News - NAV routine evaluation
15 October 2008

The latest NAV routine evaluation for yield, fertility, type, udder health, other diseases, calving traits, milk ability and temperament traits took place as scheduled. NAV carried out three evaluations per trait group:

Holstein evaluation, including data from: Danish Holstein, Danish Red Holstein, Swedish Holstein, Finnish Holstein, Finnish Ayrshire and Finn Cattle.

Red Dairy Cattle evaluation, including data from: Danish Red, Swedish Red, Finnish Ayrshire, Finnish Holstein and Finn Cattle.

Jersey evaluation, including data from: Danish Jersey and Swedish Jersey (only yield).

Extraction dates
Dates for extraction of data from national databases are given in table 1.

Table 1. Dates for extraction of data from the national databases

Trait	**Denmark**	**Finland**	**Sweden**
Yield	09.09.2008	11.09.2008	04.09.2008
Type, milk ability and temperament	15.09.2008	11.09.2008	06.09.2008
Fertility	15.09.2008	11.09.2008	08.09.2008
Udder health and other disease	15.09.2008	11.09.2008	08.09.2008
Calving	15.09.2008	11.09.2008	08.09.2008

News in relation to NAV genetic evaluation

Yield
Swedish Jersey data was included in the Jersey evaluation for the first time – the number of yield records increased by 3%. The Swedish data had a negligible effect on EBVs for Danish animals, while the EBVs for Swedish cows changed significantly – the correlation between EBVs from the old Swedish 305-day model and the new EBVs from the NAV model was about 60-70% indicating, that Swedish Jersey cows received plenty of extra information from the Danish Jersey population.

Fertility
The economic value of Fertility diseases has been taking out of the fertility index and is moved to the Other Disease index (see below). The correlation between Fertility index with and without fertility diseases is above 0.97.

Other diseases
NAV published for the first time an EBV for Other Diseases (OD). Records from first to third lactation on early reproductive disorders (ERP), late reproductive disorders (LRP), metabolic disorders (MB) and feet and legs (FL) and from first lactation only, on clinical mastitis (CM) were used in the genetic evaluations. Table 2 gives the disorder groups used for each trait. Table 3 lists the abbreviations and the recording periods for all 13 traits together with the calculated indexes.

The majority of infective and other reproductive disorder incidents occur within 40 days after calving. Thus for ERP, naturally the incidents of retained placenta and infective and other reproductive disorders will dominate. For LRP, the incidents of hormonal reproductive disorders will dominate. The EBVs from the different lactations are weighted together with the ratio 50:30:20 for 1st, 2nd and 3rd lactation respectively (table 3). The EBVs for the single disease resistance traits are weighted together in the NAV Other Disease index with economic values calculated in the NAV Total Merit project

Table 2. Disorder groups used in the other disease traits

ERP	LRP	MB	FL
Retained placenta, Hormonal reproductive disorders, Infective reproductive disorders, Other reproductive disorders	Hormonal reproductive disorders, Infective reproductive disorders, Other reproductive disorders	Ketosis, Milk fever, Other metabolic diseases, Other feed related disorders, Other diseases	Feet and leg disorders

Table 3. Definitions of traits included in the evaluation

Trait abbrev.	Definition
	Trait definitions
ERP1-ERP3	Early repr. disorder resistance (1) or not (0), 0 to 40 DIM, lact 1-3
LRP1-LP3	Late repr. disorder resistance (1) or not (0), 41 to 305 DIM, lact 1-3
MB1-MB3	Metabolic disorders resistance (1) or not (0), -15 to 305 DIM, lact 1-3
FL1-FL3	Feet & leg disorders resistance (1) or not (0), -15 to 305 DIM, lact 1-3
CM1	Clinical mastitis resistance (1) or not (0), -15 to 305 DIM, lact 1
	Index definitions
ERP	Early reproduction resistance: 0.5*ERP1+0.3*ERP2+0.2*ERP3
LRP	Late reproduction resistance: 0.5*LRP1+0.3*LRP2+0.2*LRP3
MB	Metabolic disorders resistance: 0.5*MB1+0.3*MB2+0.2*MB3
FL	Feet & leg disorders resistance: 0.5*FL1+0.3*FL2+0.2*FL3
OD	Other diseases tot resistance.:1.93*ERP+1.04*LRP+1.87*MB+1.7*FL

Table 4. Correlations between old national Other disease and NAV Other diseases for bulls born 1999-2003

	RDC	**Holstein**	**Main changes compared to national model**
Denmark	0,57	0,78	Age effects
Finland	0,47	0,55	Definition of traits old model pooled in one trait
Sweden	0,64	0,68	Definition of traits old model pooled in two trait groups

Longevity

NAV does not have a routine evaluation ready for longevity. Until a routine evaluation is ready the EBV for longevity used in the NTM index will be calculated as a simple average of INTERBULL EBVs on the Danish, Finnish and Swedish scale for longevity. A bull having 120 on the Danish scale, 118 on the Swedish scale and 116 on the Finnish scale will get an EBV of 118 for longevity included in the NTM.

Growth
NAV does not have a routine evaluation ready for growth. Until a NAV routine evaluation is ready, NAV uses EBVs from the national evaluation for growth in Denmark and Sweden. If a bull has an official EBV in both countries, the EBV with the highest reliability is used. Finland does not have a routine evaluation for growth and all Finnish bulls without an official EBV for growth are set to 100.

Milking speed and temperament
EBVs for cows is applied in the NTM

No changes for all other traits.

Genetic base
EBVs for bulls and females are expressed on the same cow base. This genetic evaluation included cows born from 15.10.2003 to 15.10.2005 in the genetic base (average 100).

For functional traits, sire models are used and EBVs for cows are not estimated. For functional traits, the genetic base includes bulls, which are sires of present cows – see table 5.

Table 5. Definition of genetic base for cows and bulls

Trait	**Genetic base**
Yield, type, milk ability and temperament	Cows born 15.10.2003 -15.10.2005
Fertility, calving, mastitis resistance and resistance against other diseases	Bulls born 15.10.1999 -15.10.2001

NTM – Nordic Total Merit Index
NTM - Nordic Total Merit - is the name of the new total economic index for dairy cattle in Finland, Sweden and Denmark. This means that bulls and cows in all three countries have a NTM breeding value calculated the same way. It also means that, for example, a bull which is used in more than one country will have exactly the same NTM, independent of whether he is used in Finland, Sweden and Denmark. The first joint NTM index will be published 15 October 2008. Tables 6-9 give the weight factors for the different breeds used when calculating NTM. Weight factors are slightly different for cows and bulls due to an approximate multi trait method used for cow NTM taking previously ignored genetic correlations between yield-fertility; yield-mastitis, yield-udder and udder-mastitis into account. For bulls, multi trait methods have a minor effect and are ignored. The following genetic correlations are included by the approximate multi trait method:

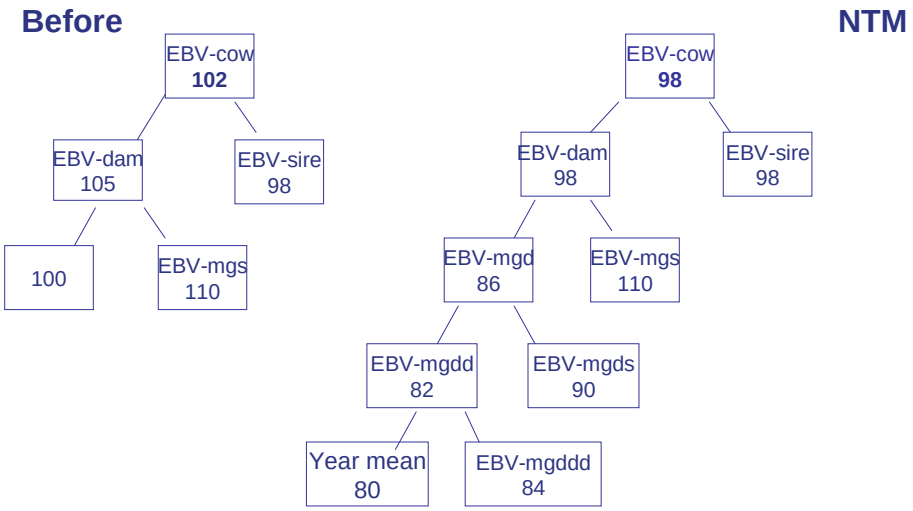
Yield - udder health	-0,3
Yield – fertility	-0,4
Udder health – udder	0,3
Yield - udder	-0,2

Pedigree index
A pedigree index is calculated for all traits without an official EBV based on daughter or own records for both cows and bulls. The pedigree index is calculated as an average of sire and dam EBVs for both bulls and females - starting from the oldest animal

Pedigree Index = ½ EBV_{sire} + ½ EBV_{dam}

The pedigree index is calculated based on all information in the pedigree as illustrated for fertility for a female in figure 1. When the pedigree index is traced back to an unknown animal

the EBV is set to a birth year mean. Birth year mean is calculated per country breed. This method is applied for all traits. The principles are illustrated in figure 1 for a female for fertility.



Figur 1 Example - female pedigree index for fertility

Table 6. Weights factors for bulls and cows in NTM for Holstein

Trait	NTM weight	NTM cow weights considering approx Multi Trait	
	Bulls	Cow with own yield records	Cow with yield records and own udder conformation records
Yield index	0.75	**0.68**	**0.68**
Growth	0.06	0.06	0.06
Fertility	0.31	0.31	0.31
Birth index	0.15	0.15	0.15
Calving index	0.17	0.17	0.17
Udder health	0.35	0.35	0.35
Other disease	0.12	0.12	0.12
Body	0.00	0.00	0.00
Feet & legs	0.15	0.15	0.15
Udder	0.18	0.18	**0.23**
Milk ability	0.08	0.08	0.08
Temperament	0.03	0.03	0.03
Longevity	0.11	0.11	0.11

Table 7. Weights factors for bulls and cows in NTM for RDC

Trait	**NTM weight**	**NTM cow weights considering approx Multi Trait**	
	Bulls	**Cow with own yield records**	**Cow with yield records and own udder conformation records**
Yield index	0.92	**0.84**	**0.84**
Growth	0.00	0.00	0.00
Fertility	0.26	0.26	0.26
Birth index	0.14	0.14	0.14
Calving index	0.12	0.12	0.12
Udder health	0.32	0.32	0.32
Other disease	0.12	0.12	0.12
Body	0.00	0.00	0.00
Feet & legs	0.09	0.09	0.09
Udder	0.32	0.32	**0.37**
Milk ability	0.06	0.06	0.06
Temperament	0.03	0.03	0.03
Longevity	0.08	0.08	0.08

Table 8. Weights factors for bulls and cows in NTM for Jersey

Trait	**NTM weight**	**NTM cow weights considering approx Multi Trait**	
	Bulls	**Cow with own yield records**	**Cow with yield records and own udder conformation records**
Yield index	0.87	**0.78**	**0.78**
Growth	0.00	0.00	0.00
Fertility	0.26	0.26	0.26
Birth index	0.06	0.06	0.06
Calving index	0.06	0.06	0.06
Udder health	0.49	0.49	0.49
Other disease	0.04	0.04	0.04
Body	0.00	0.00	0.00
Feet & legs	0.05	0.05	0.05
Udder	0.15	0.15	**0.22**
Milk ability	0.10	0.10	0.10
Temperament	0.03	0.03	0.03
Longevity	0.12	0.12	0.12

Table 9. Weights factors for bulls and cows in NTM for Red Holstein

Trait	**NTM weight**	**NTM cow weights considering approx Multi Trait**	
	Bulls	**Cow with own yield records**	**Cow with yield records and own udder conformation records**
Yield index	0.75	**0.68**	**0.68**
Growth	0.11	0.11	0.11
Fertility	0.23	0.23	0.23
Birth index	0.17	0.17	0.17
Calving index	0.17	0.17	0.17
Udder health	0.35	0.35	0.35
Other disease	0.12	0.12	0.12
Body	0.00	0.00	0.00
Feet & legs	0.15	0.15	0.15
Udder	0.24	0.24	**0.29**
Milk ability	0.08	0.08	0.08
Temperament	0.03	0.03	0.03
Longevity	0.11	0.11	0.11

The correlations between the old national TMI and the NTM index for bulls and cows are above 0.96 (table 10-11) indicating that the reranking of animals is limited within all three countries.

Table 10. Correlations between old national TMI's (S-indeks, Tjurindeks and Kokonaisjalostusarvo) and NTM for bulls born in 1999-2003

	RDC	**Holstein**	**Jersey**
Denmark	0.97	0.98	0.98
Finland	0.95	0.95	-
Sweden	0,97	0,97	-

Table 11. Correlations between old national TMI's (S-indeks, Koindeks and Kokonaisjalostusarvo) and NTM for cows born in 2004 having yield and type registration

	RDC	**Holstein**	**Jersey**
Denmark	0,93	0.96	0,96
Finland *)	0.91	0.88	-
Sweden	0,97	0,96	-

*) Finland use EBVs from the national SCC TD model for udder health instead of NAV mastitis pedigree index until NAV introduced a new mastitis model including TD SCC, mastitis and udder conformation traits. The model is under development and will hopefully be introduced in spring/summer 2009.

Finn Cattle does not follow the NAV principles for NTM, but continues with the old Finnish TMI. Furthermore NTM is not estimated for Swedish Jersey.

Publication of NTM

A bull gets an official NTM, when the bull has official EBVs for yield, type and mastitis. For traits without an official EBV, a pedigree index is used (table 12).

Table 12. Rules for publication of old national TMI and NTM for bulls

	Old national TMI	NTM
Denmark	Official EBVs for Yield and Type	Official EBVs for Yield, Type and Udder health
Finland	Official EBVs for Yield	
Sweden	Official EBVs for all traits except other diseases and longevity	

NAV – frequency and timing of routine runs

NAV performs 6 evaluations per year for all traits. The NAV evaluations are timed in a way so NAV can deliver updated EBVs to all the international evaluations. In Table 13, the current and future NAV and INTERBULL release dates are shown.

Table 13. NAV and INTERBULL release dates in 2008. EBVs released at NAV dates in bold will be delivered to international genetic evaluation

	2008	
Month	NAV	INTERBULL
January	15	First Tuesday after 11th
February		
March	**15**	
April		1st Tuesday
May	15	
June		
July		
August	**15**	3rd Tuesday
September		
October	15	
November		
December	**1**	

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