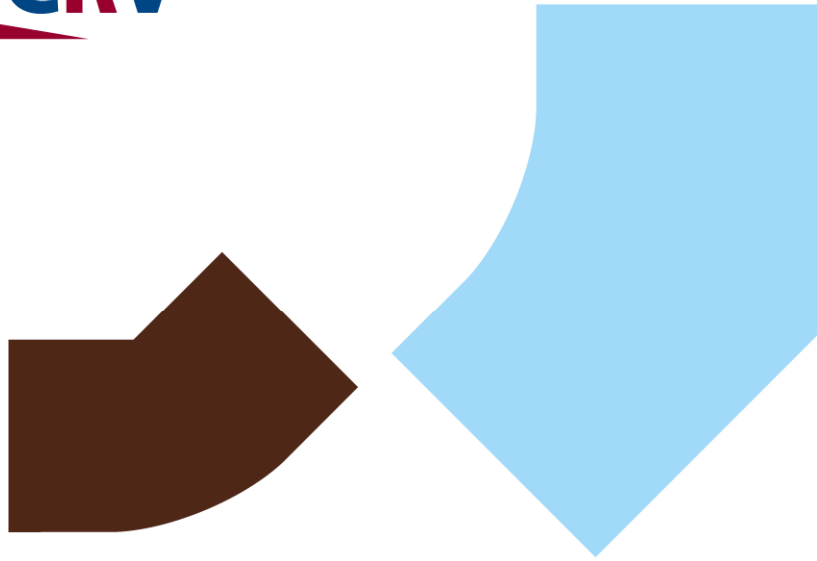




Implementation of a Claw Health Index in The Netherlands

Gerben de Jong

Content

Why Claw Health...

Model and Parameters

Presentation and Economics

Feedback to farmers

Conclusions

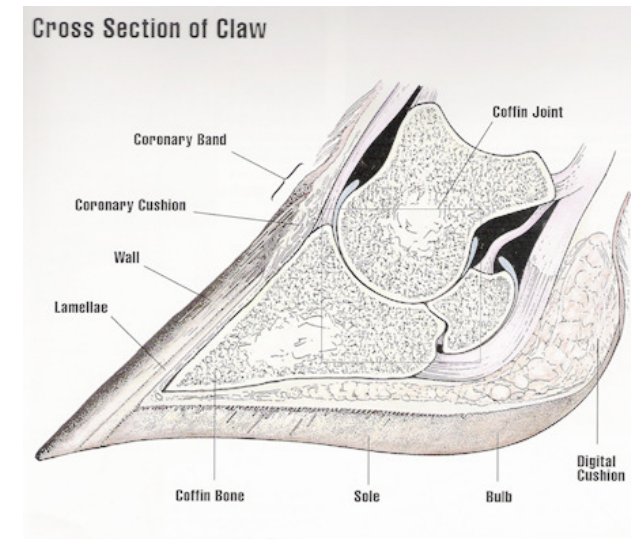
Content

Why Claw Health...

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Feedback to farmers

Implications & Conclusions



Why Claw Health...

Claw Health is major issue in Dairy Cattle

70% of Dutch cows have a claw disorder

- at least at one of the 4 claws

Claw health data is routinely scored since 2006

- enables breeding value estimation



Data

Claw disorder	scores	prevalence
• sole haemorrhage	0 - 3	38%
• digital dermatitis	0 - 3	22%
• interdigital dermatitis	0 - 3	29%
• socle ulcer	0 - 3	7%
• interdigital hyperplasia	0 or 1	5%
• white line disease	0 or 1	11%

Claw disorders I

Sole Haemorrhage

- Zoolbloeding
- Metabolic related



Digital Dermatitis

- Mortellaro
- infection related



Interdigital Dermatitis

- Stinkpoot
- Infection related



- source: Animal Health Service

Claw disorders II

Sole Ulcer

- Zoolzweer
- Metabolic related



Interdigital hyperplasia

- Tyloom
- Infection related



White Line Disease

- Witte lijn defect
- Metabolic related



Prevalence

Trait	Score	Prevalence(%)
Sole Haemorrhage	0-3	38
Digital Dermatitis	0-3	22
Interdigital Dermatitis	0-3	29
Sole Ulcer	0-3	7
Interdigital Hyperplasia	0-1	5
White Line Disease	0-1	11
At least 1 disorder	0-1	69

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Data for Breeding Value Estimation

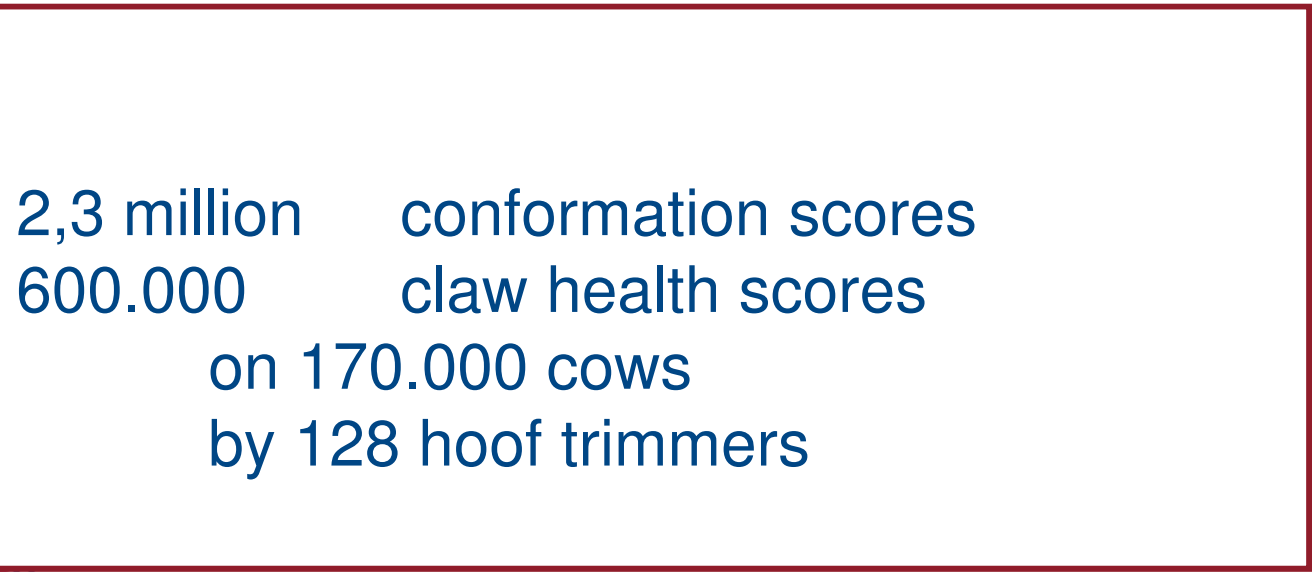
April 2010

Claw Health scores

- October 2006-February 2014

Feet & Leg Conformation score (data since 1998)

- If rear leg: rear view / side view is available

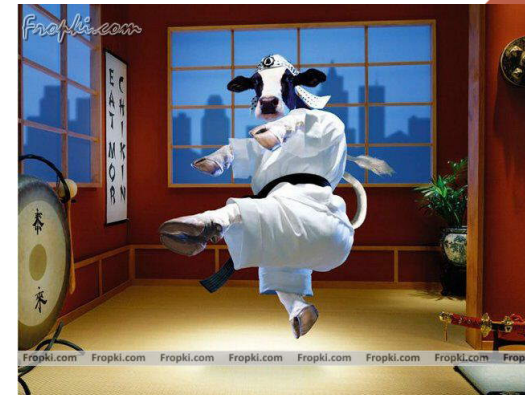


2,3 million conformation scores
600.000 claw health scores
on 170.000 cows
by 128 hoof trimmers

Model and Parameters

Multi-trait animal model including 17 traits

- 6 claw disorders
- in 2 lactation groups
 - parity 1 and parity 2+
- 5 feet & leg conformation traits
 - Rear Leg Rear View
 - Rear Leg Side View
 - Foot Angle
 - Locomotion
 - Feet & Legs



Model...

Corrects for:

- age at calving (heifers) /parity (cows)
 - stage of lactation
 - heterosis / recombination
 - herd - test day- classifier (conformation data)
 - herd - testdate (claw data)
 - hooftrimmer-half year (claw data)
 - permanent environment (claw data)
-
- Animal -> breeding value

... and Parameters

	Heifers		Cows	
	h^2	rept.	h^2	rept
Sole Haemorrhage	0.07	0.16	0.05	0.17
Digital Dermatitis	0.09	0.36	0.08	0.30
Interdigital Dermatitis	0.08	0.21	0.11	0.27
Sole Ulcer	0.08	0.30	0.12	0.30
Interdigital Hyperplasia	0.08	0.42	0.14	0.62
White Line Disease	0.03	0.14	0.03	0.17

Genetic Correlations (on observation level)

	Sole haemorrhage 1	Digital dermatitis 1	Interdigital dermatitis 1	Sole ulcer 1	Interdigital hyperplasia 1	White line disease 1	Sole haemorrhage 2+	Digital dermatitis 2+	Interdigital dermatitis 2+	Sole ulcer 2+	Interdigital hyperplasia 2+	White line disease 2+	Rear leg rear view	Rear leg side view	Foot angle	Locomotion	Feet & legs
Sole haemorrhage 1		-0.02	0.00	0.01	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Digital dermatitis 1	0.08		-0.02	0.02	0.07	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interdigital dermatitis 1	0.17	0.77		0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sole ulcer 1	0.60	0.00	0.05		-0.02	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interdigital hyperplasia 1	0.17	0.44	0.37	0.04		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
White line disease 1	0.20	-0.31	-0.18	0.51	-0.08		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sole haemorrhage 2+	0.82	0.07	0.07	0.68	-0.07	0.34		0.01	0.01	0.01	0.01	0.04	0.00	0.00	0.00	0.00	0.00
Digital dermatitis 2+	-0.12	0.81	0.42	-0.06	0.28	-0.25	0.03		-0.03	-0.01	0.04	-0.02	0.00	0.00	0.00	0.00	0.00
Interdigital dermatitis 2+	0.08	0.82	0.85	-0.07	0.45	-0.19	0.06	0.58		-0.02	0.04	-0.02	0.00	0.00	0.00	0.00	0.00
Sole ulcer 2+	0.59	0.09	-0.09	0.82	-0.01	0.46	0.79	0.11	0.00		-0.02	-0.02	0.00	0.00	0.00	0.00	0.00
Interdigital hyperplasia 2+	0.06	0.63	0.50	-0.06	0.77	-0.30	0.06	0.60	0.65	0.01		0.00	0.00	0.00	0.00	0.00	0.00
White line disease 2+	0.12	-0.29	-0.24	0.41	-0.12	0.77	0.45	-0.11	-0.05	0.58	-0.03		0.00	0.00	0.00	0.00	0.00
Rear leg rear view	0.14	-0.33	-0.26	-0.12	-0.29	0.02	0.10	-0.18	-0.13	-0.11	-0.27	0.12		-0.18	0.31	0.48	0.56
Rear leg side view	0.11	0.14	0.27	0.36	0.07	-0.07	-0.05	0.05	0.08	0.14	0.10	-0.11	-0.26		-0.40	-0.17	-0.25
Foot angle	-0.05	-0.13	-0.24	-0.22	-0.18	0.23	0.09	0.15	-0.09	-0.09	-0.15	0.16	0.38	-0.73		0.29	0.40
Locomotion	-0.20	-0.56	-0.48	-0.25	-0.37	0.00	-0.14	-0.31	-0.39	-0.30	-0.35	0.09	0.79	-0.41	0.44		0.80
Feet & legs	-0.20	-0.51	-0.41	-0.21	-0.38	0.05	-0.12	-0.28	-0.36	-0.29	-0.37	0.07	0.76	-0.49	0.53	0.92	

Genetic correlations (below diagonal) and error correlations (above diagonal) between the traits

Claw health index

Index combined base on economic value per disorder

Economic value per disorder the same

– varies from € 55 to € 79

Claw health index

- Presentation on relative scale: 100 +/- 4

$$\begin{aligned} \bullet \text{BV}_{\text{clw,rel}} = & 100 + 0,362 \times (\text{BV}_{\text{sole haemorrhage}} - 100) \\ & + 0,395 \times (\text{BV}_{\text{digital dermatitis}} - 100) \\ & + 0,425 \times (\text{BV}_{\text{interdigital dermatitis}} - 100) \\ & + 0,177 \times (\text{BV}_{\text{sole ulcer}} - 100) \\ & + 0,102 \times (\text{BV}_{\text{interdigital hyperplasia}} - 100) \\ & + 0,094 \times (\text{BV}_{\text{white line disease}} - 100) \end{aligned}$$

Claw Health in practice

Average Breeding Value Claw Health = 100

- BV 101 saves: € 1,25 / cow / year
- Bull with 110 gives € 12,50
 - Farm with 100 cows saves € 1.250 per year

Economic impact Claw Health relative to production

- based on genetic variation:
 - Production : Claw Health ~ 6 : 1
- Adjusted for reliability
 - Production : Claw Health ~ 8 : 1



Relation claw health index – other traits

kg milk	-0,07
kg fat	0,15
kg protein	0,08
SCC	0,06
Udder Score	0,14
Udder Health Index	0,05
Fertility Index	-0,02
Longevity	0,29
Feet&Legs Score	0,62

Reliability claw health index

situation	reliability
5 claw traits (excl WD)	52.6
5 CT + loc	55.4
5 CT + 5 conf	59.2
5 conf	23.7



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Digiclaw / data collection

DigiKlauw 15:11

	Werknr.	Kalfdat.	Geb.dat.
▶	4328	18-9-2003	10-11-1994
	2199	2-8-2005	16-1-1998
	2221	26-9-2005	11-11-1999
	2222	2-2-2005	14-11-1999
	2223	16-6-2004	27-12-1999

Voeg toe Melkgevend <100i

	Werknr.	Kalfdat.	Geb.dat.
▶	3126	8-1-2005	10-11-1994
	3130	4-1-2005	16-1-1998
	3132	10-1-2005	11-11-1999
	3133	1-1-2005	14-11-1999
	3143	1-1-2005	27-12-1999

Verwijder **OK**

Voorkeur Terug

DigiKlauw 15:19

WILLEMEN 3 ☒ Achter ☐ Voor

Links Rechts

	1	2	3	1	2	3
Mortellaro	☐	☐	☒	☒	☐	☐
Stinkpoot	☐	☐	☐	☐	☐	☐
Bevangenheid	☐	☐	☐	☐	☐	☐
Zoolzweer	☐	☐	☐	☐	☐	☐
Wandzweer	☐	☐	☐	☐	☐	☐
Wittelijns defect	☐	☐	☐	☐	☐	☐
Blokje bevestigd	☒	☐	☐	☐	☐	☐

Vaak Zelden

(Alleen achter bekappen) **OK**

Voorkeur Opties Historie

Digiclaw / Farm report

KlauwGezondheid Bedrijfsoverzicht



A Veehouder
Veehouderweg 2
1234 XX Koedorp

Aantal dieren 68
Waarvan rondom 4 (5%)
Vloertype Dichte vloer
Bew eiden Niet bew eiden
Datum Bekappen 22-mrt-2007

ok

Klauwgezondheid Verloop

Aandoening		7 jan	15 okt	12 nov	10 dec	7 jan	22 mrt	Streef waarde	Info
Mortellaro	mort	20	20	20	20	20	80	90	
Tyloom	tylo	80	20	20	20	20	90	90	
Zoolbloeding	zool	20		20	20	20	100	100	
Stinkpoot	stnk	60	30	40	60	80	90	100	
Zoolzweer	zz	65	20	20	20	20	20	50	Info
Bevangenheid	beva	90	100	90	90	80	65	80	Info
Wittelij	witl	100	20	90	80	75	90	100	
Totaal KGS								80	

Aandoeningen per groep laatste bekapping

Groep	Aant dieren	mort	tylo	zool	stnk	beva	witl	Totaal
Pinken	15	8	2	1			2	8
Droge koeien	4	1				2	1	2
Vaarzen	12	9	6	2		2	6	11
2e kalfs	10	3	6	2	2	2	5	6
Oudere	27	9	5	1	4	2	5	26
- 60 dgn	7	7	1	1	1	1	1	7
- 120 dgn	6	2	4		1	1	1	6
- 200 dgn	18	9	6	4		4	6	15
- 305 dgn	19	9	5			2	8	17
> 305 dgn	9	3	3	1	3		3	8
Bedrijf (melkvee)	68	30 (45%)	19 (28%)	6 (12%)	5 (10%)	8 (14%)	19 (28%)	53 (36%)
Rollend jaargem. (mv)	98	30 (45%)	19 (28%)	6 (12%)	5 (10%)	8 (14%)	19 (28%)	53 (36%)

Claw Health Relative Farm Score

Klauwgezondheid Verloop

Aandoening		20-08-2007	12-04-2008	22-10-2008	13-05-2009	30-11-2009	07-02-2010	info
Mortellaro	mort	10	60	70	70	80	70	info
Stinkpoot	stnk	100	90	50	80	70	60	info
Zoolbloeding	zool	70	50	60	90	70	90	info
Wittelijn	witl	100	80	80	70	50	70	info
Zoolzweer	zz	100	70	70	60	60	80	info
Tyloom	tylo	20	90	90	80	30	80	info
							Totaal KGS:	90



Prevelance per group of last hoof trimming

Aandoeningen per groep laatste bekapping

groep	Aantal dieren	Totaal	<u>mort</u>	<u>stnk</u>	<u>zool</u>	<u>witl</u>	<u>zz</u>	<u>tylo</u>
pink	105							
Droge koeien	21	2		1	1			
vaarzen								
2e kalfs								
oudere	169	12	2	1	3	2	2	2
- 60 dgn	9	1	1					
- 120 dgn	5	4			1	1	1	1
- 200 dgn	5	2		1	1			1
- 305 dgn	13	2				1		
> 305 dgn	158	5	1	1	2		1	
Bedrijf (mv)	190	14 (7%)	2 (1%)	2 (1%)	4 (2%)	2 (1%)	2(1%)	2 (1%)

Registered claw diseases per animal

Aandoeningen per dier

diernr	mort stnk zool witl zz chbe tylo dhak tene tukl blok verb zien																													
	lv		rv		lv		rv		lv		rv		lv		rv		lv		rv		lv		rv		lv		rv			
	la	ra	la	ra	la	ra	la	ra	la	ra	la	ra	la	ra	la	ra	la	ra	la	ra	la	ra	la	ra	la	ra	la	ra		
127	Leeuwarder 88				2																								details	
314	8/9		3																											
149	Flora 10												1																details	
9	8,02																													
213	Christina 121						3																				x		details	
86	7,11																													
233	Zwartje 83												2														x		details	
360	7,9																													
235	Maartje 40		1																										details	
170	7,08																													
239	Anna 100				1				3																				details	
152	7,07																													

Claw History per animal

Aandoeningen per dier

Datum bezoek	mort	stnk	zool	witl	zz	chbe	tylo	dhak	tene	tukl	blok	verb	zien	bekapt door
	lv ra	lv ra	lv ra	lv ra	lv ra	lv ra	lv ra	lv ra	lv ra	lv ra	lv ra	lv ra	lv ra	
04-mrt-2009	+	+	+	+	+	+	+	+	+	+	+	+	+	B. Klauwverzorger
06-aug-2008	+	1 1	2	2	+	+	+	+	+	+	X	+	+	B. Klauwverzorger
26-apr-2008	+	+	+	+	+	+	+	+	+	+	+	+	+	B. Klauwverzorger
09-apr-2008	1 3	+	+	+	+	+	+	+	+	+	+	+	+	J.Janssen
31-okt-2007	2 3	+	+	+	2 1	+	+	+	+	+	+	+	+	J.Janssen
27-jun-2007	+	1	+	+	1	+	+	+	+	+	+	+	+	J.Janssen
27-jun-2007	+	1	+	+	1	+	+	+	+	+	+	+	+	J.Janssen
23-mei-2007	+	+	+	+	+	+	+	+	+	+	+	+	+	J.Janssen

Bulls having Claw Health Index (examples)

id bull	bull	sire	mgs	rel claw health	claw health index
NLDM000260368346	GREEN-VALLEY OBELISK	BASAR	EASTLAND CASH	99	112
NLDM000439898618	HAVEP NANO	DELTA OLYMPIC	NOORDER DUSTIN	83	111
NLDM000393344640	BLARINCKHORST ROMEO	RAMOS	BULLCREST PATRON		
USAM000017188116	GLEN-TOCTIN PIPPEN ET	EMPRISE BELL ELTON	SABRE	88	110
NLDM000342544408	DUDAM SURPRISE	NOORDER DUSTIN	GLEN-TOCTIN SLOCUM	88	109
NLDM000259840073	DELTA STILIST	DELTA NOVALIS	DELTA LUXEMBURG	99	109
DEUM000341485350	RAMOS	STARTMORE RUDOLPH	EASTLAND CASH	99	109
NLDM000346898796	BUTEMARE IDO MADDISON	LOOKING MAJOR	LYLEHAVEN AMBITION	96	108
USAM000134881560	ALL-RIEHL PRINCE	TIMLYNN THRONE-ET	ETAZON ADDISON	96	108
		O-BEE MANFRED JUSTICE-ET	COMESTAR OUTSIDE	85	108
NLDM000385038533	ISIDORUS ALTAOSAN	ET	LOOKING MAJOR	85	108
NLDM000267742237	EASTLAND KENLEY	BASAR	FATAL	84	108
NLDM000362151552	CREIJLAND SET UP	NOORDER DUSTIN	ETAZON CELSIUS	93	108
			SKALSUMER SUNNY		
NLDM000163863148	GEREMJO	ETAZON MEADOW	BOY	97	108
NLDM000234931547	NOVAN	DELTA NOVALIS	EASTLAND CASH	85	108
DEUM000578891748	MASCOL	CAROL PRELUDE MTOTO ET	STARTMORE RUDOLPH	98	107
ITAM019500292622	GO-FARM FORD VIRZIL	ALZI JUROR FORD	SABBIONA SKYWALKER	95	106
USAM000122358313	O-BEE MANFRED JUSTICE-ET	HA-HO CUBBY MANFRED ET	EMPRISE BELL ELTON	98	106
USAM000017129288	CANYON-BREEZE ALLEN ET	MJR BLACKSTAR EMORY ET	TO MAR WISTER ET	98	94
		MARA-THON BW			
USAM000130588960	R-E-W BUCKEYE ET	MARSHALL-ET	STARTMORE RUDOLPH	77	94
	VANZETTI MANFRED FLAGELLO				
ITAM061051012081	ET	HA-HO CUBBY MANFRED ET	FATAL	96	94
CANM000100745543	DUDOC MR BURNS	MARKIM THUNDER	MAUGHLIN STORM	86	93
DEUM000114140295	ZABING	ZUNDER ET	STARTMORE RUDOLPH	94	93
			SINGING-BROOK N-B		
USAM000017251413	ART-ACRES PATRON SPOCK-ET	BRABANT STAR PATRON ET	MASCOT	97	93
USAM000017058140	SILDAHL BW DUTCH BOY-ET	MAIZEFIELD BELLWOOD ET	SILDAHL LASER-ET	87	93
NLDM000170475222	LIGHTNING	ETAZON LABELLE	KINGLEA LEADER	99	92
	GO-FARM ALLEN SCOOBY-DUU		SHEN-VAL NV LM		
ITAM019500366668	ET	CANYON-BREEZE ALLEN ET	FORMATION ET	92	92
		LUTZ-MEADOWS E MANDEL-ET	SOUTHWIND BELL OF		
USAM000002297473	RICECREST MARSHALL ET	ET	BARLEE	91	91
NLDM000213082196	WOUDHOEVE DUNKER	FATAL	DOMBINATOR	83	91
CANM000006663935	COMESTAR LHEROS	SHOREMAR MASON	TO-MAR BLACKSTAR ET	88	91
ITAM002701003310	BERNARDIS BW LAIBERT	MAIZEFIELD BELLWOOD ET	HEINZ LIBERTY ET	80	91
		CESAR MASCOT VALENTEIN			
ITAM061051012057	VANZETTI VALENTEIN RAUL ET	ET	FATAL	80	91
NLDM000233821937	DOOLHOF DECEMBER	ETAZON WALLACE	ETAZON LORD LILY	99	91
	JENNY-LOU MRSHL TOYSTORY	MARA-THON BW	BRABANT STAR		
USAM000060372887	ET	MARSHALL-ET	PATRON ET	94	91
			CAROL PRELUDE		
USAM000132337980	NOR-BERT CALYPSO	WIL-HART E LOUIE-ET	MTOTO ET	86	90
			RICECREST EMERSON		
NLDM000365678876	PONSSTAR SUPERMAN	LIGHTNING	ET	87	90
			ROTHROCK TRADITION		
CANM000006483399	PETINESCA CHARISMA	KED JUROR ET	LEADMAN	86	90
GBRM000000586950	COGENT COURIER ET	FATAL	ETAZON CELSIUS	80	89
	RODENBERG EMORY NEWTON-		SINGING-BROOK N-B		
USAM000017012161	ET	MJR BLACKSTAR EMORY ET	MASCOT	89	88
NLDM000296702811	ALTA AMOK	DIXIE-LEE AARON ET	DELTA LARGO	95	86
USAM000128460878	MARKWELL KITE-ET	DONNANDALE SKYCHIEF ET	TO-MAR BLACKSTAR ET	81	86

Conclusions

Claw Health is economically important

Claw Health traits are heritable

Variation between bull's EBV present

Improving Claw Health requires Claw Data

- claw health is not the same as feet & legs
- genetic correlation 0.50 – 0.60

Claw Health is a breeding value introduced

- First breeding values published April 2010
- Data collection will improve in time

Traits scored

Trait	Heritability	Incidence rate
Dermatitis	0.023	8.6
Sole ulcer	0.043	16.2
White line separation	0.017	7.2
Chronic laminitis	0.008	3.9
Interdigital Hyperplasia	0.038	0.6
Interdigital Phlegmon	0.008	0.8

Scores since 2012

At the end of 2013

- 80.000 scores
- 25 hooftrimmers
- 834 herds

Thanks for your attention

