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Nordic claw health index
Claw health in NTM

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Survey of presentation

- *Claw health traits have been introduced*
- *Economic model – assumptions – and single trait results*
- **From "raw" breeding values to indexes – importance of standardization**
- **Value of a claw health index unit**
- **Relationship to longevity (redistribution of longevity value)**
- **Relative weights of claw health:**

  Now and in the future – a proposal

  Correlations to NTM

- **Discussion (Relationship to risk of death and other factors)**

Main results from NTM-model

Value of breeding values summed across lactations

Breeding values on input scale – not index scale
Small differences between breeds

table 9	Unit	HOL	RDC	JER
Protein	*Kg*	*4.60*	*4.81*	*4.15*
Feet&Leg diseases	*%-units*	*1.75*	*1.70*	*1.69*
Feet&Legs conf.	*Point*	*17.0*	*17.0*	*17.0*
Sole Ulcer(SU)	**Point**	**64.91**	**65.23**	**66.43**
Sole Hemorrhage(SH)	**Point**	**8.67**	**8.71**	**9.00**
Horn Heel Erosion(HH)	**Point**	**13.98**	**14.05**	**14.52**
Digital Dermatitis(DE)	**Point**	**13.98**	**14.05**	**14.52**
Skin Proliferation(SP)	**Point**	**25.56**	**25.68**	**24.14**
White Line Separation(WLS)	**Point**	**8.67**	**8.71**	**9.00**
Cork Screw claws(CSC)	**Point**	**9.67**	**9.73**	**12.81**

Standard deviation of claw health breeding values

= ”Content” of 10 index units in points

Large differences in standard deviations / ”content”

Table 11	Unit	HOL	RDC	JER
Sole Ulcer(SU)	Point	0.0418	0.0252	0.0247
Sole Hemorrhage(SH)	Point	0.0591	0.0679	0.0401
Horn Heel Erosion(HH)	Point	0.0564	0.0697	0.0504
Digital Dermatitis(DE)	Point	0.0521	0.0473	0.0428
Skin Proliferation(SP)	Point	0.0231	0.0183	0.0169
White Line Separation(WLS)	Point	0.0129	0.0091	0.0082
Cork Screw claws(CSC)	Point	0.0090	0.0146	0.0059

Standard deviation of claw index traits

= ”Content” of 10 index units in Euro

*= ”Content” in point * €-value per point*

Large differences in value of a standard deviation

Top of table 12 (SU)	Unit	HOL	RDC	JER
Sole Ulcer(SU)	€	2.713	1.644	1.641
Sole Hemorrhage(SH)	€	0.512	0.592	0.361
Horn Heel Erosion(HH)	€	0.788	0.979	0.732
Digital Dermatitis(DE)	€	0.728	0.664	0.621
Skin Proliferation(SP)	€	0.591	0.470	0.408
White Line Separation(WLS)	€	0.112	0.079	0.074
Cork Screw claws(CSC)	€	0.087	0.142	0.076

Relative value of single claw indexes

Relative to value of SU-index

Differences between breeds mostly due to differences in standard deviation

	HOL	RDC	JER
Sole Ulcer(SU)	1.000	1.000	1.000
Sole Hemorrhage(SH)	0.189	0.360	0.220
Horn Heel Erosion(HH)	0.291	0.596	0.446
Digital Dermatitis(DE)	0.268	0.404	0.379
Skin Proliferation(SP)	0.218	0.286	0.249
White Line Separation(WLS)	0.041	0.048	0.045
Cork Screw claws(CSC)	0.032	0.086	0.046

Calculation of value of one of the claw health traits (example SU)

	Unit	HOL	RDC	JER
SU, value	Point	64.91	65.23	66.43
SU, SD	Point	0.0418	0.0252	0.0247
SU: Value * SD	€	2.713	1.644	1.641
SU Value * SD/10 = value of 1 SU index unit	€	0.2713	0.1644	0.1641

Calculation of value of total claw health index

	Unit	HOL	RDC	JER
Claw health calculated with relative weight on SU = 1.0 using relative weights for unstandardized BV (as Kjell) All 7 BVs are comparable on a SU scale Advantage: Value of 1 unit equal to SU value				
Value/unit in €	SU-point	64.91	65.23	66.43
Claw health, SD	SU-point	0.0625	0.0478	0.0435
Claw health index value: Value * SD/10	€	0.4057	0.3118	0.2890

Calculation of value of total claw health index
An alternative presentation

	Unit	HOL	RDC	JER
Claw health calculated as total Euro value Sum of the 7 original BV * value or Sum of the 7 indexes * index value				
Value/unit	€	1.00	1.00	1.00
Claw health, SD	**€**	**4.057**	**3.118**	**2.890**
Claw health index value: Value * SD/10	**€**	**0.4057**	**0.3118**	**0.2890**

Value per index unit of claw health index

- **HOL: 0.4057 € (3.04 DKK, 3.77 SEK)**
- **RDC: 0.3118 € (2.34 DKK, 2.90 SEK)**
- **JER: 0.2890 € (2.17 DKK, 2.69 SEK)**

Not included (important):

- **Extra value from redistributed longevity**
- ***Extra value due to increased risk of death or other factors***

A comparison to other traits

Values before transfer of value from longevity
Values before final adjustments

(*Value of claw index is 4%-5% of yield index value)*

€/index	HOL	RDC	JER
Claw health	0.41	0.31	0.29
Feet&Leg conf.	0.30	0.50	0.24
Other diseases	0.84	0.76	0.30
Yield	7.61	8.33	6.00
Claw health/Yield	*0.053*	*0.037*	*0.048*

The longevity problem

Economic model (profit model)

- *Deterministic data simulation (Excel – farm accounting)*
- *Results expressed as: Marginal profit per cow per year*
- *Many assumptions: Economic, technical, biological*

Shortcomings

- ***Insufficient modelling of cow culling process***
- ***All cow replacement costs attached to longevity***

”repair” by transfer of value from longevity to other traits

  - ***Fertility, udder health, other diseases, leg and udder conformation***
  - ***New trait added to the list: Claw health***

The longevity problem

Longevity value transferred (unchanged)

- 70% in HOL and RDC
- 50% in Jersey

With claw health included:

- Unchanged transfer to: Fertility, udder health, udder conformation
- Reduced transfer to: Other diseases, feet&leg conformation

The longevity problem

Claw health index effect on Longevity index

- 14% in HOL (of the 70%)
- 7% in RDC (of the 70%)
- 7% in JER (assumed – analyses not possible – 7% of 50%)

Transferred value reduced for

- Other diseases: 12.5% reduction in transferred value = nearly nothing
- Feet&Leg conformation: Remaining part

Claw health Values before and after transfer of value from longevity

€/index	HOL	RDC	JER
Before transfer	0.4057	0.3118	0.2890
After transfer	0.7679	0.4226	0.3520
Yield	7.61	8.33	6.00
Before long. tranf. Claw health/Yield	*0.053*	*0.037*	*0.048*
After long. tranf. Claw health/Yield	*0.101*	*0.051*	*0.059*

Holstein

	Economic 2008	Final NAV 2008	New economic	New "Final" NAV
Yield	1.00	1.00	1.00	1.00
Growth	0.08	0.08	0.08	0.08
Fertility	0.41	0.41	0.41	0.41
Birth index	0.20	0.20	0.20	0.20
Calving index	0.22	0.22	0.22	0.22
Udder health	0.46	0.46	0.46	0.46
Other diseases	0.16	0.16	0.15	0.15
Body	0.00	0.00	0.00	0.00
Feet&Legs	0.10	0.20	0.06	0.16
Udder	0.12	0.24	0.12	0.24
Milk ability	0.11	0.11	0.11	0.11
Temperament	0.04	0.04	0.04	0.04
Longevity	0.15	0.15	0.15	0.15
Claw health	**0.00**	**0.00**	**0.10**	**0.10**
Claw heath, before long.			*0.05*	*0.05*

RDC

	Economic 2008	Final NAV 2008	New economic	New "Final" NAV
Yield	1.00	1.00	1.00	1.00
Growth	0.11	0.00	0.11	0.00
Fertility	0.28	0.28	0.28	0.28
Birth index	0.15	0.15	0.15	0.15
Calving index	0.13	0.13	0.13	0.13
Udder health	0.34	0.35	0.34	0.35
Other diseases	0.13	0.13	0.13	0.13
Body	0.00	0.00	0.00	0.00
Feet&Legs	0.07	0.10	0.06	0.09
Udder	0.14	0.35	0.14	0.35
Milk ability	0.07	0.07	0.07	0.07
Temperament	0.03	0.03	0.03	0.03
Longevity	0.09	0.09	0.09	0.09
Claw health	**0.00**	**0.00**	**0.05**	**0.05**
Claw heath, before long.			*0.04*	*0.04*

Jersey

	Economic 2008	Final NAV 2008	New economic	New "Final" NAV
Yield	1.00	1.00	1.00	1.00
Growth	0.03	0.00	0.03	0.00
Fertility	0.23	0.30	0.23	0.30
Birth index	0.07	0.07	0.07	0.07
Calving index	0.06	0.07	0.06	0.07
Udder health	0.51	0.56	0.51	0.56
Other diseases	0.05	0.05	0.05	0.05
Body	0.00	0.00	0.00	0.00
Feet&Legs	0.06	0.06	0.05	0.05
Udder	0.15	0.17	0.15	0.17
Milk ability	0.11	0.11	0.11	0.11
Temperament	0.03	0.03	0.03	0.03
Longevity	0.14	0.14	0.14	0.14
Claw health	**0.00**	**0.00**	**0.06**	**0.06**
Claw heath, before long.			*0.05*	*0.05*

Correlation between NTM and other traits for HOL

Trait	Current	New incl. claw health
Yield	0.61	0.62
Growth	0.09	0.10
Fertility	0.44	0.44
Birth index	0.31	0.31
Calving index	0.35	0.34
Udder health	0.45	0.45
Other diseases	0.49	0.49
Body	-0.04	-0.05
Feet and legs	0.15	0.13
Mammary system	0.34	0.33
Milkability	0.11	0.11
Temperament	0.00	0.00
Longevity	0.71	0.72
Claw health	(0.19)	0.26

Correlation between NTM and other traits for RDC

Trait	Current	New incl. claw health
Yield	0.68	0.66
Growth	0.06	0.03
Fertility	0.16	0.16
Birth index	0.20	0.20
Calving index	0.22	0.22
Udder health	0.30	0.31
Other diseases	0.24	0.23
Body	0.06	0.05
Feet and legs	0.17	0.23
Mammary system	0.32	0.34
Milkability	0.21	0.21
Temperament	0.20	0.19
Longevity	0.60	0.61
Claw health	(0.08)	0.13

Correlation between NTM and other traits for Jersey (73 sires)

Trait	Current	New incl. claw health
Yield	0.75	0.75
Growth	-0.05	-0.06
Fertility	0.22	0.23
Birth index	-0.02	-0.02
Calving index	0.08	0.07
Udder health	0.43	0.43
Other diseases	0.30	0.30
Body	0.03	0.02
Feet and legs	0.25	0.26
Mammary system	0.25	0.24
Milkability	0.10	0.09
Temperament	0.22	0.21
Longevity	0.60	0.59
Claw health	(-0.08)	-0.02

Discussion: Increased risk of death

Increased risk of death will influence value of a trait – is not included in current version of the NTM-model

Could be a problem in relation to:

- **Udder health**
- **Other diseases**
- **Claw health – more serious?**

No estimates exist for the relationship between risk of death and claw health

Discussion
Other factors of importance ?

- **Regaining weight loss: Minor effect**
- **Vitality (related to death risk)**

Conclusions

Weight relative to yield:

- HOL: 0.10
- RDC: 0.05
- JER : 0.06

Economic value of claw health index

- HOL: 0.768 € (5.76 DDK, 7.14 SEK)
- RDC: 0.422 € (3.16 DDK, 3.92 SEK)
- JER: 0.352 € (2.64 DDK, 3.27 SEK)