

Youngstock survival in Nordic Cattle Genetic Evaluation

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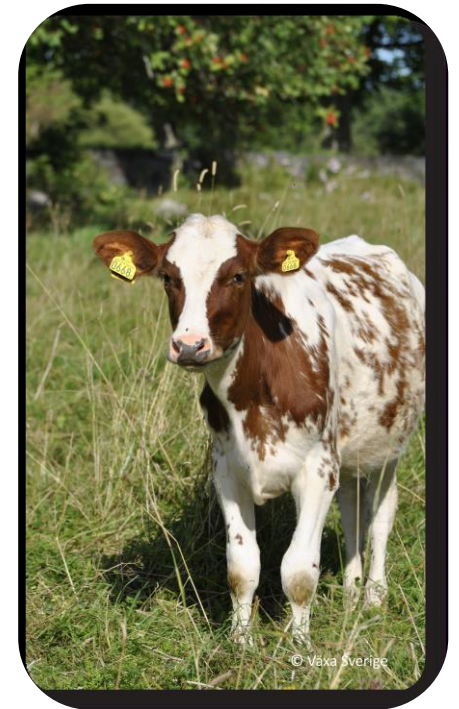
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Outline

- Nordic Total Merit and survival traits
- Youngstock survival:
 - Data, trait definition and phenotypic averages
 - Genetic parameters and evaluation model
 - Composition of sub-index and publication
 - Economic value and effect in NTM



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Nordic Total Merit



Included sub-indices

- Yield
- Growth
- Fertility
- Birth
- Calving
- Udder health
- Other diseases
- Claw health
- Frame
- Feet & legs
- Udder
- Milkability
- Temperament
- Longevity
- Youngstock survival

- Joint Nordic breeding goal
 - RDC, Holstein, Jersey
 - Denmark, Finland, Sweden
- Survival traits in NTM
 - Economically important
 - Cover the whole life-time of animals

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Importance of YSS in NTM

- Losing young animals implies economic loss
 - No replacement heifer or reduced beef sales
 - Extra work and possibly health costs
- Animal welfare and consumer concerns
- Selection for more liveborn calves and longlasting cows not enough to improve survival during rearing period



New born



30 days old



Maiden heifer

Nordic data and trait definition

- Data: all transfers/deaths of animals registered in central data bases
 - Included: purebred calves born alive from 1998
 - Excluded: animals slaughtered or exported within defined periods
- 4 single traits depending on sex of calf and rearing period
- Phenotypic averages for survival rate vary with population
 - Average survival for HOL and RDC heifers > 93%
 - Rather constant over years

		Average survival (%) Across countries, 2008-2012		
Single traits	Rearing period	HOL	RDC	JER
Heifer period 1 (HP1)	Day 2 up to 1 month	97.5	97.4	92.6
Heifer period 2 (HP2)	1 up to 15 months	96.3	95.4	93.4
Bull period 1 (BP1)	Day 2 up to 1 month	96.0	96.1	-
Bull period 2 (BP2)	1 up to 6 months	96.0	94.4	-

Genetic parameters



- Heritabilities on observed scale
 - Low (few %) \approx stillbirth and health traits
- Genetic correlations
 - Fairly high w/n period and b/n sexes
 - Lower b/n periods and w/n sex

	HOL	RDC	JER
HP1	0.8	0.7	1.8
BP1	0.6	0.6	1.2
HP2	1.0	2.0	1.5
BP2	2.4	3.0	1.0

	BP1	HP2	BP2
HP1	0.9-0.95	0.4-0.75	0.3-0.6
BP1		0.4-0.8	0.4-0.6
HP2			0.9-0.99
BP2			

Genetic evaluation model

Multiple-trait animal linear model

Fixed effects

- Herd x 5-year birth period
- Country x year x birth month
- Country x transfer to a new herd (0/1) x month of transfer
 - only included for early transfer in HP2 and BP2
- Heterozygosity

Random effects

- Phantom parent groups
 - defined by birth year and original breed group
- Herd x year of birth
- Genetic effect of animal



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Composition of sub-index and publication

- YSS EBV published since Nov. 2014
 - Sub-index created by weighing together four single traits
- YSS GEBV published since Feb 2016
- YSS included with economic weight in NTM May 2016
- Economic values for YSS
 - Required additional biological and economical assumptions



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BIOLOGICAL ASSUMPTIONS:

- Mortality rates
- Average age of death

ECONOMICAL ASSUMPTIONS = ADDITIONAL COSTS YSS:

- Destruction
- Extra cost to prevent death
- Extra work

NORMAL COSTS:

- Feed
- Housing
- Labour

ECONOMIC MODEL with YSS

ANIMAL VALUE:

- Slaughter price
 - Heifer
- RDC/HOL €1200
JER €700

ECONOMIC VALUES FOR YSS

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Economic values single traits

- **Value (€) of improving survival by 1% unit per cow and year**
(Multiply by 100 ≈ value of one calf)

Single traits	Value (€) Across countries		
	HOL	RDC	JER
Heifer period 1 (HP1)	3.45	3.55	2.00
Heifer period 2 (HP2)	4.05	4.15	2.41
Bull period 1 (BP1)	1.29	1.43	0.27
Bull period 2 (BP2)	1.79	2.02	0.79

- Within breed: **highest value for HP2** (≈ €405 for HOL)
- ...and **lowest value for BP1** (≈ €129 for HOL)

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Economic value of an index unit

Value (€) 1
index unit YSS
= **economic wt**
in NTM

RDC: 2.03 / HOL:
1.40 / JER: 0.92 €



Sub-index	HOL	RDC	JER
Yield	7.61	8.33	6.80
Growth	0.61	-	-
Fertility	3.15	2.26	1.56
Birth	1.52	1.21	0.47
Calving	1.72	1.04	0.47
Udder health	3.55	2.78	3.44
Other diseases	1.12	1.04	0.31
Feet & legs	1.22	0.78	0.31
Udder	2.54	2.78	2.03
Milkability	0.81	0.87	0.78
Temperament	0.30	0.26	0.23
Longevity	1.12	0.61	0.63
Claw health	0.81	0.43	0.39
Youngstock survival	1.40	2.03	0.92

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Effect of including YSS in NTM

Sire EBV correlations: YSS vs. old NTM (w/o YSS incl.)

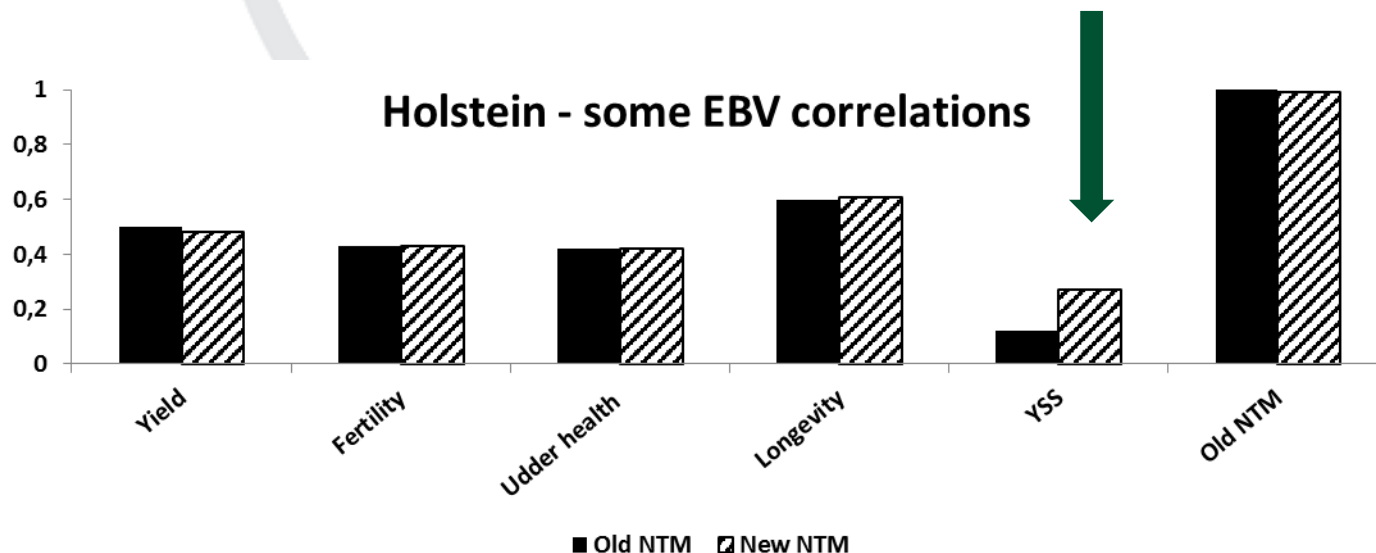
➤ Low correlations between YSS and other NTM traits

- Favourable to NTM and functional traits, unfavourable to Frame

Sire EBV correlations: NTM (old or new) and sub-indices

➤ Largest impact on RDC, smaller on other breeds

- Correlation new NTM – old NTM: RDC 0.97, JER and HOL 0.99
- Minor changes most sub-indices, except ↑ progress YSS all breeds



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Conclusions youngstock survival

- Small re-ranking of bulls based on NTM
 - However, some effects on progress in other traits
- Improves the economical and ethical value of NTM
 - Increased standard deviation NTM (a few %)
→ greater economic difference between selected bulls and average NTM level
- Gain of adding YSS is larger than other earlier improvements
 - Because of low correlations to other NTM traits

With Youngstock survival in NTM, we have a more economically optimal breeding goal

