

News - NAV routine evaluation

August 13, 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	26.06.2019	10.06.2019	13.06.2019
Type, milkability and temperament	26.06.2019	10.06.2019	14.06.2019
Fertility	26.06.2019	10.06.2019	15.06.2019
Udder health and other disease	26.06.2019	10.06.2019	15.06.2019
Calving ¹⁾	26.06.2019	10.06.2019	15.06.2019
Longevity	26.06.2019	10.06.2019	14.06.2019
Growth ¹⁾	26.06.2019	10.06.2019	15.06.2019
Claw health	26.06.2019	10.06.2019	14.06.2019
Youngstock survival	26.06.2019	10.06.2019	15.06.2019
Saved feed	26.06.2019	10.06.2019	14.06.2019

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 27th June 2019. INTERBULL information from April 2019 was included in the genomic prediction.

News in relation to NAV genetic evaluation

Traditional evaluation

EBVs for Saved feed and maintenance efficiency are published for the first time

Genomic prediction

GEBVs will be published for the first time for Saved feed, and a number of sub-indices, as soon as some remaining programming is completed.

Saved feed

At the genetic evaluation in August 2019, NAV will for the first time publish breeding values related to feed efficiency. There will be a new sub-index called Saved feed, which is an index that in the future will include two breeding values, maintenance efficiency and metabolic efficiency. In August however, only maintenance efficiency goes into the index, but metabolic efficiency will follow as soon as

development work is finalized. Saved feed gives the opportunity to breed for cows that are more feed efficient.

The breeding value for maintenance efficiency will be published in August 2019, while the breeding value for metabolic efficiency is expected to be launched in winter 2019/20.

Genetic evaluation for maintenance efficiency

The genetic evaluation of maintenance efficiency is based on breeding values for metabolic body weight (MBW). Included weight data reaches back to the year 1990 and comprise in total 0.8 million cows with body weight (BW) observations, complemented with 1st parity conformation observations from 3.4 million cows. BW observations are either heart girth measurements (90%) or scale measurements and are used to calculate MBW in 1st, 2nd and 3rd parity.

Table 2 Number of observations used in genetic evaluations for maintenance efficiency by trait and breed

Trait	Holstein	RDC	Jersey
MBW, 1 lact	269,746	521,289	4,113
MBW, 2 lact	157,556	323,195	2,157
MBW, 3 lact	67,701	106,134	1,215
Stature, 1 lact	1,829,079	841,718	256,962
Chest width, 1 lact	1,823,373	798,341	261,614
Body depth, 1 lact	1,823,374	798,351	261,613

Phenotypic means for metabolic bodyweight and bodyweight are presented in table 3 per lactation and breed.

Table 3. Phenotypic mean of metabolic body weight by lactation and breed

Trait	Holstein	Nordic Red	Jersey
MBW, 1 lact	112.9 (545kg BW)	107.8 (513kg BW)	86.2 (380kg BW)
MBW, 2 lact	122.4 (608kg BW)	115.2 (560kg BW)	96.8 (444kg BW)
MBW, 3 lact	127.2 (629kg BW)	119.2 (587kg BW)	101.1 (471kg BW)

Differences in accuracy of measurement types (heart girth/scale) and in the number of BW observations per cow are dealt with by weighting MBW observations in the genetic models. The applied multiple-trait animal models include six traits: 1st, 2nd and 3rd parity MBW, and as indicator traits: stature, chest width, and body depth. MBW is a high heritable trait - estimated heritabilities are in the range 0.46-0.56 (table 4). Estimated genetic correlations (table 4) among MBW traits were high (>0.96) and genetic correlations between MBW and conformation traits ranged from 0.65-0.68 (stature), 0.53-0.58 (chest width) and 0.48-0.51 (body depth) in different lactations.

Table 4. Genetic parameters - heritabilities (on diagonal) and genetic correlations

	MBW1	MBW2	MBW3	Stature	Chest width	Body depth
MBW, 1 lact	0.46	0.98	0.96	0.65	0.58	0.51
MBW, 2 lact		0.51	0.99	0.68	0.55	0.49
MBW, 3 lact			0.56	0.68	0.53	0.48
Stature, 1 lact				0.60	0.17	0.21
Chest width, 1 lact					0.18	0.55
Body depth, 1 lact						0.26

Correlations between maintenance efficiency and other traits

EBV for maintenance efficiency has a strongly unfavorable correlation to the sub-index frame (table 5), which is not surprising, because frame reflects the size of the cow. Furthermore, it has also been found that smaller cows are genetically better for longevity and claw health. The correlation between breeding values for maintenance efficiency and NTM and yield index production is close to zero.

Table 5. Correlation between EBV maintenance efficiency and other traits

Traits	Holstein (N=316 bulls)	Nordic Red (N=222 bulls)
Frame	-0.8	-0.7
Growth	-0.2	-0.3
Y-index	-0.1	0.1
Mastitis	0.1	0.1
Fertility	0.1	0.0
Claw health	0.2	0.2
Longevity	0.2	0.3
NTM	0.1	0.2

Reliabilities

Cows having own phenotypic records for weight or bulls having several daughters will get high EBV reliabilities. Reliabilities for GEBV for maintenance efficiency are 60-65%.

Publication plans

In August the traditional EBVs for bulls will be available at the NAV search page, and the Faba data base only. GEBVs for bulls will be published as soon as some remaining programming is completed. During the autumn 2019 the plan is to publish the (G)EBV for Saved feed for bulls and females on the national databases - more detailed information will be given nationally.

Less feed costs with less heavy cows

It is a fact that heavy cows eat more to maintain themselves than lighter cows. This also means that from a feed efficiency point of view, lighter cows use less feed for maintenance. With the new breeding value for maintenance efficiency, daughters of two bulls having a difference of 20 index units will have a difference in dry matter intake of 60-80 kg per lactation.

Metabolic efficiency is the next step

Maintenance efficiency doesn't tell anything about how efficient the individual cow utilizes the feed she eats. To be able to say something about that, we need individual feed intake records in large scale. This is currently difficult and very expensive. However, it seems to become possible to get more registrations from Nordic dairy cows with the Cattle Feed Intake System (CFIT) developed by VikingGenetics. Results from this system looks very promising, but it is presently only in small scale and it will take some years to get data for a large number of cows. Meanwhile we have the possibility to use feed intake data from research farms in the Nordic countries together with data from around Europe and North America for Holstein. These data will be the basis for a breeding value for metabolic efficiency in the beginning but more data from commercial herds will be included as soon as it is available. Even though we work together across borders the amount of data is still very limited, and the reliability of this breeding value will therefore initially be very low.

Large focus on feed efficiency worldwide

The Nordic countries are not the only countries with focus on feed efficiency - it has been a hot topic worldwide the last years, and many countries have established or will establish genetic evaluation for feed efficiency. However, the weak point for all countries is the limited number of feed intake records that results in low reliabilities on genomic breeding values. Therefore, some countries have started to use different kinds of equipment that can measure feed intake for the individual cow. Furthermore, countries are joining consortiums and are sharing feed intake data, to get started with a genomic evaluation for feed efficiency.

GEBV for sub traits

GEBV for a number of single traits will within 2 months be published at the NAV search page for the first time for the majority of the following traits groups:

- Claw health traits
- General health traits
- Fertility traits
- Calving traits
- Growth traits
- Persistency

Validation reliabilities for most of the single traits are in line with the reliabilities earlier found for the overall indices for the trait group, but for some breed x trait group combinations the results might require more research and will not be published right away.

Genetic base

EBVs for bulls and females are expressed on the same cow base. This genetic evaluation included cows born from 13.08.2014 to 13.08.2016 in the genetic base (average 100).

Publication

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 $\frac{1}{2}(\text{EBVsire}-100) + \frac{1}{4}(\text{EBVmgs}-100) + 100$. 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. An improvement of the handling of ids for the beef bulls has been introduced to link together national information for the same bull from the three countries.

Breeding values for AI beef bulls will be estimated four times per year, in connection to the NAV routine genetic evaluation for dairy breeds (table 6), and EBVs are published at [NAVs beef cattle page](#).

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 are shown. The beef evaluation based on beefxdairy crossbreeds will take place along with the large NAV runs 4 times a year.

Table 6. NAV and INTERBULL release dates in 2019. 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
January 2019	3		
February 2019		5	
March 2019	5		
April 2019	2		2
May 2019		7	
June 2019	4		
July 2019	2		
August 2019		13	13
September 2019	3		
October 2019	1		
November 2019		5	
December 2019	3		3

¹⁾ Genotypes updated; ²⁾ Genotypes and phenotypes updated; ³⁾ Beef evaluation

You can get more information about the joint Nordic evaluation:

General about Nordic Cattle Genetic Evaluation: www.nordicebv.info

Contact person: Gert Pedersen Aamand, Ph.: +45 87405288 gap@seges.dk,

Denmark: <https://www.landbrugsinfo.dk>

Contact person: Ulrik Sander Nielsen, Seges Cattle, Ph. +45 87405289, usn@seges.dk

Sweden: www.sweebv.info, www.vxa.se

Contact person: Emma Carlén, Växa Sverige, Ph +46 10 4710614. Genetic.Evaluation@vxa.se

Finland: www.faba.fi

Contact person: Jukka Pösö, Faba co-op, Ph +358-400614035 jukka.poso@faba.fi