	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, 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, has the highest genetic level for udder.

- Jersey: Denmark has lower genetic level for the body than USA, but better 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 2009 or later.

Country	No. of bulls	Average	STD
Australia	6	95,8	7,5
Germany	12	91,9	8,6
Denmark	63	100,3	9,2
Estonia	17	91,7	8,4
Finland	198	100,0	8,4
Lithuania	6	98,3	5,9
Norway	176	96,0	10,1
New Zealand	31	90,0	8,6
Sweden	131	101	7,7
USA	6	86,6	10,2

Table 10. Genetic level for udder health, Holstein. Bulls born in 2009 or later.

Country	No. of bulls	Average	STD
Australia	97	95,5	6,7
Belgium	19	99,8	7,0
Canada	234	96,3	6,9
Switzerland	45	97,0	6,1
Czech Republic	49	95,8	10,0
Germany	623	96,7	8,0
Denmark	328	102,0	8,4
Spain	139	94,1	7,9
Estonia	53	95,3	7,4
Finland	60	101,3	8,5
France	463	95,8	6,4
UK	132	96,6	8,0
Hungary	8	98,7	5,1
Ireland	96	97,5	8,0
Israel	87	100,6	7,7
Italy	565	96,9	7,7
Japan	250	91,4	8,1
Netherlands	693	97,4	7,8
New Zealand	523	94,9	6,9
Poland	401	95,0	8,6
Portugal	6	94,7	5,3
Slovenia	18	94,9	9,3
Sweden	79	103,1	7,3
USA	2404	100,4	8,0

Table 11. Genetic level for udder health, Jersey. Bulls born in 2009 or later.

Country	No. of bulls	Average	STD
Australia	13	90,0	4,0
Canada	11	85,9	8,1
Denmark	105	101,7	7,7
USA	384	87,5	8,5

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

- Red breeds: Sweden, Denmark and Finland have higher genetic level than Norway
- Holstein: Denmark, Sweden, Finland and USA 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 2007 or later.

Country	No. of bulls	Average	STD
Australia	24	87,9	9,0
Canada	54	93,0	5,7
Germany	15	90,0	11,5
Denmark	13	98,4	7,0
Finland	116	85,0	15,1
UK	8	88,7	4,5
New Zealand	63	85,8	6,3
Sweden	23	101,2	7,3
USA	16	87,0	9,3

Table 13. Genetic level for longevity, Holstein. Bulls born in 2007 or later.

Country	No. of bulls	Average	STD
Australia	141	90,7	7,8
Belgium	26	95,2	9,0
Canada	598	93,9	9,6
Switzerland	78	88,7	7,4
Czech Republic	85	96,5	8,3
Germany	956	93,2	8,9
Denmark	217	97,7	9,1
Spain	207	94,4	6,8
Finland	26	98,9	7,7
France	968	93,2	8,0
UK	181	94,6	7,5
Hungary	19	92,5	7,9
Ireland	147	92,8	7,5

Israel	143	92,9	5,9
Italy	774	96,9	7,4
Luxembourg	8	95,0	6,6
Netherlands	931	96,0	8,5
New Zealand	726	91,7	6,2
Poland	654	92,4	7,5
Slovenia	34	91,3	8,2
Sweden	23	101,9	8,6
USA	3006	101,2	9,4

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

Country	No	Average	STD
Australia	39	87,7	4,1
Canada	35	87,3	6,6
Denmark	34	98,5	8,3
UK	6	90,7	4,3
Ireland	13	85,0	4,3
New Zealand	538	87,3	5,1
USA	391	92,4	6,6
South Africa	5	87,2	4,5

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 2009 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 2009 or later.

Country	Calving, direct			Calving, maternal		
	No. of bulls	Average	STD	No. of bulls	Average	STD
Canada	48	96,1	7,0	15	96,7	6,6
Denmark	62	98,1	9,4	76	103	7,4
Finland	176	101,8	8,2	168	98,8	8,3
Norway	176	101,0	7,3	176	92,9	5,8
Sweden	138	101,8	6,1	136	102,9	6,3
USA	7	95,0	7,7	1	101,0	

Table 16. Genetic level for calving, maternal and calving, direct, Holstein. Bulls born in 2009 or later.

Country	Calving, direct			Calving, maternal		
	No. of bulls	Average	STD	No. of bulls	Average	STD
Australia	172	94,4	6,6	6	102,7	5,0
Belgium	28	100,6	7,9	26	99,9	7,3
Canada	526	96,5	7,1	488	98,2	8,2
Switzerland	58	95,0	5,7	44	96,5	7,2
Germany	719	95,9	7,5	652	98,3	7,6
Denmark	419	101,2	7,3	407	102,0	8,4
Finland	65	100,7	9,4	64	102,6	8,3
France	688	97,3	7,6	593	98,9	8,9
UK	146	97,7	7,8	47	97,3	8,7
Hungary	10	95,1	5,3	9	100,4	6,9
Ireland	127	101,4	5,9	9	104,8	6,7
Israel	9	101,0	5,0	105	98,0	6,2
Italy	689	95,1	7,8	263	97,8	6,4
Luxembourg	5	96,8	7,5	5	102,6	8,8
Netherlands	701	97,2	6,9	613	98,1	7,8
New Zealand	563	101,2	5,2	10	88,6	7,0
Sweden	89	102,2	8,3	96	101,6	8,0
USA	2944	97,3	6,7	2652	102,4	7,1

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 2009 or later.

Country	No. of bulls	Average	STD
Australia	12	95,9	9,8
Canada	24	95,6	7,2
Germany	10	94,6	7,8
Denmark	34	97,7	9,7
Finland	160	94,8	8,2
Norway	176	105,9	7,9
New Zealand	26	98,2	4,1
Sweden	126	100,3	7,5
USA	5	93,4	7,9

Table 18. Genetic level for female fertility, Holstein. Bulls born in 2009 or later.

Country	No. of bulls	Average	STD
Australia	94	92,0	8,2
Belgium	24	99,6	6,1
Canada	477	93,8	8,9
Switzerland	46	94,9	3,0
Czech Republic	39	96,8	2,5
Germany	589	95,7	7,6
Denmark	377	100,9	9,4
Spain	36	91,3	6,6
Finland	68	103,3	10,8
France	495	94,8	4,6
UK	154	95,9	6,6
Hungary	5	93,6	4,2
Ireland	79	108,4	7,8
Israel	88	100,6	2,4
Italy	611	94,8	6,7
Netherlands	656	96,5	8,1
New Zealand	498	106,5	6,1
Poland	241	92,9	6,9
Sweden	88	102,0	8,8
USA	2598	97,8	8,8

Table 19. Genetic level for female fertility, Jersey. Bulls born in 2009 or later.

Country	No. of bulls	Average	STD
Australia	53	98,8	9,2
Canada	22	95,8	9,4
Denmark	126	100,8	11,0
UK	5	98,8	5,3
Ireland	6	98,7	10,6
New Zealand	486	99,5	6,9
USA	449	91,9	9,7

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 and New Zealand than the other major countries

Milking speed and temperament

In Tables 20-22, the genetic level for bulls from different countries, born in 2009 or later are shown for Holstein, Red breeds and Jersey.

Table 20. Genetic level for milking speed and temperament, Red breeds. Bulls born in 2009 or later.

Country	Milking speed			Temperament		
	No. of bulls	Average	STD	No. of bulls	Average	STD
Australia	36	97,2	3,5	36	98,5	4,8
Canada	72	93,6	6,4	72	90,6	4,1
Germany	28	103,4	5,2	26	102,6	3,2
Denmark	113	104,6	8,1	75	105,8	11,9
Finland	254	98,5	6,0	253	99,4	7,0
Norway	233	98,8	2,1	229	98,6	2,6
New Zealand	39	100,8	6,5	39	95,7	4,7
Sweden	179	100,9	5,2	189	101,1	6,9

Table 21. Genetic level for milking speed and temperament, Holstein. Bulls born in 2009 or later.

Country	Milking speed			Temperament		
	No. of bulls	Average	STD	No. of bulls	Average	STD
Australia	152	104,2	5,1	152	102,0	5,4
Belgium	21	95,1	7,3	20	99,3	7,0
Canada	391	97,5	5,7	387	102,5	5,0
Switzerland	51	98,9	4,4	51	102,3	3,5
Germany	587	97,0	8,3	328	100,3	9,3
Denmark	398	99,2	10,9	191	100,1	12,7
Finland	59	98,4	6,5	58	100,2	8,4
France	471	96,7	7,6	452	105,7	8,0
UK	161	97,3	10,9	151	99,2	6,3
Ireland	9	91,5	6,2			
Italy	27	97,2	10,5	22	101,6	8,1
Netherlands	560	98,3	9,2	454	101,3	7,9
New Zealand	484	103,5	6,1	484	95,3	3,7
Slovenia	25	95,2	5,7			
Sweden	94	99,7	5,8	87	100,5	8,1
USA	380	97,6	8,6	369	104,0	7,8

Table 22. Genetic level for milking speed, Jersey. Bulls born in 2009 or later.

Country	No. of bulls	Average	STD
Australien	67	101,6	6,3
Canada	41	93,7	8,4
Danmark	148	101,2	10,7
New Zealand	433	98,4	7,5
USA	42	98,0	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 Sweden are in top for milking speed. Finland is above average for milking speed together with Nederlands. 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 2009 or later.

Table 23. Genetic level for NTM, Red breeds. Bulls born in 2009 or later.

Country	No. of bulls	Average	STD
Canada	7	-18,7	8,2
Germany	10	-11,5	8,2
Denmark	36	10,8	7,5
Finland	172	3,4	8,5
Norway	176	-8,2	8,6
Sweden	137	5,7	7,4

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

Country	No. of bulls	Average	STD
Australia	44	-1,7	8,8
Belgium	24	4,4	7,6
Canada	375	-1,7	9,9
Switzerland	49	-10,1	6,4
Czech Republic	45	-4,0	6,9
Germany	642	-0,7	8,8
Denmark	412	7,7	8,0
Spain	120	-7,6	8,5
Estonia	56	-8,9	7,6
Finland	64	5,6	8,3
France	519	-0,2	7,3
UK	155	-2,0	8,5
Hungary	7	-1,6	10,0
Ireland	49	-9,1	12,0
Italy	662	-4,4	9,0
Japan	75	-1,8	7,8
Netherlands	692	0,8	8,4
Poland	400	-7,5	7,8
Portugal	5	-19,0	10,4
Slovenia	23	-13,7	7,3
Sweden	96	8,5	7,6
USA	2119	3,7	8,7

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

Country	No. of bulls	Average	STD
Australia	19	-9,4	5,6
Canada	11	-22,4	11,1
Denmark	105	4,3	8,4
USA	262	-6,4	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
- Jersey: Denmark's average NTM is almost 10 index points better than USA

Dates of publication of Interbull breeding values in 2016:

Table 26. Dates of publication in 2016

Month	Date
April	5
August	9
December	6

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 2016 the following changes are done compared to December 2015 routine evaluation:

Yield

- Change of base
    - Holstein from France
    - Holstein from Italy + 1 year of data deleted
    - Holstein and RDC from Germany
    - All breeds from Canada
- RDC from Norway has changed standard deviation from 10 to 12
- Some Holstein and Jersey bulls from New Zealand have lost daughters due to parentage verification

Calving

- Change of base
    - Holstein from France
    - Holstein from Italy + 1 year of data deleted
    - All breeds from Canada
- RDC from Norway has changed standard deviation from 10 to 12
- Holstein and RDC from Germany have fewer herds due to different editing
- Some Holstein and Jersey bulls from New Zealand have lost daughters due to parentage verification

Conformation

- Change of base
    - Holstein from France
    - Holstein from Italy + 1 year of data deleted
    - Holstein and Jersey from Great Britain
    - Holstein, Jersey and RDC from Canada
- RDC from Norway has changed standard deviation from 10 to 12
- All breeds from New Zealand has change in number og daughters and herds due to parent-age verification + has general error in number of herds

Udder health

- Change of base
    - All breeds from France
    - Holstein from Italy + 1 year of data deleted
    - Holstein, Jersey and RDC from Germany
    - All breeds from Canada
- RDC from Norway has changed standard deviation from 10 to 12
- All breeds from Holland has added clinical mastitis to evaluation
- All breeds from New Zealand has change in number og daughters and herds due to parent-age verification

Longevity

- Change of base
    - Holstein from France
    - Holstein from Italy + 1 year of data deleted
    - All breeds from Canada
- RDC from Norway has changed standard deviation from 10 to 12
- All breeds from New Zealand has change in number og daughters and herds due to parent-age verification

Milking speed and temperament

- Change of base
    - All breeds from Canada
- RDC from Norway has changed standard deviation from 10 to 12
- Holstein and RDC from Germany change editing
- All breeds from Holland modify genetic groups
- All breeds from New Zealand has change in number og daughters and herds due to parent-age verification

Fertility

- Change of base
    - Holstein from Italy + 1 year of data deleted
    - All breeds from France
    - All breeds from Canada
- RDC from Norway has changed standard deviation from 10 to 12
- Holstein and RDC from Germany change editing
- All breeds from New Zealand has change in number og daughters and herds due to parent-age verification

Regards

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