Hygiene and feed related hoof diseases show different patterns of correlations to other functional traits

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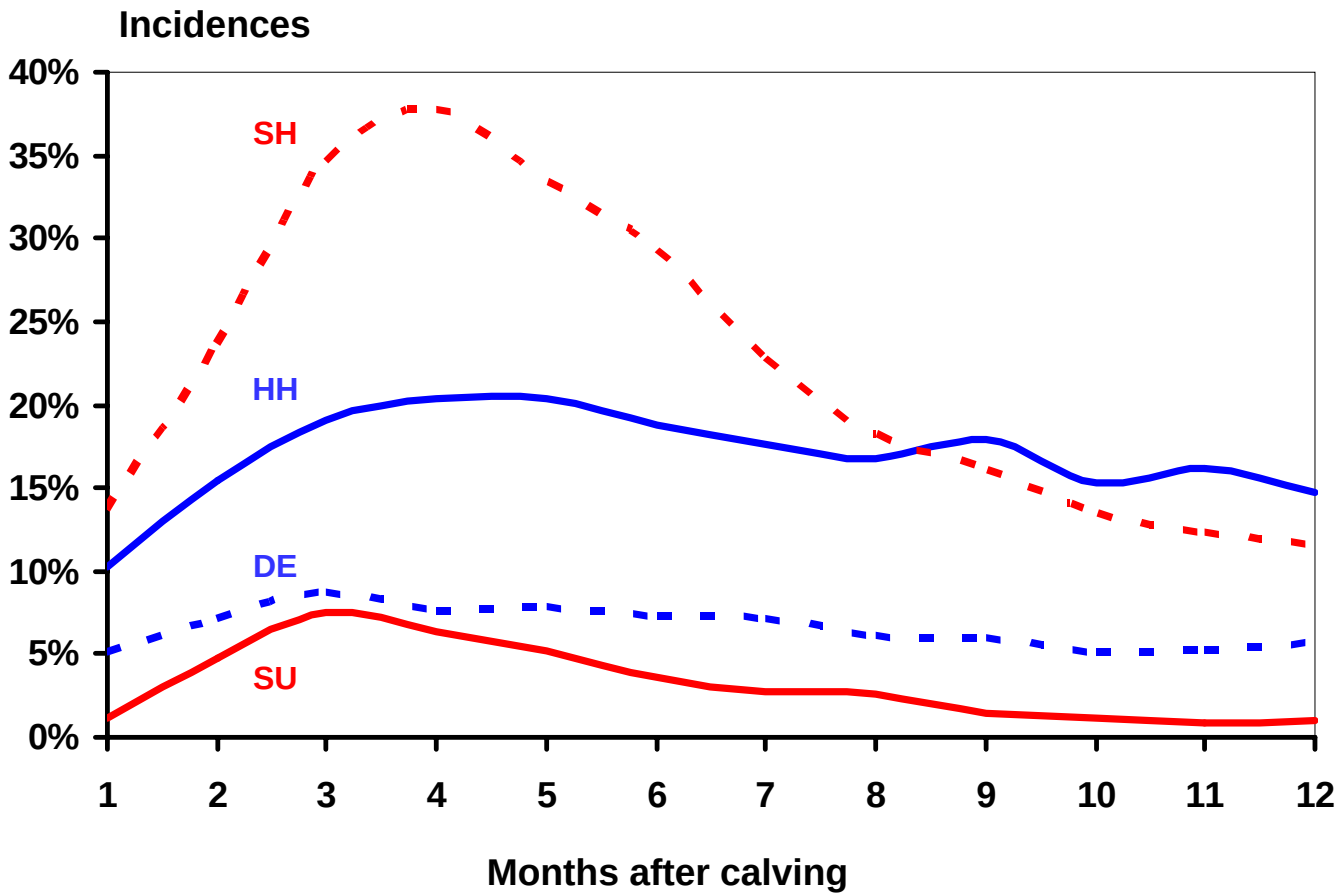
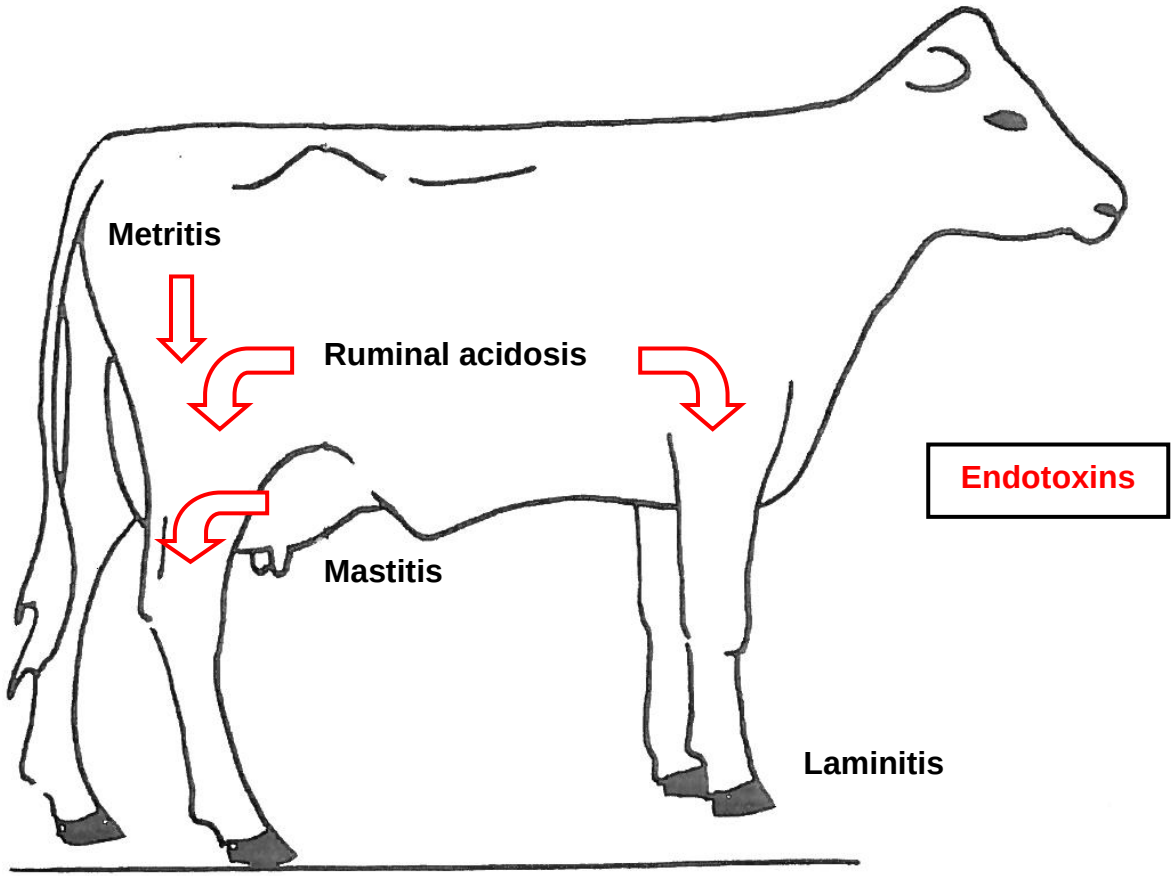
Hoof diseases

- Hygiene related hoof diseases
  - Dermatitis (DE)
  - Heel horn erosion (HH)
- Feed related hoof diseases
  - Sole hemorrhage (SH)
  - Sole ulcer (SU)

Incidences within months after calving



Causes of laminitis



Objective

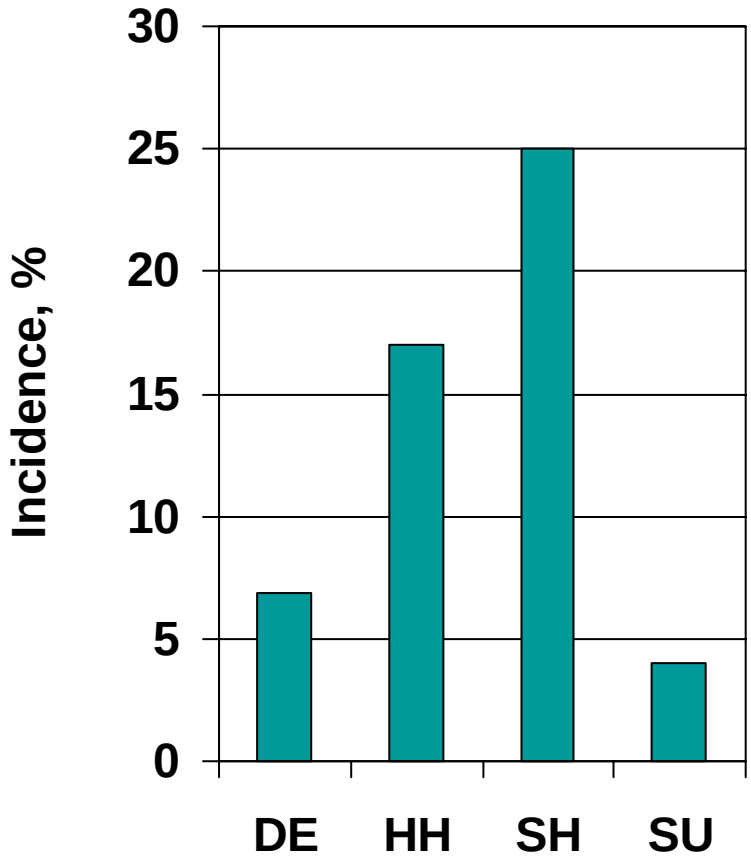
- To estimate genetic parameters for
  - Four hoof diseases
- and genetic correlations to
  - Clinical mastitis (CM)
  - Somatic cell score (SCS)
  - Days from calving to first insemination (CFI)
  - Number of inseminations (NI)
  - Protein yield (PY)

Data

- Hoof trimming records
  - About 64.000 records after editing
  - From January 2003 to March 2008
- Other records
  - About 314.000 records in total
  - Date of first calving between January 1996 and December 2006
- Records on first parity Swedish Red cows
  - Delivered by Swedish Dairy Association

Incidences

- The first hoof trimming after calving
- Binary traits
- At least one hoof disease: 40 %



Statistical analyses

- Editing procedures and fixed effects like the Swedish genetic evaluation before Sweden, Finland and Denmark formed Nordic Cattle Genetic Evaluation

Fixed effects and fixed linear regressions

	Hoof diseases	Udder health	Fertility	Protein yield
Herd and year of calving	X	X	X	X
Year and month of calving			X	X
Age at calving in months and five-year period				X
Month of calving	X	X		
Age at calving in months	X	X		
Lactation stage in months	X			
Regression on days open				X

Statistical analyses

- Changes:
  - Fixed linear regressions on breed proportion and degree of heterozygosity
  - Random effect of hoof trimmer
  - Animal models instead of sire models
- Series of tri-variate linear animal models

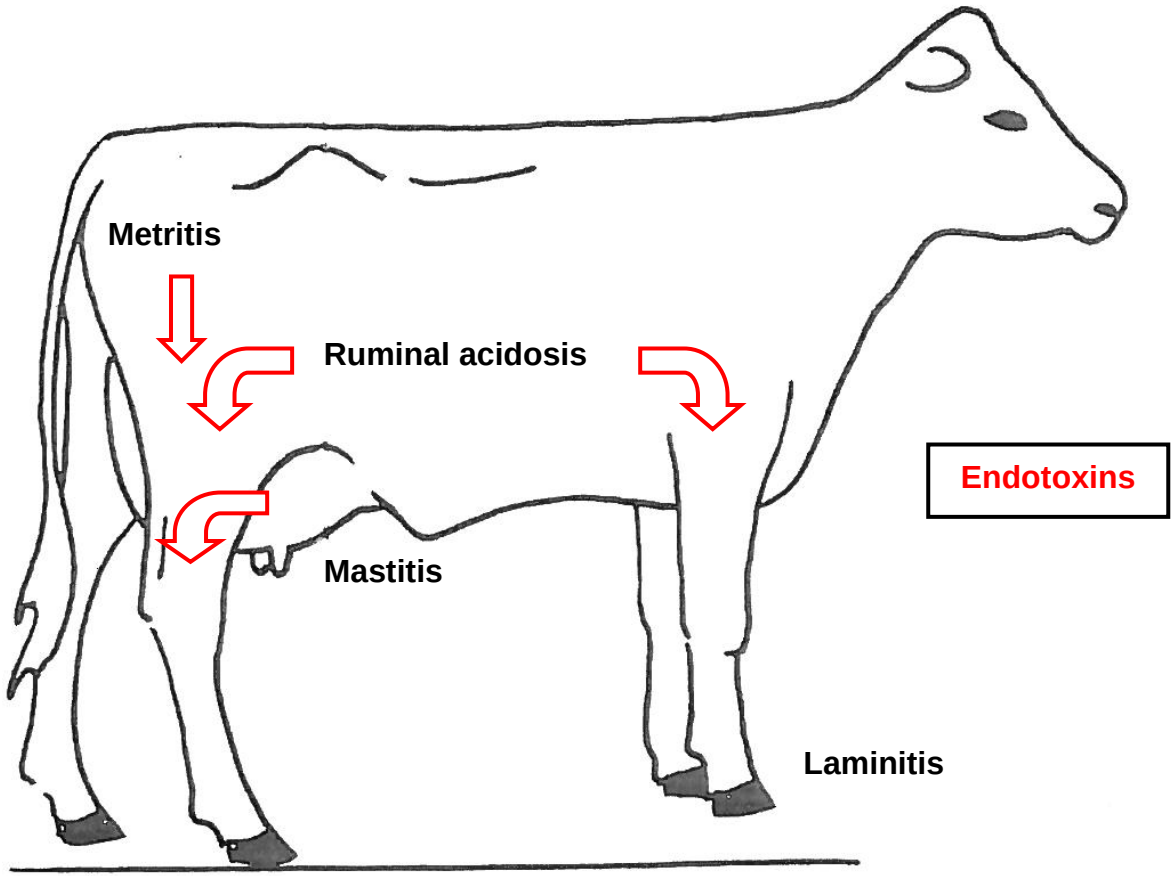
Heritabilities and genetic correlations

	DE	HH	SH	SU
DE	**0.035**	**0.87**	-0.042	-0.19
HH		**0.031**	**0.23**	0.13
SH			**0.050**	**0.73**
SU				**0.033**

Genetic correlations to the udder health traits

	CM	SCS
DE	-0.0011	-0.018
HH	-0.051	-0.0059
SH	**0.35**	0.11
SU	**0.32**	0.14

Causes of laminitis



Genetic correlations to the fertility traits

	CFI	NI
DE	0.0092	**0.32**
HH	-0.036	**0.22**
SH	0.10	-0.10
SU	**0.33**	-0.044

Genetic correlations to protein yield

	PY
DE	0.074
HH	**0.24**
SH	**0.11**
SU	**0.20**

Conclusions

- The two groups of hoof diseases:
  - are heritable
  - are not influenced by the exact same genes
  - show different patterns of correlations to other functional traits
- All hoof diseases are unfavourably correlated to protein yield