INTERBULL breeding values calculated August 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 09.08.2016.

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	17	92,7	95,4	90,4	91,9	8,7
Canada	29	87,1	86,7	80,3	81,5	9,3
Germany	12	96,3	96,3	93,6	94,3	7,5
Denmark	41	102,0	107,8	105,4	107,1	7,2
Estonia	20	96,1	95,2	92,7	93,1	9,8
Finland	203	104,1	102,3	103,8	103,1	7,9
Norway	247	95,1	94,1	95,0	94,6	9,0
New Zealand	29	87,4	91,5	86,4	88,3	8,9
Sweden	166	99,8	102,5	102,4	103,0	7,0
USA	9	77,4	71,1	66,4	66,3	7,6

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	109	96,9	98,8	97,5	98,2	7,2
Belgium	34	105,7	105,7	104,6	104,8	7,8
Canada	573	105,9	105,1	102,3	102,7	9,5
Switzerland	55	97,9	97,3	93,7	94,3	7,9
Czech Republic	50	103,8	99,8	98,7	98,1	9,0
Germany	747	104,8	103,5	102,8	102,7	8,6
Denmark	483	102,7	103,1	104,0	103,9	8,3
Spain	155	101,9	99,8	96,3	96,5	8,7
Estonia	75	95,9	99,8	94,4	96,3	8,7
Finland	78	100,8	100,6	101,4	101,2	8,1
France	704	106,8	103,0	105,7	104,5	7,4
UK	190	103,8	104,7	100,2	101,3	9,0
Hungary	8	104,5	105,6	101,8	102,8	9,0
Ireland	150	77,6	93,2	83,6	88,6	12,2
Israel	106	95,9	100,5	95,9	97,8	8,4
Italy	760	102,0	100,1	97,9	98,0	8,7
Japan	96	108,3	102,9	103,9	102,6	7,8
Luxembourg	5	104,2	107,2	105,0	106,2	8,7
Netherlands	882	103,1	102,7	102,4	102,3	9,7
New Zealand	520	78,9	93,4	87,3	91,5	7,9
Poland	463	99,0	99,2	97,4	97,8	7,6
Portugal	5	89,8	90,0	86,2	86,8	12,8
Slovenia	27	92,8	89,7	88,7	88,3	4,6
Sweden	112	101,4	103,0	104,5	104,5	7,8
USA	3001	106,4	104,3	102,1	102,1	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	37	103,8	95,8	103,4	99,5	5,8
Canada	16	97,8	82,6	89,4	83,6	11,8
Denmark	132	100,3	101,5	101,5	101,9	8,3
New Zealand	350	95,7	88,2	95,4	91,8	7,1
USA	386	115,6	101,4	110,8	104,8	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	803	117,1	109,8	111,9	112,2	9,5
Germany	1356	115,7	107,8	112,0	111,8	9,0
Denmark	713	114,1	108,5	114,2	114,2	8,6
Netherlands	1309	114,7	108,2	112,9	112,9	9,5
USA	4214	117,9	109,6	112,4	112,4	8,5
Red Holstein on Red Holstein base						
Belgium	18	110,8	103,4	114,3	110,9	9,0
Switzerland	158	99,3	95,1	96,9	96,0	8,3
Germany	239	108,2	98,4	105,6	102,6	8,7
Denmark	13	104,2	99,8	103,8	102,5	9,4
Spain	6	105,2	98,8	99,8	98,8	6,5
Italy	34	107,6	97,8	104,7	101,8	9,4
Netherlands	316	104,9	101,3	108,2	106,5	9,2

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, France, Germany, USA and Netherlands 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 include 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	57	107,1	5,0	102,6	3,5	111,4	7,1
Germany	21	108,6	6,5	104,2	3,3	105,1	8,0
Denmark	104	103,1	8,7	102,4	4,5	102,9	8,6
Finland	202	97,4	7,5	96,6	4,8	101,5	8,0
UK	5	100,6	12,5			105,8	8,3
Norway	247			98,7	4,3	90,0	9,0
Sweden	166	97,3	7,7	97,8	4,9	100,7	7,3
USA	9	112,4	7,4	101,9	3,5	116,0	9,0

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	8,0	98,2	3,7	97,1	10,8
Belgium	33	111,5	11,1	100,5	6,2	104,9	10,7
Canada	546	117,0	10,4	100,9	5,8	107,8	9,7
Switzerland	60	114,7	10,3	100,4	6,3	104,0	9,4
Czech Republic	54	109,5	9,1	100,8	5,7	99,9	8,3
Germany	802	110,0	10,6	100,7	6,3	103,8	10,4
Denmark	483	102,4	11,9	100,2	6,1	103,3	9,8
Spain	184	113,5	10,8	100,4	5,6	105,2	8,5
Estonia	66	102,9	8,4	97,3	4,7	90,3	10,3
Finland	73	99,0	8,8	99,8	5,8	104,1	8,6
France	668	112,9	10,3	99,1	5,4	102,1	9,9
UK	186	110,2	10,9	100,7	5,1	102,6	10,0
Hungary	9	108,0	4,9	100,9	5,7	107,0	8,7
Ireland	33	97,0	15,9	96,5	5,8	91,6	20,7
Italy	782	112,5	9,9	101,0	5,1	104,8	9,4
Japan	436	113,1	9,9	99,4	4,8	101,0	10,1
Luxembourg	5	108,2	5,5	101,4	4,6	107,6	6,2
Netherlands	824	109,9	11,0	101,9	6,2	104,4	10,6
New Zealand	460	87,3	10,2	103,5	8,8	100,9	13,6
Poland	492	106,4	10,0	98,9	4,8	95,7	9,2
Portugal	6	107,8	2,6	97,8	6,3	92,0	8,7
Slovenia	25	102,7	7,8	98,1	5,7	92,5	10,0
Sweden	109	97,9	9,1	98,6	6,4	101,6	7,8
USA	2145	112,4	10,1	101,8	5,2	108,3	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	23	102,4	5,9	99,1	5,4	84,7	6,7
Canada	37	111,5	6,4	111,2	8,7	100,6	8,0
Denmark	149	100,2	9,0	101,2	7,2	100,7	10,0
USA	407	110,6	7,3	102,8	7,4	94,5	8,7

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	94,8	7,6
Canada	5	96,0	7,0
Germany	14	91,7	9,1
Denmark	78	98,8	9,0
Estonia	19	92,4	9,4
Finland	242	99,9	8,1
UK	5	97,8	9,4
Lithuania	6	99,4	4,4
Norway	247	95,6	9,9
New Zealand	45	89,9	9,6
Sweden	165	101,3	8,2
USA	10	87,8	9,4

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

Country	No. of bulls	Average	STD
Australia	164	95,1	6,9
Belgium	34	98,7	7,9
Canada	394	95,8	8,7
Switzerland	62	95,4	6,6
Czech Republic	57	94,7	10,3
Germany	815	96,6	8,1
Denmark	490	102,0	8,4
Spain	186	94,6	7,7
Estonia	71	94,9	7,5
Finland	77	101,7	8,1
France	661	96,0	6,7
UK	206	96,4	8,3
Hungary	9	98,6	7,7
Ireland	172	95,9	8,0
Israel	112	100,2	7,8
Italy	776	96,3	7,9
Japan	414	91,5	8,5
Luxembourg	5	93,8	11,8
Netherlands	888	97,4	7,9
New Zealand	563	93,5	8,2
Poland	533	95,0	9,2
Portugal	9	91,3	7,3
Slovenia	29	92,7	8,8
Sweden	112	102,7	7,7
USA	3079	100,1	8,2

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

Country	No. of bulls	Average	STD
Australia	18	89,1	5,6
Canada	15	86,1	7,0
Denmark	131	101,3	7,7
UK	5	90,0	4,9
USA	439	87,4	8,7

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	86,6	9,1
Canada	62	92,2	6,3
Germany	18	89,6	10,1
Denmark	34	96,8	7,1
Finland	170	86,3	14,6
UK	9	87,2	4,9
New Zealand	66	85,6	6,2
Sweden	47	100,0	7,2
USA	18	86,9	9,0

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

Country	No. of bulls	Average	STD
Australia	172	89,4	8,3
Belgium	30	95,2	9,2
Canada	669	93,7	9,6
Switzerland	80	87,9	7,3
Czech Republic	85	95,6	8,6
Germany	1071	93,2	9,2
Denmark	308	98,3	9,1
Spain	244	94,7	7,1
Finland	50	98,5	7,8
France	1059	92,6	7,9
UK	218	94,6	7,6
Hungary	19	92,1	8,1
Ireland	153	92,6	7,2
Israel	156	92,7	6,0
Italy	864	96,4	7,6
Luxembourg	8	93,8	7,1
Netherlands	1067	95,8	8,5
New Zealand	738	91,4	6,6
Poland	719	92,2	7,7
Slovenia	38	91,3	8,4
Sweden	42	103,0	8,7
USA	3355	101,0	9,4

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

Country	No	Average	STD
Australia	48	87,4	4,2
Canada	40	88,2	6,5
Denmark	53	98,4	8,8
UK	8	88,8	4,0
Ireland	13	84,1	4,1
New Zealand	541	87,6	5,2
USA	438	91,9	6,8
South Africa	6	85,9	3,8

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 and the Nordic countries have 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	57	95,9	7,3	20	96,1	6,1
Denmark	72	98,6	9,3	91	102,5	7,5
Finland	207	101,6	8,1	172	98,9	8,3
Norway	247	100,5	7,8	247	92,9	6,1
Sweden	168	101,8	6,3	165	102,7	6,5
USA	7	94,4	8,2	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	194	94,3	6,5	6	102,0	6,2
Belgium	34	100,4	7,5	31	99,0	7,9
Canada	617	96,5	7,1	568	97,7	8,1
Switzerland	68	95,3	5,6	48	96,1	6,9
Germany	813	96,0	7,4	737	97,9	7,7
Denmark	482	100,9	7,2	474	101,6	8,4
Finland	78	101,1	9,2	65	102,0	8,5
France	757	97,2	7,5	655	98,7	9,1
UK	163	97,5	7,4	52	97,6	8,6
Hungary	10	94,7	5,2	9	100,1	6,5
Ireland	186	101,2	5,5	9	104,2	6,6
Israel	13	100,8	6,0	115	97,6	6,3
Italy	784	95,0	7,8	303	97,3	6,3
Luxembourg	6	95,0	7,2	6	100,8	8,5
Netherlands	789	97,3	6,7	702	97,7	7,8
New Zealand	568	101,0	5,2	12	91,8	9,8
Sweden	105	102,0	8,2	112	100,8	8,9
USA	3292	97,4	6,7	2971	102,1	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	16	95,6	10,3
Canada	29	94,0	7,5
Germany	12	96,9	7,0
Denmark	41	97,6	9,1
Finland	196	95,1	8,1
Norway	247	105,8	8,6
New Zealand	29	98,6	4,3
Sweden	155	100,6	7,4
USA	9	96,9	7,9

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

Country	No. of bulls	Average	STD
Australia	107	92,0	7,9
Belgium	30	99,0	5,3
Canada	557	93,5	9,1
Switzerland	55	95,3	2,9
Czech Republic	39	96,6	2,4
Germany	674	95,5	7,7
Denmark	453	101,0	9,3
Spain	85	91,2	6,7
Finland	80	102,8	11,6
France	564	94,9	4,6
UK	179	96,1	7,5
Hungary	5	93,0	4,9
Ireland	102	108,5	7,0
Israel	100	100,6	2,5
Italy	723	94,7	6,6
Luxembourg	5	95,8	4,9
Netherlands	759	96,0	8,5
New Zealand	519	105,9	6,0
Poland	303	93,1	7,3
Sweden	107	102,1	8,3
USA	2902	97,9	9,1

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

Country	No. of bulls	Average	STD
Australia	57	99,7	9,1
Canada	24	96,5	10,4
Denmark	148	101,6	10,9
UK	6	99,2	7,4
Ireland	7	96,9	9,6
New Zealand	491	99,5	7,0
USA	496	92,6	10,0

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	20	95,9	5,7	20	98,8	6,8
Canada	57	92,3	7,8	56	88,3	5,5
Germany	21	103,8	6,8	21	100,2	6,2
Denmark	81	105,5	8,6	39	106,7	14,2
Finland	200	98,4	6,2	191	100,1	7,1
Norway	201	99,6	2,0	199	99,4	2,6
New Zealand	28	99,8	7,0	28	95,3	4,8
Sweden	166	101,2	4,0	165	100,2	6,1

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	150	104,2	5,3	150	102,0	5,7
Belgium	28	94,5	7,9	24	99,3	7,4
Canada	455	97,5	6,4	450	102,4	5,5
Switzerland	59	99,1	4,3	58	101,6	3,5
Germany	664	97,3	8,6	387	100,1	9,7
Denmark	465	99,1	11,0	230	100,2	13,5
Finland	73	98,8	7,1	72	100,9	9,1
France	560	96,9	7,8	540	105,4	8,2
UK	183	97,8	11,6	169	98,8	6,5
Ireland	9	91,2	6,2			
Italy	31	96,7	10,9	25	102,1	8,0
Netherlands	653	98,2	9,5	529	101,2	8,2
New Zealand	493	103,4	6,5	493	95,5	3,9
Slovenia	31	96,6	7,5			
Sweden	111	100,4	4,8	105	99,9	7,3
USA	452	97,7	9,2	437	104,2	8,2

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

Country	No. of bulls	Average	STD
Australien	68	101,3	6,2
Canada	42	93,5	8,5
Danmark	181	100,7	11,4
New Zealand	435	98,0	7,6
USA	47	98,0	7,8

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, Finland, Sweden and Netherlands are in top 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 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	10	-24,6	13,7
Germany	12	-8,2	10,2
Denmark	41	10,5	8,1
Finland	203	3,5	9,2
Norway	247	-9,1	8,8
Sweden	166	5,2	7,8
USA	5	-30,0	4,7

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

Country	No. of bulls	Average	STD
Australia	47	-3,0	8,8
Belgium	31	2,8	7,6
Canada	463	-3,1	10,4
Switzerland	55	-10,5	6,6
Czech Republic	46	-5,2	7,1
Germany	734	-1,6	8,9
Denmark	481	7,0	8,3
Spain	155	-8,1	9,4
Estonia	68	-9,8	6,9
Finland	77	6,5	9,4
France	613	-1,1	7,3
UK	184	-2,5	8,5
Hungary	8	-1,4	9,8
Ireland	52	-9,8	12,1
Italy	752	-5,1	9,1
Japan	96	-3,1	7,7
Luxembourg	5	2,2	6,1
Netherlands	819	0,0	8,6
Poland	460	-8,2	8,1
Portugal	5	-20,6	10,7
Slovenia	27	-15,1	7,0
Sweden	112	8,1	7,3
USA	2358	2,7	9,0

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

Country	No. of bulls	Average	STD
Australia	21	-9,5	6,2
Canada	15	-22,9	10,6
Denmark	132	4,0	8,8
USA	341	-6,1	8,9

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 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 August 2016 the following changes are done compared to April 2016 routine evaluation:

Yield

- RDC from Norway define effect of herd*year*season in a way that can course reliability to change
- Holstein and RDC from DFS has few bulls loosing reliability

Fertility

- RDC from Norway define effect of herd*year*season in a way that can course reliability to change
- Holstein from Germany has changed editing
- Jersey from New Zealand have base change and small decrease in information due to parentage testing

Calving

- RDC from Norway has a model where breeding values can change due to instability in separation of maternal and direct effect. This is especially the case for the youngest sire that are only “sires of calf”
- Holstein and RDC from DFS has few bulls loosing reliability
- Holstein from Italy has small decrease in reliability
- Holstein from Germany has small decrease in reliability due to correction of data and pedigree
- Jersey from New Zealand have base change and small decrease in information due to parentage testing

Conformation

- Holstein and RDC from DFS has few bulls loosing reliability
- Jersey from New Zealand have base change and small decrease in information due to parentage testing

Udder health

- RDC from Norway define effect of herd*year*season in a way that can course reliability to change
- Jersey from New Zealand have base change and small decrease in information due to parentage testing
- Holstein and RDC from Canada has changed calculation of EDC resulting in fewer records and lower reliability for some bulls. Records in calculation of EBV are unchanged

Longevity

- Holstein from Germany has some change in number of daughters due to different editing of data
- Jersey from New Zealand have base change and small decrease in information due to parentage testing

- Holstein from Spain has changed editing. This results in a decrease in reliability for some bulls

Milking speed and temperament

- None
- All breeds from New Zealand has change in number og daughters and herds due to parent-age verification

Regards

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