NAV Nordisk Avlsværdi Vurdering

Nordic Cattle Genetic Evaluation

NTM 2018

Final weights for NTM and yield indices for HOL RDC and JER
Final weights for HOL udder conformation index
Final weights RDC frame index

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Final 2018 NTM

After the May 2018 NAV Workshop, the NTM working group was asked to perform a few follow-up analyses before decisions about final NTM weights could be made in the respective breeding associations for HOL and RDC. No additional analyses were requested by JER but JER has subsequently discussed the weights proposed at the May 2018 Workshop for beef production. On June 15, NAV received final proposals for HOL, RDC and JER.

In this note, final weights for each NTM trait within breed are presented together with the expected genetic response for each trait. The latter is shown with both current and new weights for M, F and P in the yield index. The weights are not yet scaled to achieve a standard deviation of 10 for NTM; thus; current NTM weights are also shown relative to a weight of 1 for yield.

Regarding the yield index, new weights for M, F, and P are shown for each breed together with the expected response for M, F, P, F%, and P% for both the current and new yield index for HOL, RDC and JER.

HOL has made small changes to the weights of the udder conformation traits within the udder conformation index. These weights are presented but the effect of this change is not included in the calculation of expected response for the NTM traits.

RDC has made small changes to the frame index; these are presented. Frame is not an NTM trait, i.e. has zero weight in the NTM, but expected response for frame is calculated.

Holstein

HOL yield index

The new 2018 weights for M, F, and P in the yield index for HOL are, current weights in ( ):

Milk: -0.25; fat: 0.55; protein: 0.70 (milk: -0.20; fat: 0.40; protein: 0.80)

Statistics for new and current yield indices are shown in Table 1. Standard deviations (SD) of the new yield index increases slightly because more weight is put on fat yield which has a larger SD than protein yield. The correlations between breeding values for the new and current yield indices were 0.975 and 0.987 based on genotyped (GS) and progeny tested bulls, respectively. The lower correlation for the GS bulls is caused by larger relative differences in SD for the milk, fat and protein indices when SD is based on genotyped bulls compared to progeny tested bulls.

Table 1. Statistics for current and new yield indices based on 5,218 genotyped Nordic HOL bulls (GS) born 2015-2016 and 789 progeny tested Nordic HOL bulls born 2009-2010 (Prog).

	Mean		SD	
	GS	Prog	GS	Prog
Current yield index	108.6	102.3	5.9	7.4
New yield index	108.9	102.3	6.3	7.6

The expected genetic response of both the current and new yield index is given as correlations between the yield index and the different yield traits is shown in Table 2.

Table 2. Correlations between milk yield, fat yield, protein yield, fat percentage, and protein percentage for current yield index and new yield index (new weights) for HOL. Correlations are based on 5,218 genotyped Nordic HOL bulls born 2015-2016.

	Milk yield	Fat yield	Protein yield	Fat %	Protein %
Current yield index	0.44	0.83	0.87	0.20	0.22
New yield index	0.28	0.92	0.75	0.39	0.33

HOL NTM

Changed NTM weights: None

Using new weighting of the M, F, and P indices in the yield index increased expected genetic response (Table 3) for yield slightly – small decreases were also observed for the remaining NTM traits.

Table 3. Weights in NTM (relative to yield index) and expected genetic response for current NTM and new 2018 NTM with and without new weights for M, F, and P in yield index for HOL. Response based on 5,218 genotyped Nordic HOL bulls born 2015-2016.

Trait	NTM weights		Expected genetic response		
	Current NTM	New NTM	Current NTM	New NTM	New NTM New yield
Yield index	1.00	**1.00**	0.41	0.54	**0.58**
Beef production	0.08	**0.09**	0.03	0.10	**0.08**
Fertility	0.41	**0.40**	0.48	0.47	**0.45**
Birth index	0.20	**0.16**	0.27	0.26	**0.25**
Calving index	0.23	**0.16**	0.37	0.34	**0.33**
Udder health	0.47	**0.33**	0.51	0.40	**0.39**
General health	0.15	**0.15**	0.36	0.36	**0.35**
Frame	0.00	**0.00**	0.01	0.02	**0.02**
Feet & legs	0.16	**0.05**	0.30	0.20	**0.19**
Udder	0.33	**0.20**	0.42	0.29	**0.28**
Milking speed	0.11	**0.10**	0.05	0.07	**0.08**
Temperament	0.04	**0.04**	0.09	0.10	**0.09**
Longevity	0.15	**0.07**	0.63	0.56	**0.52**
Claw health	0.11	**0.11**	0.26	0.25	**0.24**
Young stock survival	0.19	**0.14**	0.26	0.24	**0.23**

HOL udder conformation index

New weights for linear udder type traits within the udder conformation index and expected genetic response relative to the udder conformation index are shown in Table 4.

Table 4. Current and new weights of the individual linear udder type traits in the udder conformation index for HOL. Also, expected genetic response of both the current and new indices is given as correlations between the udder conformation index and the linear udder type traits. Values are based on Nordic HOL bulls born 2011-2017 with at least 15 daughters with classifier records (N = 1,128).

			Expected genetic response	
Linear type trait	Current weight	New Weight	Current index	New index
Fore udder attachment	0.17	**0.20**	0.71	**0.72**
Rear udder height	0.10	**0.10**	0.52	**0.57**
Rear udder width	-	**-**	0.22	**0.28**
Udder cleft	0.10	**0.20**	0.01	**0.23**
Udder depth	0.24	**0.25**	0.89	**0.80**
Teat length	0.05	**-**	0.14	**0.00**
Teat thickness	0.05	**-**	0.06	**-0.04**
Teat placement, front	0.07	**-**	0.16	**0.07**
Teat placement, rear	-0.12	**-0.15**	-0.02	**0.06**
Udder balance	-0.10	**-0.10**	0.14	**0.00**

RDC

RDC yield index

The new 2018 weights for M, F, and P in the yield index for RDC are, current weights in ( ):

Milk: -0.25; fat: 0.55; protein: 0.70 (Milk: -0.20; fat: 0.40; protein: 0.80)

Statistics for new and current yield indices are shown in Table 5. SD of the new yield index is nearly unchanged in RDC. The correlations between breeding values for the new and current yield index were 0.980 and 0.990 based on GS and progeny tested bulls, respectively.

Table 5. Statistics for current and new yield indices based on 4,368 genotyped Nordic RDC bulls (GS) born 2015-2016 and 302 progeny tested Nordic RDC bulls born 2009-2010 (Prog).

	Mean		SD	
	GS	Prog	GS	Prog
Current yield index	106.5	101.6	4.7	7.6
New yield index	106.5	101.5	4.7	7.8

The expected response for milk, fat and protein yield and fat and protein relative to the yield index percentage for current and new yield index is shown in Table 6.

Table 6. Correlations between milk yield, fat yield, protein yield, fat percentage for current yield index and new yield index (new weights) for RDC. Correlations are based on 4,368 genotyped Nordic RDC bulls born 2015-2016.

	Milk	Fat	Protein	Fat %	Protein %
Current yield index	0.57	0.85	0.93	0.09	0.11
New yield index	0.47	0.91	0.86	0.24	0.19

RDC NTM

Changed NTM weights: weight on udder health changed from 0.23 to 0.25.

Using new weighting of the M, F, and P indices in the yield index had none or minor impact on the expected genetic response (Table 7).

Table 7. Weights in NTM (relative to yield index) and expected genetic response for current NTM and new 2018 NTM with and without new weights for M, F, and P in yield index for RDC. Response based on 4,368 genotyped Nordic RDC bulls born 2015-2016.

Trait	NTM weights		Expected genetic response		
	Current NTM	New NTM	Current NTM	New NTM	New NTM New yield
Yield index	1.00	**1.00**	0.65	0.69	**0.69**
Beef production	0.00	**0.10**	-0.10	0.02	**0.02**
Fertility	0.24	**0.35**	0.16	0.26	**0.25**
Birth index	0.13	**0.11**	0.18	0.15	**0.16**
Calving index	0.11	**0.10**	0.19	0.18	**0.18**
Udder health	0.30	**0.25**	0.35	0.28	**0.29**
General health	0.11	**0.11**	0.17	0.19	**0.19**
Frame	0.00	**0.00**	0.04	0.05	**0.04**
Feet & legs	0.08	**0.06**	0.28	0.23	**0.23**
Udder	0.35	**0.25**	0.37	0.26	**0.27**
Milking speed	0.09	**0.11**	0.14	0.18	**0.20**
Temperament	0.03	**0.03**	0.05	0.06	**0.07**
Longevity	0.07	**0.06**	0.45	0.46	**0.45**
Claw health	0.05	**0.07**	0.16	0.16	**0.15**
Young stock survival	0.22	**0.19**	0.32	0.28	**0.28**

RDC frame index

The new weights for traits with the frame index are shown below – current weights in ( ).

Stature: **15** (10)
Body depth: **25** (15)
Chest width: **30**(20)
Dairy form: **10** (10)
Topline; **0** (10)
Rump width: **20** (15)
Rump angle: **0** (20)

The correlations between the individual frame index traits and the current and new frame indices are shown in Table 8. Furthermore, correlations between NTM traits, frame sub-traits, current and new frame indices are shown.

Table 8. Expected genetic response for traits included in current and new frame index (two top rows) given as correlations between the frame index and the frame sub-traits. Also, correlations between NTM traits, frame sub-traits, current and new frame indices are shown. Calculations based on Nordic RDC bulls born in 2009 and with at least 15 daughters with classifier records (N = 743).

	Frame sub-trait								
NTM trait	Stature	Body depth	Chest width	Dairy form	Top line	Rump width	Rump angle	Frame, current	Frame, new
Frame, current	0.79	0.56	0.40	0.27	0.07	0.57	-0.39	-	**0.78**
Frame, new	**0.56**	**0.80**	**0.74**	**0.08**	**-0.17**	**0.62**	**-0.11**	**0.78**	-
Yield	0.06	0.28	0.02	0.28	-0.16	0.12	-0.05	0.14	**0.20**
Growth	0.11	0.21	0.34	-0.18	-0.27	0.24	-0.06	0.19	**0.33**
Fertility	-0.07	-0.19	-0.12	-0.04	0.14	-0.12	-0.03	-0.08	**-0.19**
Birth	-0.43	-0.32	-0.21	-0.16	0.03	-0.41	0.16	-0.48	**-0.46**
Calving	0.09	-0.11	-0.14	0.08	0.02	0.11	0.04	-0.01	**-0.05**
Udder health	-0.02	-0.15	0.02	-0.23	0.13	-0.01	-0.02	-0.03	**-0.08**
General health	-0.17	-0.05	0.03	-0.25	-0.05	-0.22	0.03	-0.18	**-0.13**
Claw health	-0.09	-0.13	-0.07	-0.07	0.03	-0.15	0.04	-0.13	**-0.16**
Feet & legs	-0.17	-0.29	-0.41	0.19	0.14	-0.25	-0.06	-0.23	**-0.41**
Udder conf.	0.36	-0.06	0.07	0.04	0.08	0.17	-0.26	0.32	**0.14**
Milking speed	0.09	0.11	-0.22	0.29	0.00	0.09	-0.05	0.06	**0.00**
Temperament	0.08	0.07	-0.08	0.19	-0.07	0.11	-0.10	0.10	**0.06**
Longevity	-0.16	-0.13	-0.13	0.03	0.13	-0.15	-0.05	-0.12	**-0.19**
Young stock survival	-0.20	-0.24	-0.26	0.02	0.07	-0.23	-0.01	-0.27	**-0.33**
NTM	0.02	0.00	-0.16	0.20	-0.01	-0.02	-0.13	0.03	**-0.06**

Jersey

JER yield index

The new weights for M, F, and P in the yield index for JER are, current weights in ( ):

Milk: -0.30; fat: 0.65; protein: 0.65 (milk: -0.30; fat: 0.50; protein: 0.80)

Statistics for new and current yield indices are shown in Table 9. SD of the new yield index increases slightly because more weight is but on fat which has a larger SD than protein. The correlations between breeding values for the new and current yield index were 0.987 and 0.996 based on GS and prog bulls, respectively. The lower correlation for the GS bulls is caused by larger relative differences in SD for the milk, fat and protein indices when SD is based on genotyped bulls compared to progeny tested bulls.

Table 9. Statistics for current and new yield indices based on 867 genotyped Nordic JER bulls (GS) born 2015-2016 and 97 progeny tested Nordic JER born 2009-2010.

	Mean		SD	
	GS	Prog	GS	Prog
Current yield index	106.6	100.3	5.2	8.1
New yield index	106.7	100.1	5.3	8.2

Table 10. Correlations between milk yield, fat yield, protein yield, fat percentage, and protein percentage, for current yield index and new yield index (new weights) for JER. Correlations are based on 867 genotyped Nordic JER bulls born 2015-2016.

	Milk	Fat	Protein	Fat %	Protein %
Current yield index	0.50	0.92	0.87	-0.05	0.04
New yield index	0.41	0.95	0.80	0.06	0.12

JER NTM

Changed NTM weights: weight on beef production changed from 0.08 to 0.00.

Using new weighting of the M, F, and P indices in the yield resulted in a minor increase in expected genetic response for yield and none of minor impacts on the remaining NTM traits (Table 11).

Table 11. Weights in NTM (relative to yield index) and expected genetic response for current NTM and new 2018 NTM with and without new weights for M, F, and P in yield index for JER. Response based on 867 genotyped Nordic JER bulls born 2015-2016.

Trait	NTM weights		Expected genetic response		
	Current NTM	New NTM	Current NTM	New NTM	New NTM New yield
Yield index	1.00	**1.00**	0.59	0.61	**0.63**
Beef production	0.00	**0.00**	-0.02	0.02	**0.02**
Fertility	0.23	**0.31**	0.23	0.32	**0.31**
Birth index	0.07	**0.05**	0.09	0.07	**0.09**
Calving index	0.07	**0.08**	0.19	0.17	**0.16**
Udder health	0.51	**0.53**	0.58	0.56	**0.57**
General health	0.05	**0.17**	0.28	0.32	**0.33**
Frame	0.00	**0.00**	0.17	0.13	**0.11**
Feet & legs	0.05	**0.09**	0.15	0.21	**0.20**
Udder	0.30	**0.18**	0.42	0.30	**0.30**
Milking speed	0.11	**0.11**	0.09	0.06	**0.08**
Temperament	0.03	**0.03**	0.00	-0.02	**-0.01**
Longevity	0.09	**0.11**	0.49	0.53	**0.52**
Claw health[1]	0.06	**0.05**	0.16	0.16	**0.16**
Young stock survival[1]	0.14	**0.12**	0.32	0.32	**0.33**

[1]Based on progeny tested Nordic JER bulls born 2009-2010. N = 97