

Genetic Evaluation of Claw Health

2nd May 2011 first release

A photograph of a brown and white spotted cow grazing in a grassy field. The cow is the central focus, with its head down. The background consists of dense green trees and a small white structure with a dark roof on the left. The image is used as a background for the text.

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Number of claw trimmings last 12 months

	RDC	HOL	JER	Total	%
Sweden	68,206	77,012	1,303	146,521	41
Finland	12,012	6,598	-	18,610	5
Denmark	13,271	148,751	23,319	185,341	53

- Last year about 350,000 registrations

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Number of claw trimmings in total all years

	RDC	HOL	JER	I alt
Sweden	384,739	429,532	5,552	819,823
Finland	92,913	44,359	-	137,272
Denmark	15,177	166,295	25,493	206,965

Number of records in total >1,164,000

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Trait definition – genetic evaluation

Trait	Denmark	Finland	Sweden
Dermatit (DE)	Digital de+ spaltebetaendelse	Sorkkavälin ihon tulehdus+ Sorkka- alueen ihotulehdus	Digital de+klövspalteksam
Heel Horn Erosion (HH)	Balleråd	Kantasyöpymä	Klövröta
Sole Haemorrhage (SH)	Såleblödning	Vertymiä anturassa	Sulblödning
Sole Ulcer (SU)	Sålesår	Anturahaavauma	klövsulesår
Cork screw claws (CSC)	Proptraekker klov	Sorkkakiertymä	Korkskruvskölv
Skin Proliferation (SP)	Nydannelse+Digital vorte	Sorkkavälin liikakasvu+Sorkkasyylä	Limax+vårta
White line separation+ double sole (WLS)	Hul vaeg+ dobbelt sål	Valkoviivan repeämä+ (Valkoviivan repeämä?)	Hålvägg+ dubbelsula

Trait definition

- **Today**
 - **A few differences in trait definitions across countries**
 - **Finland score 0/1 (except dermatitis) and Sweden and Denmark 0/1/2**

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Trait definition

Working group of claw experts:

- **Christer Bergsten, Pia Nielsen; Nynne Capion, Terhi Vahlsten, Jouni Niemi**
- **Agreement for the future**
 - **Claw disease definitions 100% harmonised**
 - **Classification 0/1 or 0/1/2 disease dependent**
 - **Joint atlas with pictures of all diseases**

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Registration in the three countries today

Finland (paper):

Claw trimmer deliver a report – farmer or technician key the data and transfer to data base

Sweden (paper):

Report from claw trimmer is scanned to data base

Denmark (PC – touch screen):

Claw trimmer or farmer key the data simultaneous with claw trimming – transferred by blue tooth to data base

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dansk: Sålesår
engelsk: Sole ulcer
svensk: Klövsulesår
finsk: Anturahaavauma (764)

Mild



Sever



Future registration in the three countries

Three separate registration systems one per country

or

A joint registrations system - will ensure joint development

(Danish Cattle has offered a joint ownership to the electronic registration program)

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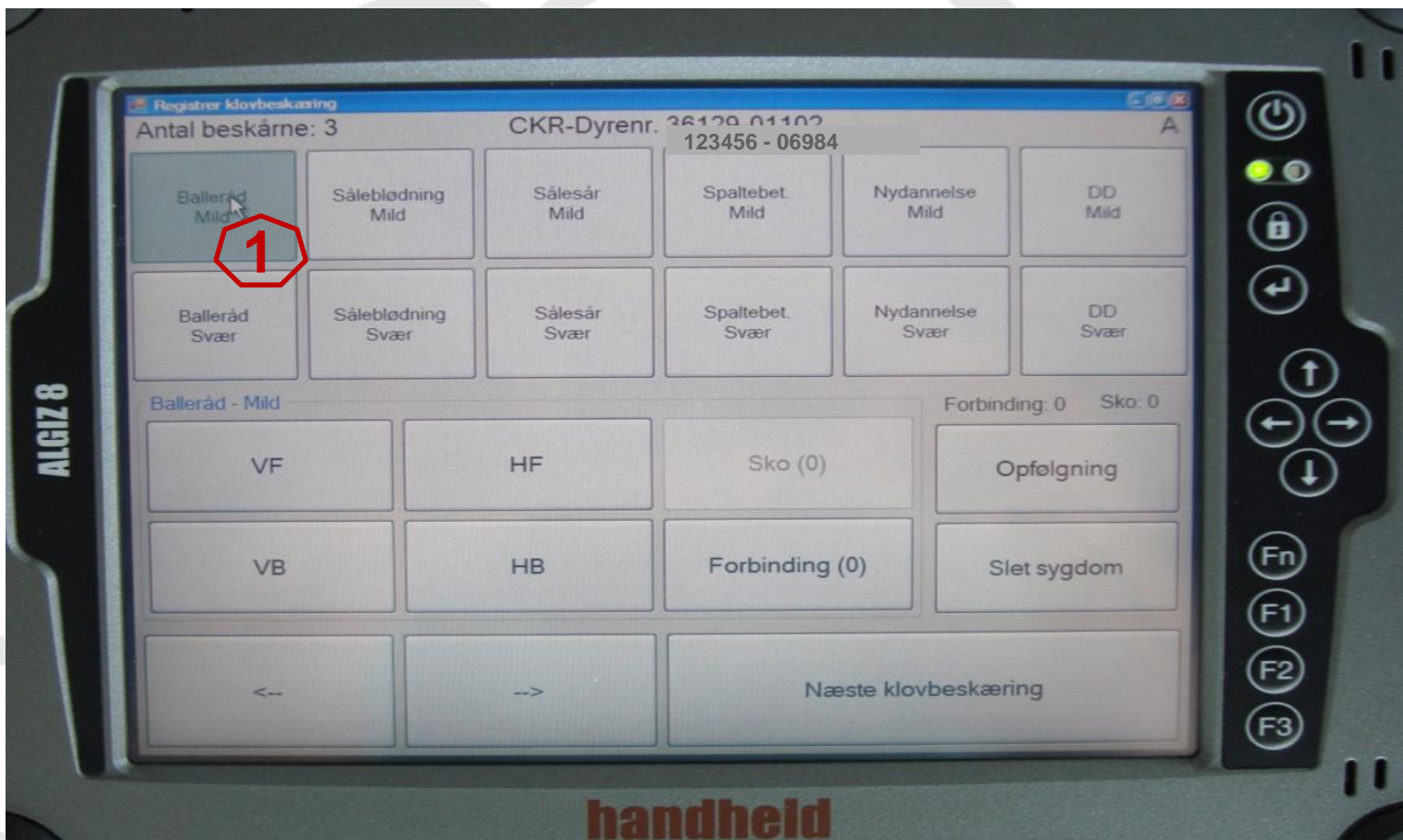


Started spring
2010





Claw disease registration. One claw disease and the severity can be registered by one touch



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Nordic Cattle Genetic Evaluation

From disorder recording to trait definition

Trait name	Disorders (coding)	Mean
Dermatitis (DE)	Interdigital (1), Digital (2), Dermatitis	0.16
Heel Horn Erosion (HH)	Mild (1), severe (2)	0.20
Skin Proliferation (SP)	interdigital hyperplasia, wart (1)	0.03
Sole Haemorrhage (SH)	Mild(1), severe (2)	0.21
Sole Ulcer (SU)	Mild (1), severe(2)	0.07
Cork screw claws (CSC)	(1)	0.02
White line separation (WLS)	White Line Separation, Double sole (1)	0.06

Trait definition ...

- 7 traits per lactation
- 3 lactations
- Maximum 3 trimmings per lactation
- Trimmings within 430 days after calving

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Trait definition...

- **Uninformative records deleted:**
- **Records from herd-years with just "0" records**
- **Deleted if probability of a "1" record is 95%**

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Number of trimmed cows per sire sires born 2004-2006

	Holstein	RDC	Jersey
Denmark	28	15	25
Finland	10	10	
Sweden	46	58	9

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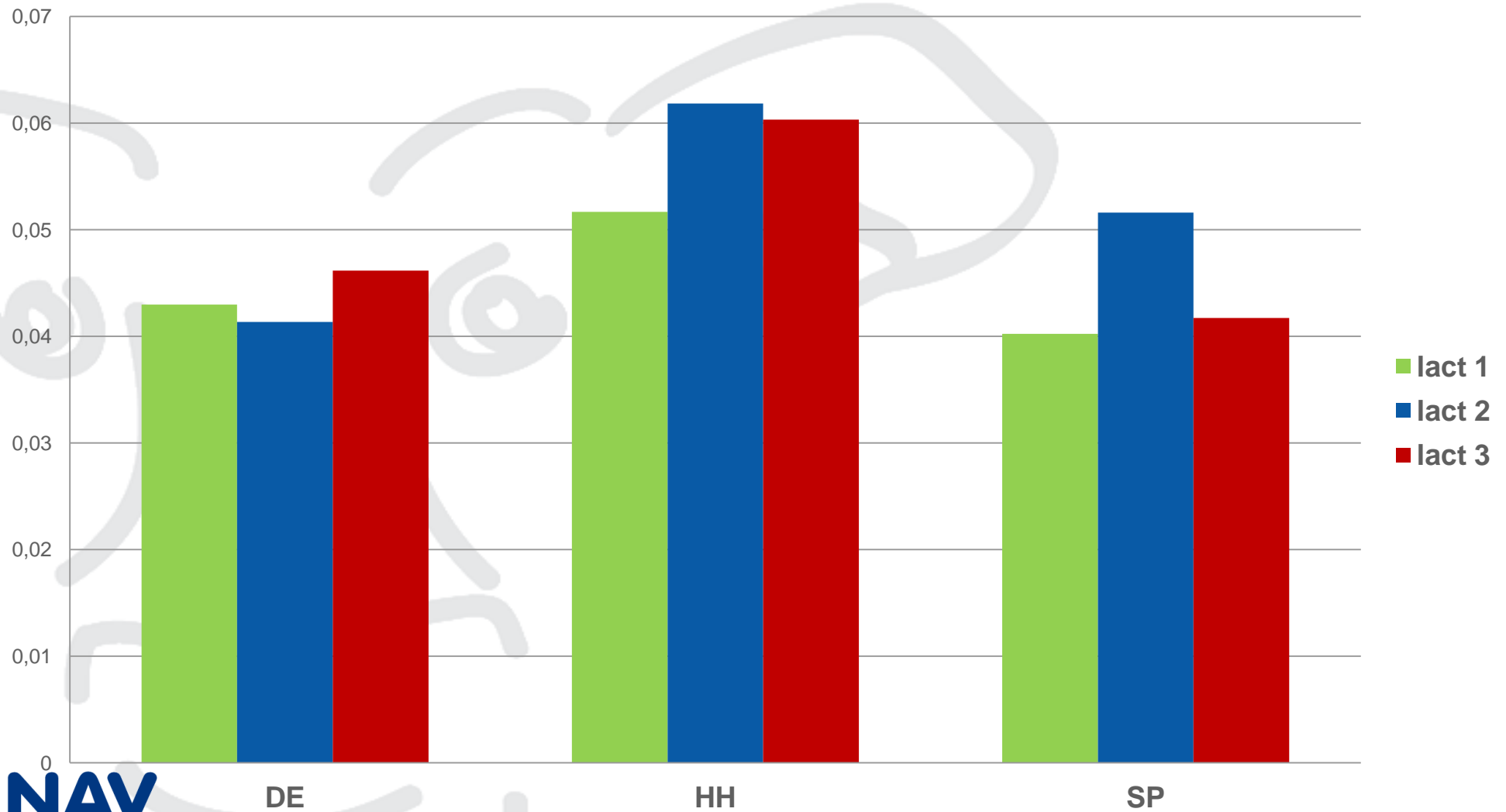


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Model

Effect	Type
Herd*period (5 year)	fix
herd*half-year	random
Year*month	fix
Lactation stage	fix
Calving age	fix
Permanent environment	random
Animal	random

Heritability for infection related traits



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DE

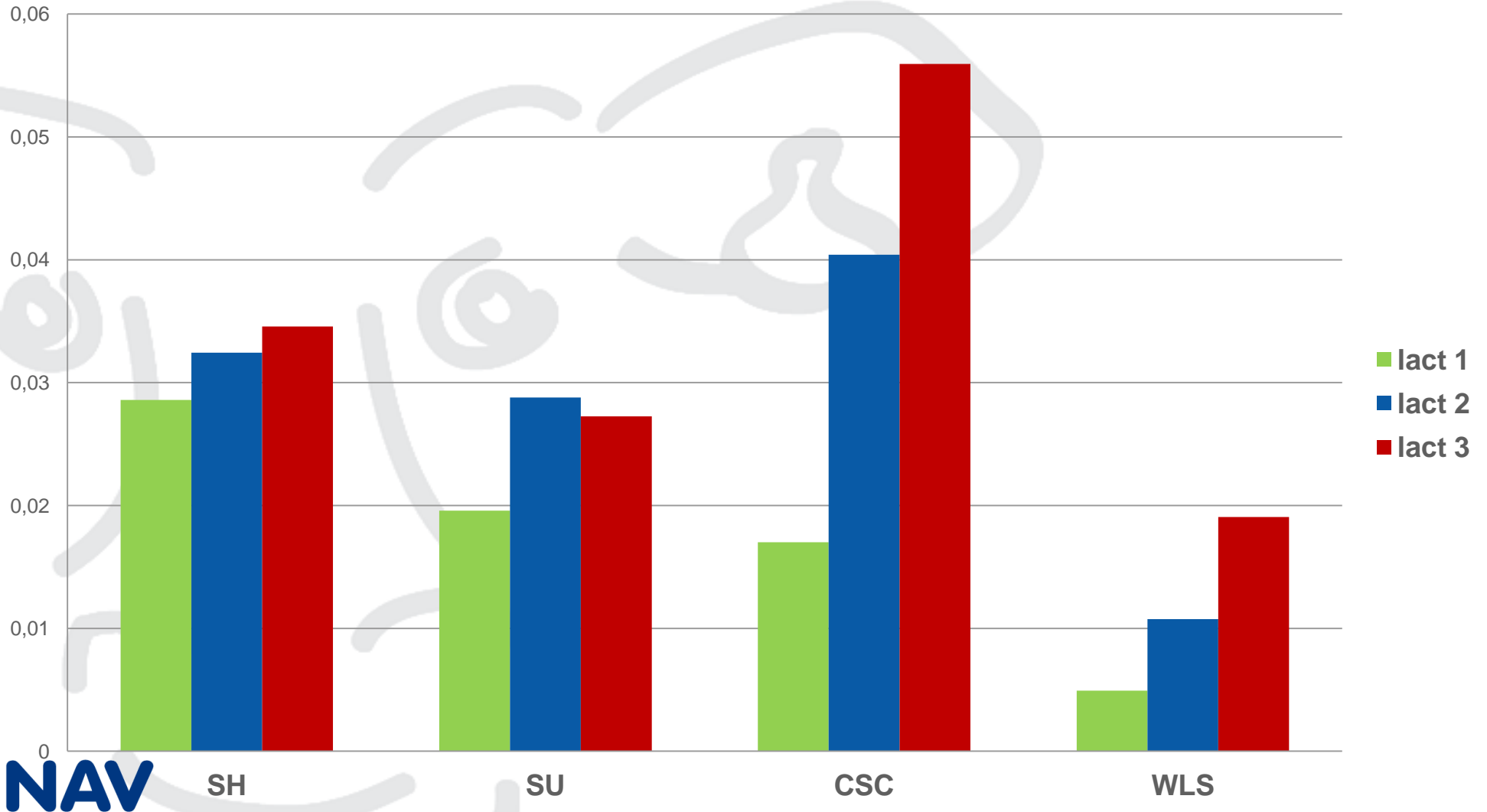
HH

SP



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Heritability for feed related traits



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SH

SU

CSC

WLS



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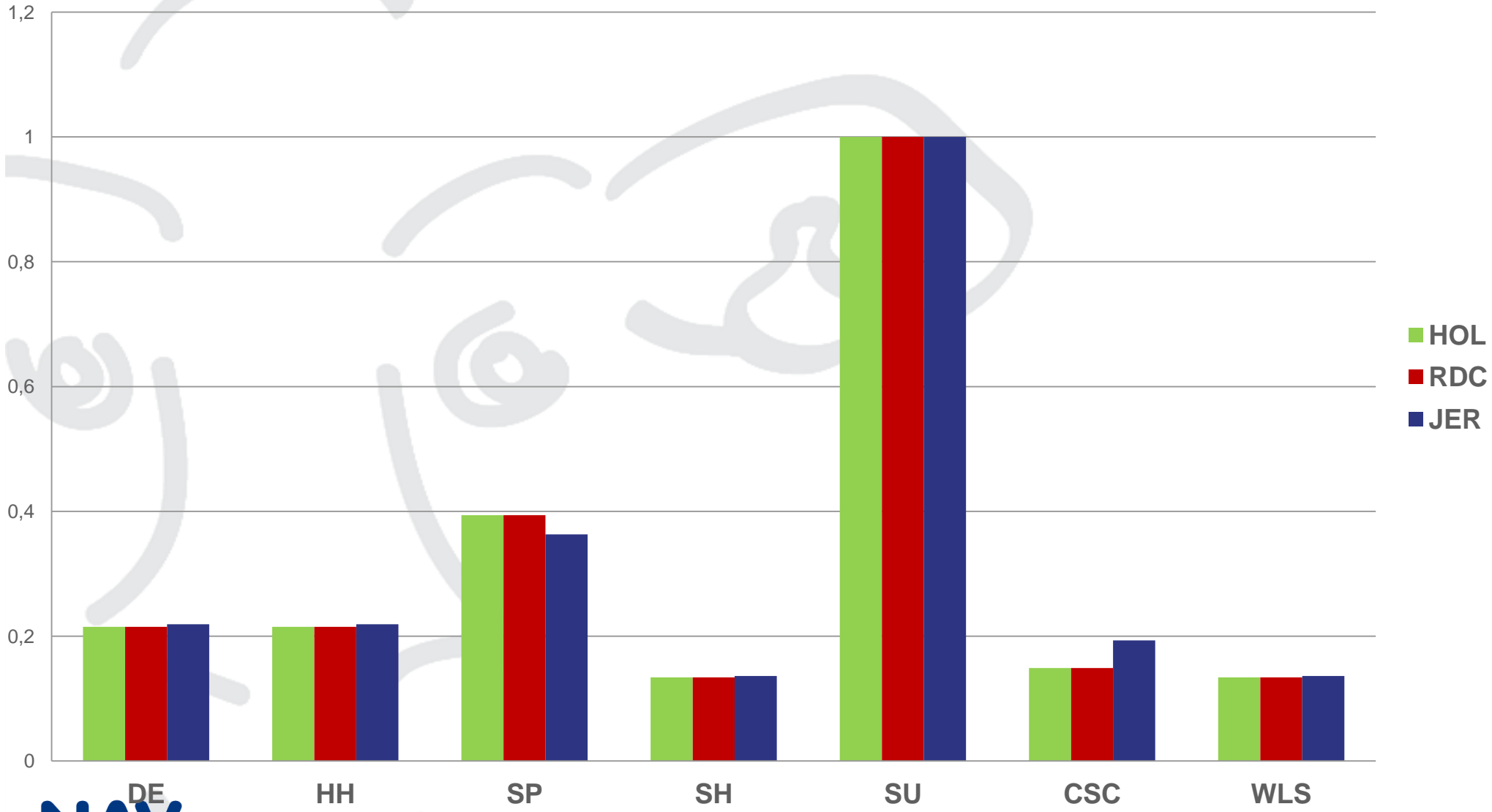
Genetic correlations

Between	Range
Infection related traits (DE, HH, SP)	0.3-0.9
Feed related traits (SH, SU, CSC, WLS)	0.2-0.9

Between	Range
Infection related and feed related traits	-0.2 to 0.3

Between	
Same trait in different Lactations	0.79-0.99

Relative Economic weights (Pedersen 2011)



Correlations between rbvs for claw traits and claw health index

Trait	RDC	Holstein	Jersey
DE	0.63	0.50	0.62
HH	0.76	0.62	0.77
SP	0.58	0.41	0.56
SH	0.66	0.83	0.74
SU	0.79	0.90	0.84
CSC	0.34	0.57	0.68
WLS	0.53	0.78	0.66

Sire EBVs and their trait means

	V Exes	Var Elvis	Difference
Daughters	10516	4669	
Claw index	119	98	21
DE	0.32	0.31	0.01
HH	0.16	0.22	- 0.06
SP	0.05	0.10	- 0.06
SH	0.18	0.24	- 0.06
SU	0.08	0.10	- 0.02
CSC	0.00	0.01	- 0.01
WLS	0.10	0.10	- 0.01

Publication rules

- Official Claw index when reliability = 40 and over
- Almost all bulls in birth year 2005-06 from Denmark and Sweden
- 80% of bulls in birth year 2005-06 from Finland

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Correlations between claw health and selected traits

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Criterion for bulls too be included

- Bulls born 2000 to 2005

Claw health traits: >14 daughters and official claw health index

NTM, type traits and Other disease : Official EBVs

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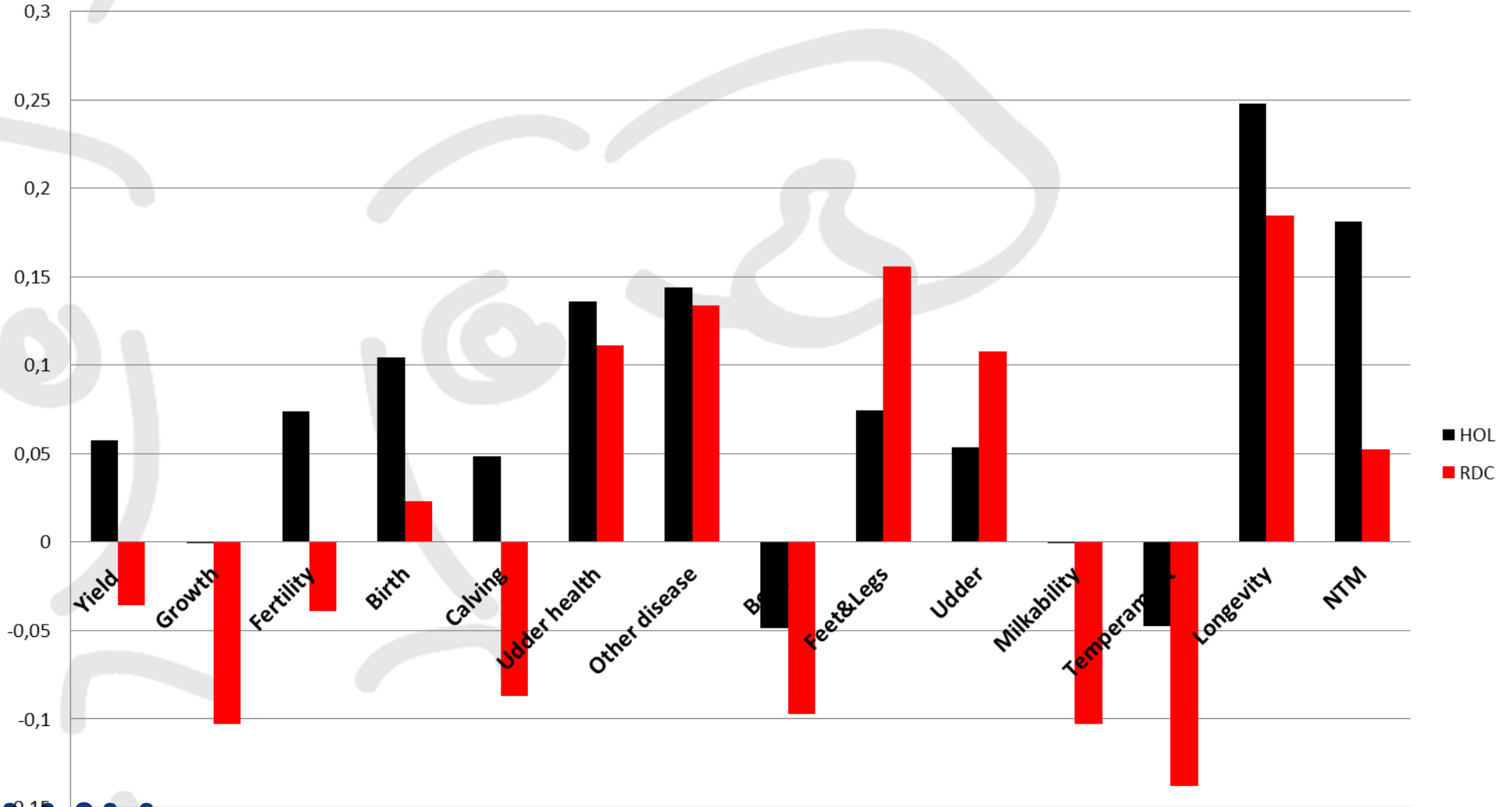
Correlation between claw health and NTM traits

	HOL	RDC
• Longevity	0.25	0.20
• NTM	0.20	0.05
• Other disease	0.15	0.15
• Udder health	0.15	0.10
• Feet&Legs	0.05	0.15
• Temperament	-0.05	-0.15

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Correlations between claw health and NTM traits



Infection related claw diagnoses

- Dermatitis (DE)

Digital de + spaltebetaendelse Sorkkavälin ihon tulehdus + Sorkka-alueen ihotulehdus **Digital de + klövspaltekssem**

- Heel Horn Erosion (HH)

Balleråd Kantasyöpymä **Klövröta**

- Skin Proliferation (SP)

Nydannelse+Digital vorte Sorkkavälin

NAV liikakasvu+Sorkkasyylä **Limax+vårta**

Malformation claw diagnoses

- **Cork screw claws (CSC)**
Proptraekker klov **Sorkkakiertymä**
Korkskruvsklöv

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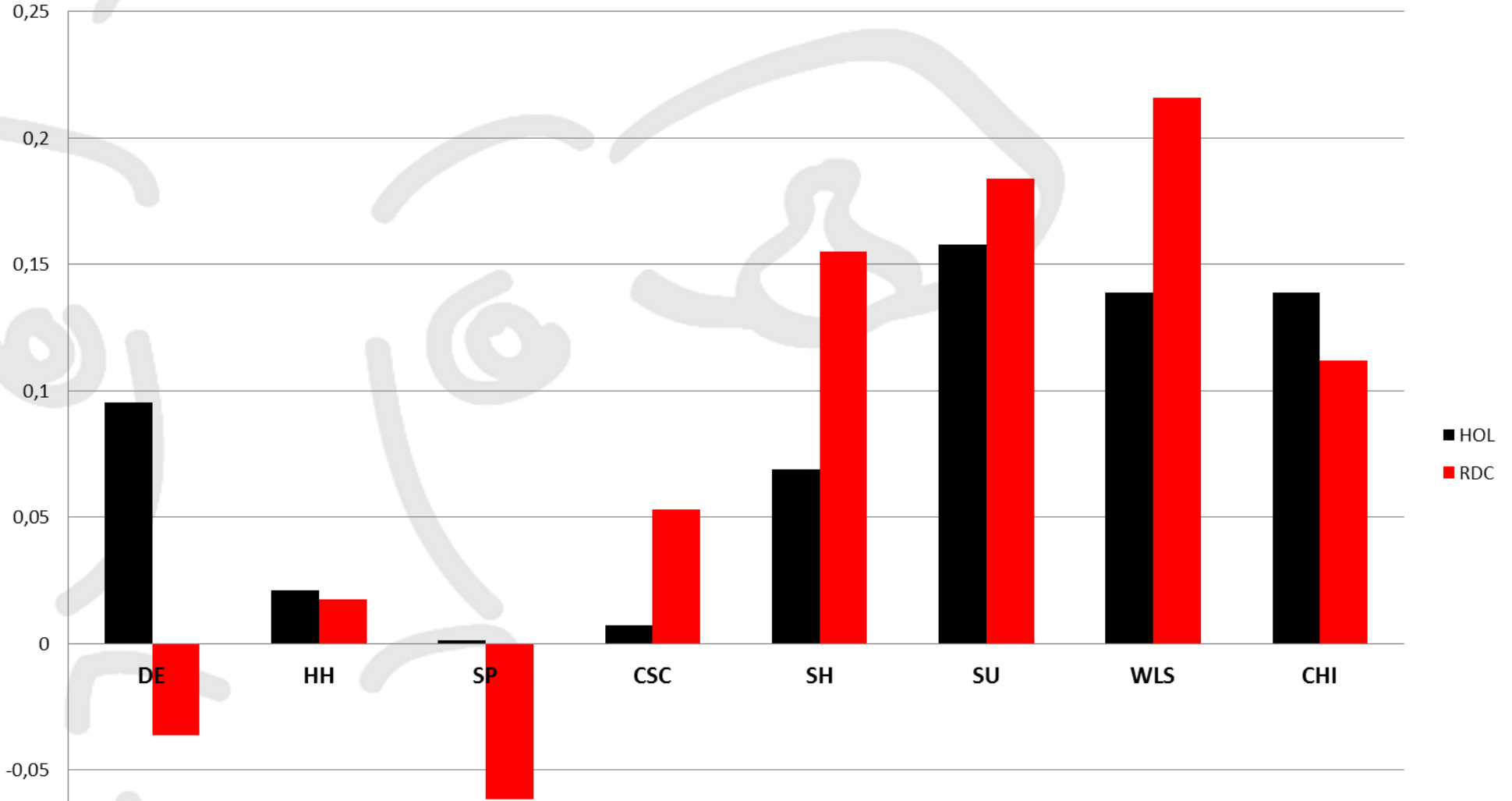


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Metabolic related claw traits

- **Sole Haemorrhage (SH)**
Såleblödning Vertymiä anturassa **Sulblödning**
- **Sole Ulcer (SU)**
Sålesår Anturahaavauma + Valkoviivan paise
Klövsolesår
- **White line separation+ double sole (WLS)**
Hul vaeg+ dobbelt sål Valkoviivan repeämä
Hålvägg+ dubbelsula

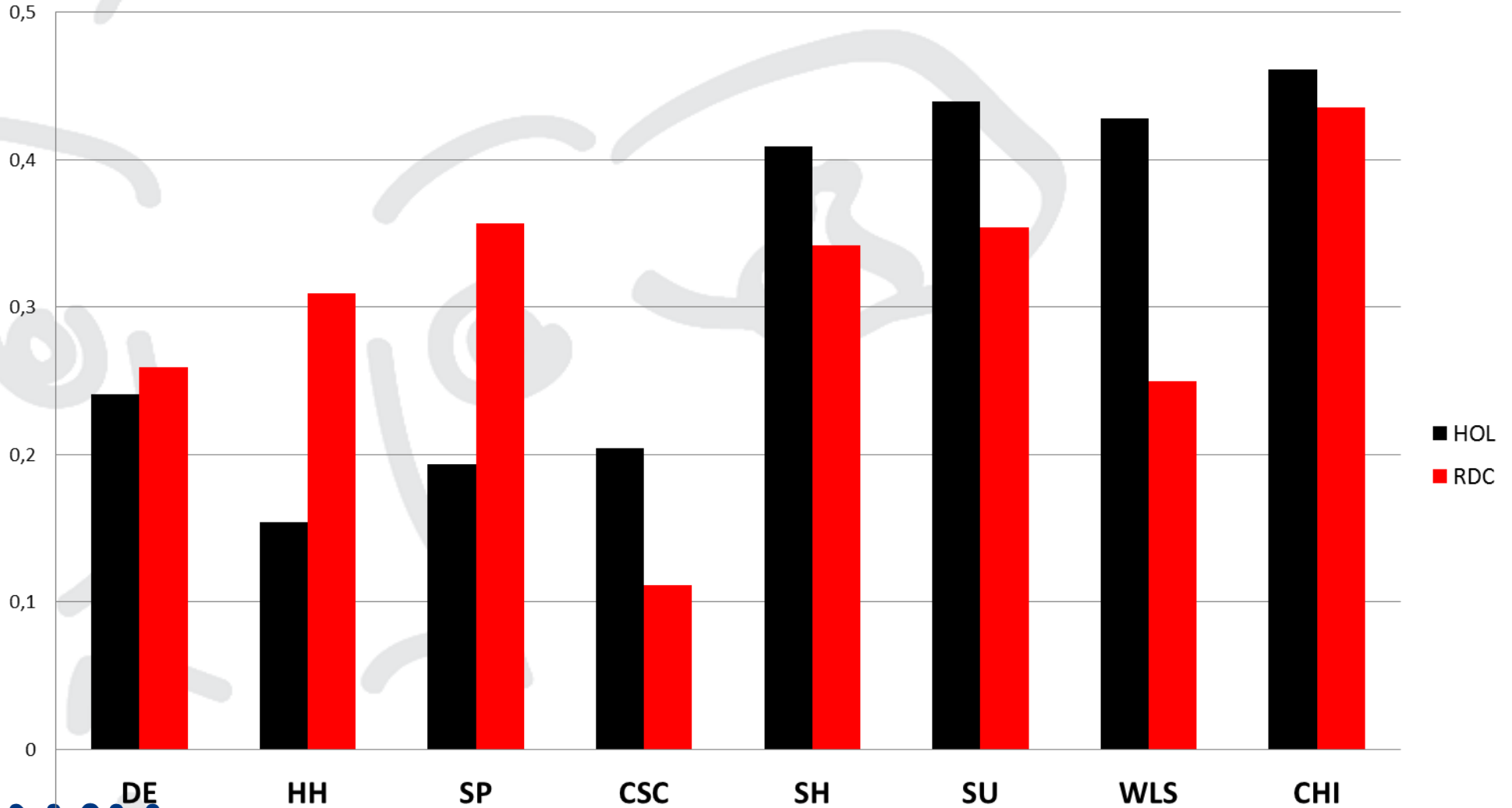
Correlation claw health and metabolic disease



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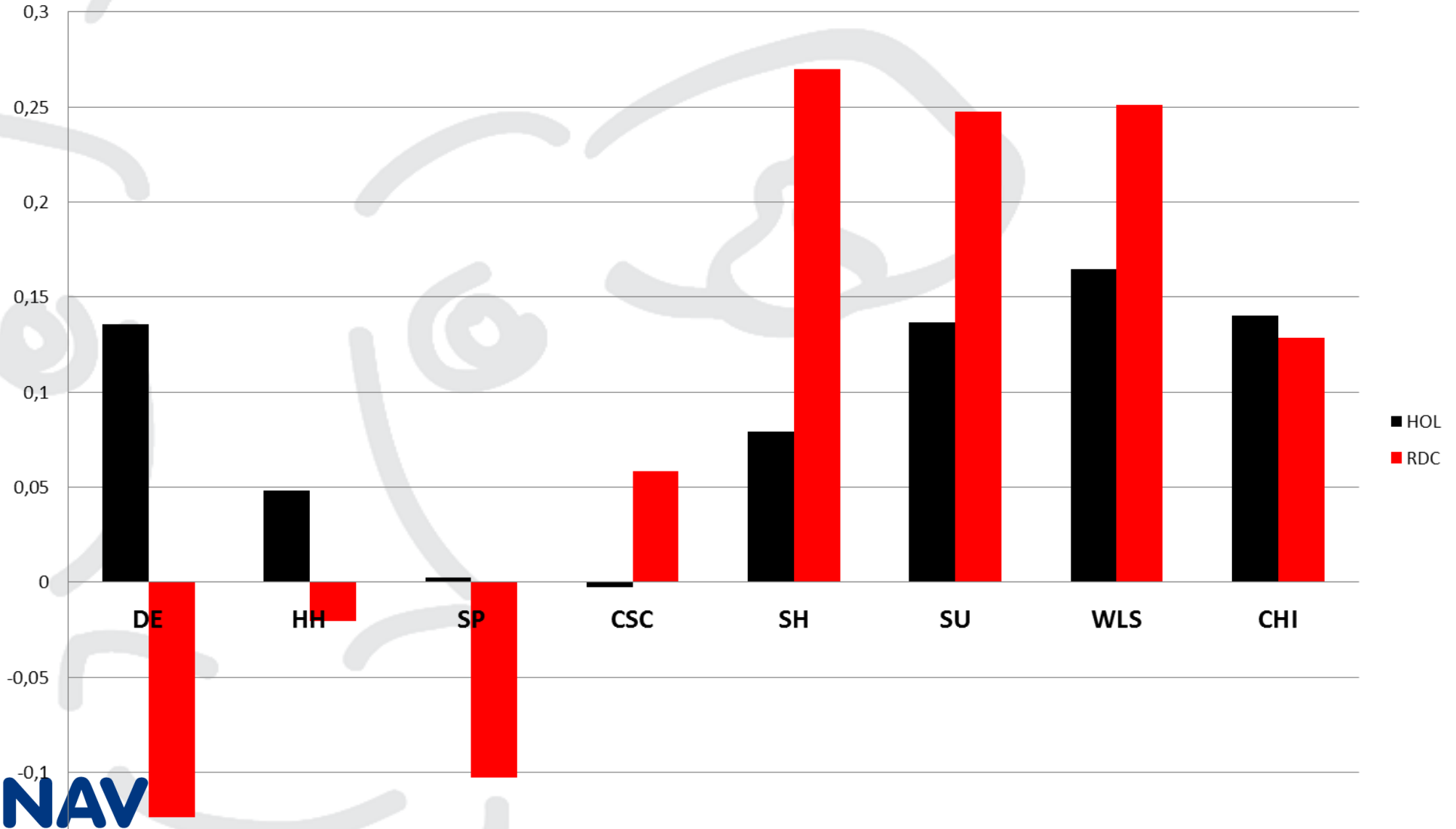
Correlation between claw health and OD feet and legs



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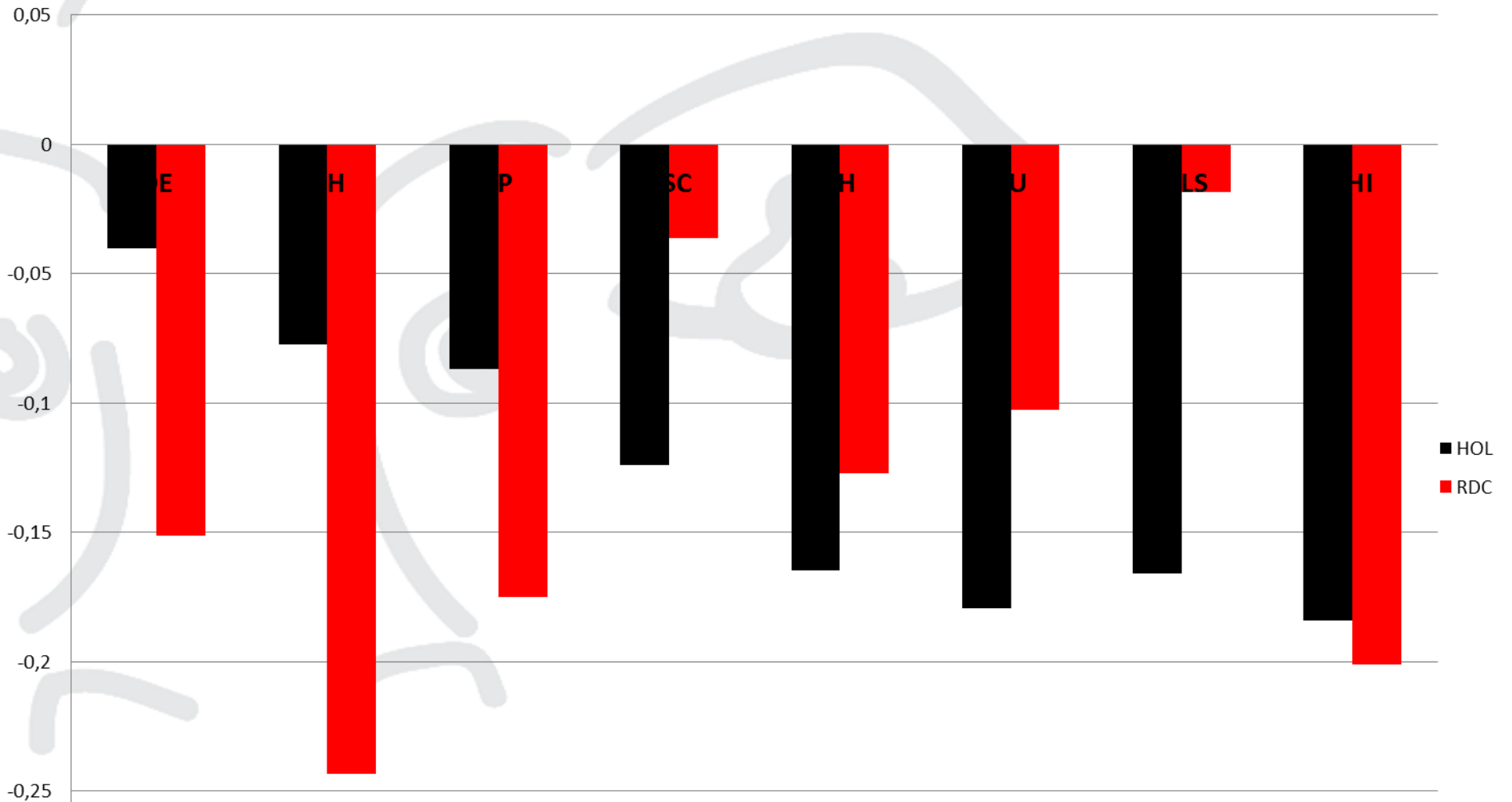
Correlation between claw health and Other Disease

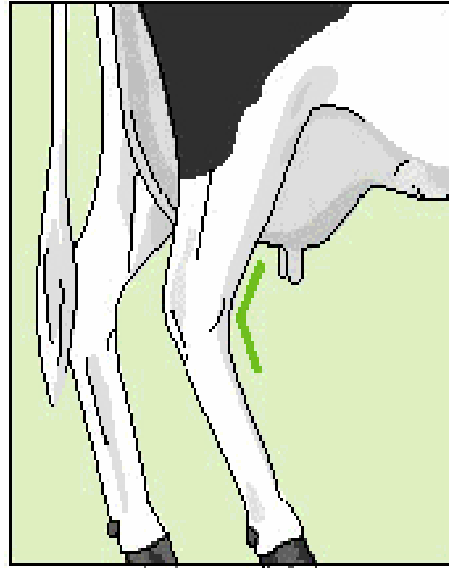
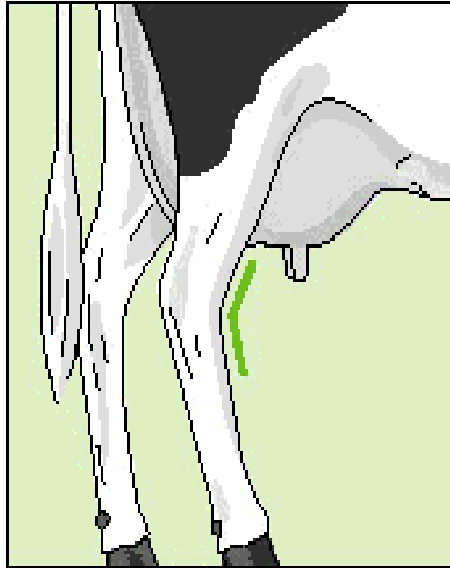
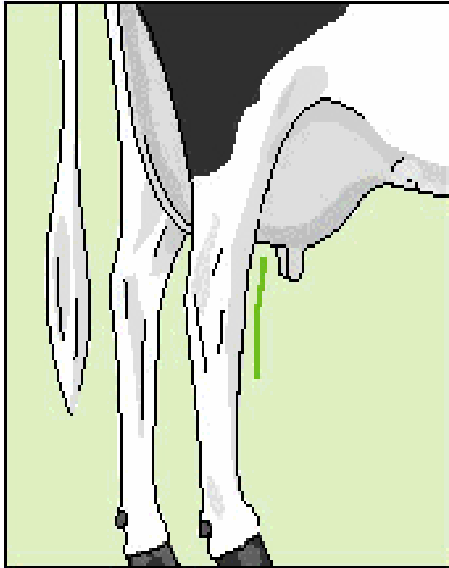


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Correlation between claw health and rear legs side view



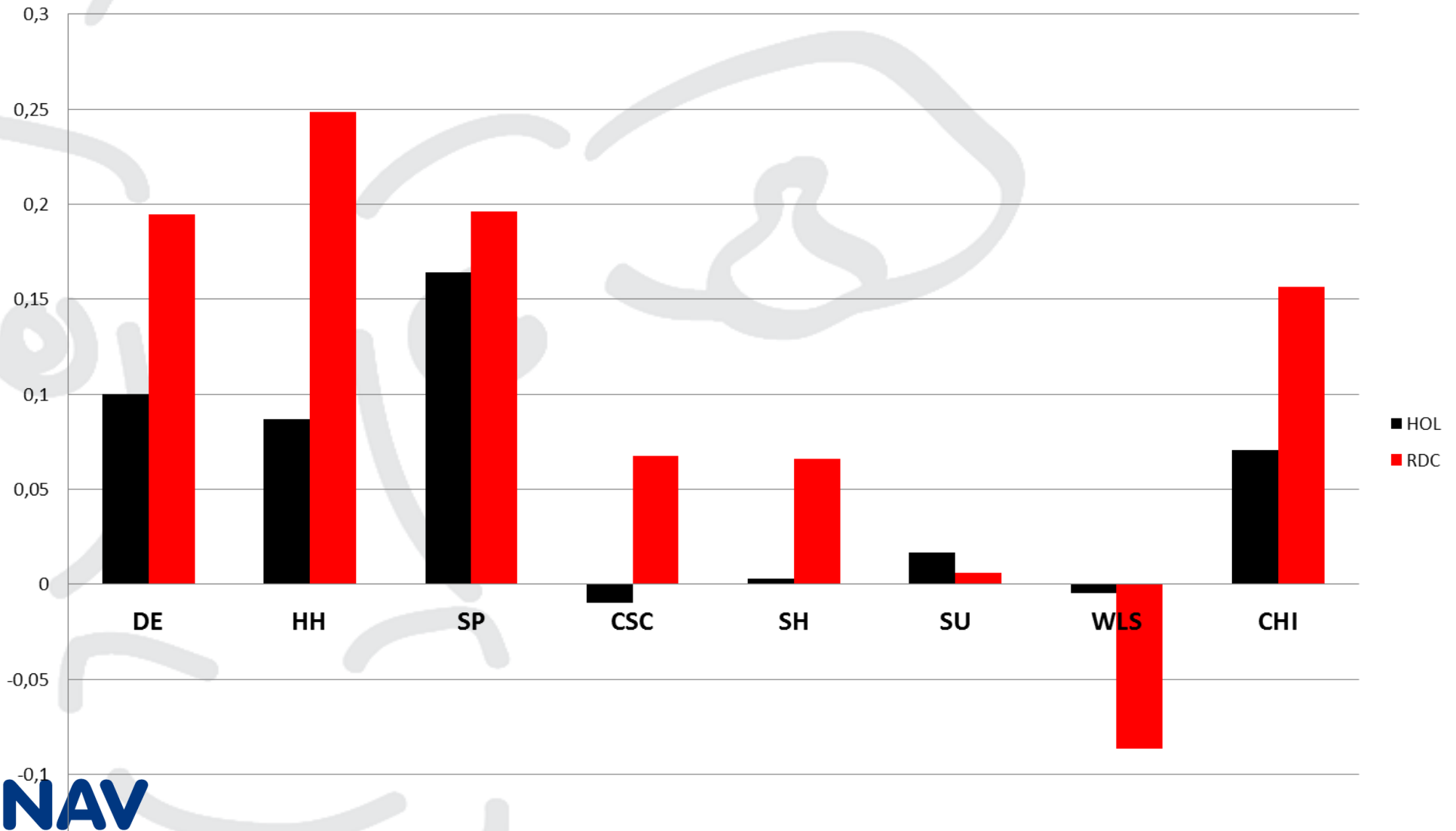


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Correlation between claw health and type feet&legs



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Summary

- **Claw health has a low favourable correlation to NTM and NTM subtraits**
- **Selection for claw health is favourable for all fitness traits**

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- + claw helath in NTM

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