News - NAV routine evaluation
November 5, 2019

Dairy cattle

The latest NAV routine evaluation for yield, fertility, conformation, udder health, general health, calving traits, milkability, temperament, growth, longevity, young stock survival, claw health, saved feed and NTM took place as scheduled. NAV carried out three evaluations per trait group:

Holstein evaluation, including data from: Danish 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, Swedish Jersey and Finnish Jersey.

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	26.09.2019	15.09.2019	20.09.2019
Type, milkability and temperament	26.09.2019	15.09.2019	20.09.2019
Fertility	26.09.2019	15.09.2019	21.09.2019
Udder health and other disease	26.09.2019	15.09.2019	21.09.2019
Calving[1]	26.09.2019	15.09.2019	21.09.2019
Longevity	26.09.2019	15.09.2019	21.09.2019
Growth[1]	26.09.2019	15.09.2019	21.09.2019
Claw health	26.09.2019	15.09.2019	21.09.2019
Youngstock survival	26.09.2019	15.09.2019	21.09.2019
Saved feed	26.09.2019	15.09.2019	20.09.2019

[1]Including data for the evaluation of beef bulls used on dairy

Data used in genomic prediction

Genotypes were extracted from the joint Nordic SNP data base 17th October 2019. INTERBULL information from August 2019 was included in the genomic prediction.

News in relation to NAV dairy genetic evaluation
Traditional evaluation

No changes

Genomic prediction

GEBV for the following traits are published for the first time:
- Saved feed
- Persistency
- Carcass conformation score and Daily carcass gain

New genomic breeding values

At the genetic evaluation in November 2019, NAV will for the first time publish genomic breeding values for Saved feed, persistency, carcass conformation score and Daily carcass gain.

In table 2 the predicted model reliabilities for Saved feed and persistency are shown. The reliabilities are dependent on the size of the reference population

Table 2 Mean model reliabilities. 185 Holstein, 184 RDC, and 66 JER AI bulls born 2017-18

Trait	Holstein	RDC	Jersey
Saved feed	0.66	0.63	0.52
Persistency	0.74	0.75	0.71

GEBV for more single sub traits

NAV is still working on development of GEBV of single traits within the following traits groups:
- Claw health traits
- General health traits
- Fertility traits
- Calving traits

Preliminary results for some breed x trait group combinations require more research before they can be published.

Genetic base

EBVs for bulls and females are expressed on the same cow base. This genetic evaluation included cows born from 05.11.2014 to 05.11.2016 in the genetic base (average 100).

Publication of NTM for Nordic and foreign bulls

NTM is published if the bull has official EBVs (NAV (G)EBV or international EBV) for Yield, Mastitis and Type. By official means for NAV EBVs that the NAV thresholds are met, and for international EBVs (IB EBVs) that Interbull EBVs for the single bull exist. For traits without a NAV (G)EBV or an IB (G)EBV a NAV pedigree index is calculated.

For bulls with a Nordic herd book number the pedigree index follows the principles described in the October 2008 routine information. For foreign bulls without a Nordic herd book number the pedigree index is calculated in as ½(EBVsire-100) +1/4(EBVmgs-100) +100. If EBVsire or EBVmgs is not official NAV EBVs then 100 is used.

Publication of EBVs/GEBVs

Official EBVs/GEBVs for bulls used for AI in Denmark, Finland or Sweden are published at the NAV Bull Search.

Official NAV GEBVs for foreign AI bulls not used for AI in Denmark, Finland and Sweden are published at NAV homepage. The excel sheets also include GEBVs for bulls used for AI in Denmark, Finland and Sweden. The excel sheets include AI bulls that are 10 months to 5 years old at the date of publication and is mainly useful for foreign AI-companies.

Interbull EBVs/GEBVs are published at the NAV Interbull search.

Genetic evaluation of beef bulls used in dairy herds
The latest NAV routine evaluation for AI beef bulls based on their crossbred offspring from dairy cows for birth and carcass traits took place as scheduled. Extraction date for the data can be found in table 1.

Breeding values for AI beef bulls are estimated four times per year, in connection to the NAV routine genetic evaluation for dairy breeds (table 8), and EBVs are published at NAV Beef Search.

News in relation to NAV genetic evaluation of beef bulls used in dairy herds
- Modified publication criteria for calving traits
- 5 new overall EBVs

Publication criteria
The publication criteria for calving traits have been modified, the old one was based on reliability for calf survuival only. Based on the following facts it was decided to modify the criteria:
- It was very difficult to calculate how much test semen should be used to achieve a given reliability
- Calving ease 2+ is the most important calving trait to select, but old NAV threshold for publication was based on calf survival 2+

The modified thresholds for publication of EBVs are presented in table 3.

Table 3. Publication criteria for publication of EBVs for beef bulls evaluated based on dairy x beef crosses

	Calving traits (new)	Carcass traits (unchanged)
Trait	Calving ease or Calf survival 2+	Carcass conformation
Threshold	R^2_{IA} min 50% or number of beef × dairy offspring with calf survival 2+ information in the evaluation >500	R^2_{IA} min 50% or number of beef × dairy offspring with carcass conformation information in the evaluation >500

Overall EBVs a and Total merit index
Five new overall EBVs are published for the first time November 5th (table 4).

Table 4 Overall EBVs for beef bulls used in dairy herds.

Overall EBV	Description	Detailed explanation
Birth index	Index for beef traits	Combine calving ease 2+ and calf survival 2+
Growth index, short	Index for growth traits – short fattening period	Combine carcass conformation score, daily carcass gain, and carcass fat score
Growth index, long	Index for growth traits – long fattening period	Combine carcass conformation score, daily carcass gain, and carcass fat score
NBDI, short	Nordic beef × dairy index – short fattening period	Combine Growth index, short and Birth Index
NBDI, long	Nordic beef × dairy index – long fattening period	Combine Growth index, long and Birth Index

The traits are combined in the overall EBVs based on estimates of economic values for the different traits. The economic values have been calculated with the NTM model previously used to calculate economic values for dairy breeds. Calculation of economic values were done after updating biologi-

cal and economic assumptions for the beef x dairy crossbreds, and after revising the model to consider carcass fat score and increased risk for dairy cow losses following difficult calvings. The economic values (table 5) are calculated for two different production systems: short and long production period. The short period (slaughter age below 550 days) reflect the most common production system in Denmark and the long (slaughter age >550 days) the most common in Sweden and Finland. The economic values used when combining the traits for the short period is based on Danish assumptions about prices and economic values for the long production period is based on an average of Swedish and Finnish assumptions.

Table 5. Estimates of economic values euro/unit for the different traits for the two production periods

	Short (DNK)	Long (SWE& FIN)
Daily carcass gain(kg/day)	251.7	350.4
Carcass conformation score (point)	2.4	8.9
Carcass fat score(point)	3.9	-11.4
Calf survival 2+, later (0-1)	263.9	
Calving ease 2+, later (point)	53.5	

The relative value of the carcass traits compared to birth traits is highest in the long period because the traits are expressed on more kilos, and the beef prices are higher in Sweden and Finland than in Denmark.

In table 6 the relative weights given to the EBVs for the single traits in NBDI are presented. NBDI_short and NBDI_long are both presented with a genetic standard deviation of 10 like for the other breeding values. Across breeds the standard deviation of NBDI_long is larger than for NBDI_short since carcass conformation score has a relative larger value in the long fatting period, and significant breed differences exists for carcass conformation score.

Table 6. Relative weights given to EBVs for the single traits in NDBI, short and NBDI, long.

	NBDI, short	NBDI, long
Daily carcass gain	0.76	0.70
Carcass conformation score	0.19	0.55
Carcass fat score	0.08	-0.28
Calf survival 2+, later (0-1)	0.59	0.55
Calving ease 2+, later (point)	0.61	0.57

Table 7 shows within breed correlations between NBDI and EBVs for single traits. The correlations show that birth traits have the highest influence on NBDI_short and that Growth index has the highest influence on NBDI_long.

Table 7. Within breed correlations between NBDI and EBV for single traits 8 (main traits are marked with **bold**).

	NBDI, short	NBDI, long
NBDI, short	**1.00**	**0.85**
NBDI, long	**0.85**	**1.00**
Birth index	**0.63**	**0.37**
Calf survival lact 1	0.64	0.39
Calf survival lact 2+	0.63	0.39
Calving ease lact 1	0.57	0.33
Calving ease lact 2+	0.57	0.32
Growth index short	**0.46**	**0.59**
Growth index long	**0.37**	**0.71**
Daily Carcass gain	0.41	0.48
Carcass conformation score	0.24	0.64
Carcass fat score	0.08	-0.33

NAV – frequency and timing of routine runs

NAV has 4 large evaluations per year, which include updated phenotypic and genomic data, and additional eight small runs including updated genotypes. In Table 6 the NAV and INTERBULL release dates for 2019 and 2020 are shown. The beef evaluation based on beefxdairy crossbreeds takes place along with the large NAV runs 4 times a year.

Table 8. NAV and INTERBULL release dates in 2019/20. EBVs released at NAV dates in bold will be delivered to international genetic evaluation.

Month	NAV Small run[1]	NAV Large runs[2][3]	INTERBULL
November 19		5	
December 19	3		3
January 2020	7		
February 2020		4	
March 2020	3		
April 2020	7		7
May 2020		5	
June 2020	2		
July 2020	7		
August 2020		11	11
September 2020	1		
October 2020	6		
November 2020		3	
December 2020	1		1

[1] Genotypes updated; [2] Genotypes and phenotypes updated; [3] Beef evaluation

You can get more information about the joint Nordic evaluation:
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