

2018 NTM weights and expected genetic response

Calculating NTM weights
Handling longevity
Expected genetic response
Compare with current NTM index

Lars Peter Sørensen, Jørn Pedersen
Jukka Pösö, Freddy Fikse
Jan-Åke Eriksson, Morten Kargo, Ulrik Sander Nielsen
Gert Pedersen Aamand
January 2018

NAV



Nordisk Avlsværdi Vurdering • Nordic Cattle Genetic Evaluation

Calculating NTM index weights

Convert value per trait unit to value per index unit

We need:

- Economic value per trait unit, e.g. value of 1 kg protein in 1st lactation is 1.74 € (HOL)
- Number of trait units per index unit, e.g. 2.00 kg of protein per index unit
- Value per index unit is then: $1.74 * 2.00 = 3.48$ € per index unit

Result: **value per index unit for each composite trait, e.g. yield**

Economic value of yield

NTM type	HOL	RDC	JER
Conventional, €	10.94	11.57	9.36
Organic, €	7.86	8.26	6.68
Original 2008-2012, €	7.61	8.33	6.00

- Assumed genetic SD (kg protein and kg fat per index unit) is higher than in 2008
- 77, 87, and 95 % of change for conv. HOL, RDC, and JER can be explained by increased genetic SD of yield traits

HOL NTM values (€/index unit), conv. **before** long. transf.

	Original 2008-2012	Conventional	
Yield	7.61	10.94	↑
Growth	0.61	0.77	→
Fertility	2.44	3.83	↑
Birth, direct	1.52	1.42	→
Calving, maternal	1.67	1.42	→
Udder health	2.66	2.84	→
General health	0.84	1.20	→
Body conformation	0.00	0.00	→
Feet & legs conformation	0.30	0.33	→
Udder conformation	0.68	0.55	→
Milkability	0.84	0.88	→
Temperament	0.30	0.44	→
Longevity	3.73	2.30	↓
Claw health	0.38	0.77	→
Young stock survival	1.37	1.20	→

NA



RDC NTM values (€/index unit), conv. **before** long. transf.

	Original 2008-2012	Conventional	
Yield	8.33	11.57	↑
Growth	0.92	0.93	→
Fertility	1.92	3.01	↑
Birth, direct	1.25	0.93	↓
Calving, maternal	1.08	0.93	↘
Udder health	2.42	1.85	↘
General health	0.83	1.04	↗
Body conformation	0.00	0.00	→
Feet & legs conformation	0.50	0.35	↓
Udder conformation	0.75	0.69	↘
Milkability	0.58	1.04	↗
Temperament	0.25	0.35	↗
Longevity	2.33	1.85	↘
Claw health	0.33	0.58	↗
Young stock survival	2.00	1.74	↘

NA



JER NTM values (€/index unit), conv. **before** long. transf.

	Original 2008-2012	Conventional	
Yield	6.79	9.36	↑
Growth	0.20	0.56	→
Fertility	1.56	1.78	→
Birth, direct	0.48	0.37	→
Calving, maternal	0.41	0.56	→
Udder health	2.72	2.71	→
General health	0.34	0.84	↑
Body conformation	0.00	0.00	→
Feet & legs conformation	0.27	0.28	→
Udder conformation	0.88	1.03	→
Milkability	0.75	0.75	→
Temperament	0.20	0.19	→
Longevity	1.90	2.53	→
Claw health	0.27	0.37	→
Young stock survival	0.95	0.94	→

The longevity issue

- EBV for longevity is affected by other traits, e.g. fertility, udder health a.o.
- Effect of culling on these traits not included in model
- The amount of weight to be transferred found by analyzing relationship between longevity and these traits (similar principle used in 2008)

Longevity transfer

	HOL	RDC	JER
% weight to be transferred	67 (70)	65 (70)	65 (50)
	Distribution of transfer, %		
Fertility	24 (26)	32 (26)	36 (0)
Udder health	33 (32)	33 (26)	23 (73)
General health	16 (13)	6 (14)	8 (0)
Feet & legs conformation	9 (5)	18 (0)	25 (6)
Udder conformation	0 (9)	0 (26)	9 (13)
Claw health	18 (14)	11 (7)	0 (7)

2008-2012 values in ()

Note: udder conformation does not explain variation in longevity in HOL and RDC in conv. NTM

HOL NTM values (€/index unit), conv. **before and after** longevity transfer

	Conventional before	Conventional after
Yield	10.94	10.94
Growth	0.77	0.77
Fertility	3.83	4.16
Birth, direct	1.42	1.42
Calving, maternal	1.42	1.42
Udder health	2.84	3.28
General health	1.20	1.42
Body conformation	0.00	0.00
Feet & legs conformation	0.33	0.44
Udder conformation	0.55	0.55
Milkability	0.88	0.88
Temperament	0.44	0.44
Longevity	2.30	0.77
Claw health	0.77	0.98
Young stock survival	1.20	1.20

RDC NTM values (€/index unit), conv. before and **after** longevity transfer

	Conventional before	Conventional after
Yield	11.57	11.57
Growth	0.93	0.93
Fertility	3.01	3.36
Birth, direct	0.93	0.93
Calving, maternal	0.93	0.93
Udder health	1.85	2.20
General health	1.27	1.27
Body conformation	0.00	0.00
Feet & legs conformation	0.35	0.58
Udder conformation	0.69	0.69
Milkability	1.04	1.04
Temperament	0.35	0.35
Longevity	1.85	0.69
Claw health	0.58	0.69
Young stock survival	1.74	1.74

JER NTM values (€/index unit), conv. before and **after** longevity transfer

	Conventional before	Conventional after
Yield	9.36	9.36
Growth	0.56	0.56
Fertility	1.78	2.34
Birth, direct	0.37	0.37
Calving, maternal	0.56	0.56
Udder health	2.71	3.09
General health	0.84	1.03
Body conformation	0.00	0.00
Feet & legs conformation	0.28	0.66
Udder conformation	1.03	1.22
Milkability	0.75	0.75
Temperament	0.19	0.19
Longevity	2.53	0.84
Claw health	0.37	0.37
Youngstock survival	0.94	0.94

Summary, conventional NTM

- Value of yield index increase considerably
- Growth increase – improving EUROP form for crosses is more valuable than improving form for purebred
- Udder conf. HOL and RDC decrease – genetic SD decrease and no transfer from longevity
- Disease traits: marginal changes despite health agreement schemes – large increase in General Health for JER

HOL NTM values, conv. and organic **after** long. transf.

	Conventional	Organic
Yield	10.94	7.86
Growth	0.77	0.63
Fertility	4.16 (3.83)	3.69 (3.30)
Birth, direct	1.42	1.26
Calving, maternal	1.42	1.26
Udder health	3.28 (2.84)	5.66 (5.19)
General health	1.42 (1.20)	1.81 (1.57)
Body conformation	0.00	0.00
Feet & legs conformation	0.44 (0.33)	0.39 (0.31)
Udder conformation	0.55	0.94
Milkability	0.88	0.94
Temperament	0.44	0.39
Longevity	0.77 (2.30)	0.71 (2.04)
Claw health	0.98 (0.77)	10.10 (0.86)
Young stock survival	1.20	1.10

NAV



RDC NTM values, conv. and organic **after** long. transf.

	Conventional	Organic
Yield	11.57	8.26
Growth	0.93	0.66
Fertility	3.36 (3.01)	2.97 (2.64)
Birth, direct	0.93	0.83
Calving, maternal	0.93	0.91
Udder health	2.20 (1.85)	3.72 (3.39)
General health	1.04 (1.04)	1.40 (1.32)
Body conformation	0.00	0.00
Feet & legs conformation	0.58 (0.35)	0.58 (0.33)
Udder conformation	0.69	0.74
Milkability	1.04	0.99
Temperament	0.35	0.33
Longevity	0.69 (1.85)	0.58 (1.73)
Claw health	0.69 (0.58)	0.66 (0.58)
Young stock survival	1.74	1.57

NAV



JER NTM values, conv. and organic **after** long. transf.

	Conventional	Organic
Yield	9.36	6.68
Growth	0.56	0.27
Fertility	2.34 (1.78)	1.80 (1.34)
Birth, direct	0.37	0.20
Calving, maternal	0.56	0.33
Udder health	3.09 (2.71)	5.14 (4.81)
General health	1.03 (0.84)	1.54 (1.40)
Body conformation	0.00	0.00
Feet & legs conformation	0.66 (0.28)	0.60 (0.27)
Udder conformation	1.22 (1.03)	1.20 (1.07)
Milkability	0.75	0.73
Temperament	0.19	0.20
Longevity	0.84 (2.53)	0.73 (2.14)
Claw health	0.37	0.33
Young stock survival	0.94	0.40

NAV



Summary, organic NTM

Compared to conventional NTM:

- Value of yield index lower – higher marginal feed costs, relative difference between roughage and concentrates higher in organic
 - Value of disease traits considerable higher – no health agreement schemes
 - Value of remaining traits slightly lower
 - JER special case: affected more by higher feed costs for beef production because of more feed per kg gain
- NAV** (growth, fertility, calving traits, young stock survival)

Genetic response, new NTM indices

- Correlations between NTM index and sub-trait indicate proportional genetic response in each sub-trait compared to selection on sub-trait only
- Calculations based on genotyped Nordic bull calves born 2015-2016
 - Today all bull selection takes place in this group
 - Unselected
 - Similar response can be expected from female selection

Genetic response, HOL

(Table 2.1)

	Original 2008-2012	Conventional	Change
Yield	0.48	0.63	↑
Growth	0.07	0.11	→
Fertility	0.48	0.44	→
Birth, direct	0.30	0.26	→
Calving, maternal	0.38	0.32	→
Udder health	0.47	0.34	↓
General health	0.39	0.34	→
Body conformation	-0.03	0.01	→
Feet & legs conformation	0.24	0.17	↓
Udder conformation	0.23	0.11	↓
Milkability	0.03	0.04	→
Temperament	0.08	0.09	→
Longevity	0.60	0.50	→
Claw health	0.24	0.24	→
Young stock survival	0.29	0.23	→

Genetic response, RDC

(Table 2.2)

	Original 2008-2012	Conventional	Change
Yield	0.68	0.80	↑
Growth	0.01	0.05	↑
Fertility	0.22	0.21	→
Birth, direct	0.23	0.14	↓
Calving, maternal	0.19	0.16	→
Udder health	0.33	0.15	↓
General health	0.22	0.17	→
Body conformation	0.00	0.02	→
Feet & legs conformation	0.26	0.20	→
Udder conformation	0.16	0.04	↓
Milkability	0.11	0.18	↗
Temperament	0.04	0.09	↗
Longevity	0.49	0.45	→
Claw health	0.15	0.14	→
Young stock survival	0.36	0.25	↓

Genetic response, JER

(Table 2.3)

	Original 2008-2012	Conventional	Change
Yield	0.67	0.77	↑
Growth	0.01	0.07	↑
Fertility	0.23	0.25	→
Birth, direct	0.11	0.08	→
Calving, maternal	0.22	0.18	→
Udder health	0.53	0.38	↓
General health	0.28	0.27	→
Body conformation	0.15	0.15	→
Feet & legs conformation	0.12	0.17	↘
Udder conformation	0.27	0.15	↓
Milkability	0.06	0.07	→
Temperament	0.02	-0.01	↘
Longevity	0.52	0.48	↘
Claw health	0.16	0.09	↘
Young stock survival	0.33	0.28	↘



Summary:

Genetic response, conventional NTM compared to 2008

- Higher response for production traits
- Lower response in udder health (and a bit lower for General health)
- Lower response in conformation traits
- Response in remaining traits quite similar to 2008

Organic NTM, genetic response

(Table 2.1-2.3)

Compared to conventional NTM:

- Lower response in production traits
- Increased response for fertility
- Calving traits are similar – JER lower
- Increased response for disease traits
- Increase in feet&legs and udder conformation
- Slight increase for longevity

NAV



Correlations between conv. NTM and organic NTM

HOL	RDC	JER
0.95	0.95	0.92

- Correlations are high but some re-ranking can be expected
- JER "suffers" more from high organic feed costs – affect growth and through that other traits as well

Increase weight on udder conformation

- **Current NTM: more weight on udder than originally calculated, based on recommendations from breed organizations**

	RDC	HOL	JER
Current NTM	0.35	0.33	0.30
Original 2008 NTM	0.14	0.12	0.15

- **Predict response using current weight on udder conf. for new conv. NTM**

Increase weight on udder conformation

RDC example (genetic response):

Trait	Conv. NTM	Conv. NTM udder
Yield	0.82	0.74
Udder health	0.14	0.24
General health	0.15	0.13
Udder conf.	0.04	0.37
Body	0.03	0.13

Increase weight on udder conformation

Summary:

- Lower response in production traits
- Increased response in udder health
- Correlations between conv. NTM and conv. NTM udder are: HOL: 0.94; RDC: 0.95; JER: 0.97
- Some re-ranking can be expected

Breeding for polledness

- Costs related to dehorning: veterinarian, extra work, and materials
- DNK only heifers are dehorned

	HOL			RDC			JER
	DNK	SWE	FIN	DNK	SWE	FIN	DNK
Per annual cow, €	2.73	7.06	5.87	2.73	6.86	5.82	2.85
Average, €	5.22			5.13			2.85

- Cost for dehorning larger in SWE and FIN than DNK – only heifers are dehorned in DNK
- Value of polledness 30-50% of value of one yield index unit

Sensitivity analyses (proposal)

- **Economic and biological parameters may not reflect situation when NTM 2018 is realized**
- **Parameters may be based on assumptions, i.e. when information has not been available**
- **We re-run model with slightly different assumptions**
- **This tests the robustness of the estimated values**

Plans until May 24th 2018

- **Feed back from group work in relation to sensitivity analyses**
- **Closer check up on the increased response from yield caused by the assumption about genetic standard deviation**

NAV



Nordisk Avlsværdis Vurdering • Nordic Cattle Genetic Evaluation