Genetic Parameters for Claw Health Traits in Spanish Dairy Cows

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INTRODUCTION

➢ Lameness is the third most important reason for culling in Spanish dairy farms.

➢ One third of cows have at least one claw lesion.

➢ Most of those lesions become chronic overtime.

➢ 2012: I-SAP was implemented in Spain.

CLAW HEALTH DISORDERS

6 common claw health disorders are recorded:

- **Dermatitis (DE)**
- **Sole Ulcer (SU)**
- **White Line (WL)**
- **Chronic Laminitis (CL)**
- **Hyperplasia (HP)**
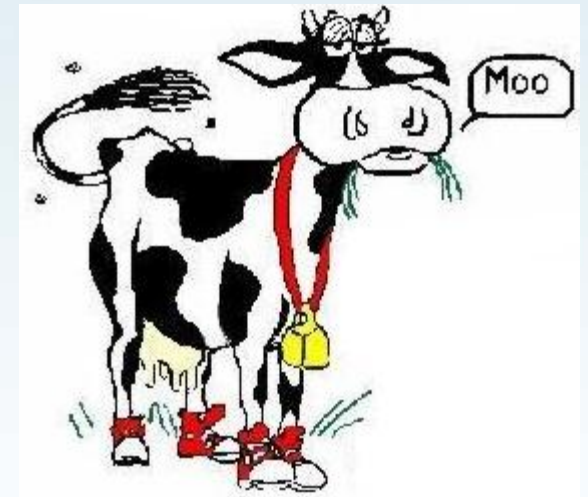- **Phlegmon (FH)**

A general claw disorder trait is defined:

Overall Claw Disorder (OCD)

If there is more than one disorder, the highest score is kept for OCD.

AIM

To estimate genetic parameters of claw health traits in Spanish dairy cattle

DATA

78,257 claw trimming records collected from
July 2012 to June 2013

Data editing:

✓ Only lesions in hind legs were included
✓ Herds with percentage of cow trimmed less than 50% were removed
✓ Only trimmers with more than 2,000 records
✓ Visit with less than 5 cows were excluded

49,963 claw trimming records (35,337 cows)

MODELS

❑Linear animal model

- Multi-trait analyses
  REML using VCE 6.0 software
  (Groeneveld et al., 2008)

❑Threshold animal model

- Several bi-variate runs
  Gibbs sampling using TM software
  (Legarra et al., 2008)

Single chain of 80,000 iterations,
30,000 discarded as burn in, and
retaining one every 10 samples

Effect	Type	Levels
Herd-visit-date-Trimmer	Fixed	1,679
Lactation-calving age	Fixed	31
Days in milk	Fixed	6
Permanent environmental	Random	35,337
Animal	Random	116,298
Residual	Random	

RESULTS

Statistical summary of claw health data

Trait		Mean	SD	Min	Max	Frequency
Dermatitis	DE	0.067	0.25	0	2	6.64
Sole Ulcer	SU	0.100	0.33	0	2	9.13
White line	WL	0.045	0.23	0	2	4.05
Chronic laminitis	CL	0.029	0.19	0	2	2.68
Hyperplasia	HP	0.002	0.05	0	2	0.16
Phlegmon	PH	0.007	0.11	0	2	0.56
Overall claw disorder	OCD	0.232	0.46	0	2	21.43

Claw disorders scored as a categorical trait: 0: absence of disorder, 1: mild lesion, and 2: severe lesion

RESULTS

Heritability

	Linear model		Threshold model	
	h^2	S.E.	h^2	S.E.
DE	**0.02**	0.004	**0.14**	0.031
SU	**0.04**	0.004	**0.15**	0.024
WL	**0.02**	0.003	**0.09**	0.021
CL	**0.01**	0.002	**0.07**	0.019
HP	**0.04**	0.003	**0.39**	0.068
PH	**0.01**	0.002	**0.06**	0.019
OCD	**0.05**	0.004	**0.11**	0.007

Heritabilities estimated with LM range from 1 to 5%. Those estimated with TM range from 6 to 39%.

Heritability of the combined trait OCD shows no significant advantage

![CONAFE]

RESULTS

Repeatabilities estimated with LM range from 3 to 18%. Those estimated with TM range from 33 to 69%.

Repeatability

	Linear model		Threshold model	
	r	S.E.	r	S.E.
DE	**0.10**	0.006	**0.42**	0.032
SU	**0.17**	0.006	**0.51**	0.019
WL	**0.11**	0.005	**0.42**	0.030
CL	**0.18**	0.006	**0.58**	0.035
HP	**0.05**	0.004	**0.69**	0.135
PH	**0.03**	0.004	**0.33**	0.212
OCD	**0.15**	0.005	**0.38**	0.016

RESULTS

Genetic correlations above diagonal and phenotypic correlations below diagonal

Linear model

	DE	SU	WL	CL	HP	PH	OCD
DE	-	-0.08	-0.30	-0.27	0.10	0.33	0.39
SU	-0.05	-	0.98	0.95	0.00	-0.69	0.98
WL	-0.04	-0.01	-	0.63	-0.22	-0.05	0.93
CL	-0.03	0.01	0.03	-	-0.03	-0.61	0.78
HP	-0.01	-0.01	-0.01	-0.01	-	0.18	0.04
PH	-0.01	-0.02	-0.02	-0.01	0.01	-	0.16
OCD	0.44	0.60	0.37	0.32	0.07	0.18	-

Same pattern

Threshold model

	DE	SU	WL	CL	HP	PH	OCD
DE	-	0.05	-0.30	-0.12	0.72	0.48	0.61
SU	-0.18	-	0.79	0.75	-0.10	-0.73	0.97
WL	-0.23	-0.02	-	0.36	-0.45	-0.62	0.91
CL	-0.18	0.09	0.09	-	-0.37	-0.64	0.85
HP	0.16	-0.07	-0.15	-0.20	-	-0.45	0.38
PH	-0.29	-0.24	-0.12	-0.16	0.09	-	-0.21
OCD	0.94	0.97	0.85	0.79	0.29	0.11	-

RESULTS

CONAFE

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CONCLUSIONS

❑   Heritability estimates for claw disorders are low to moderate: concerted selection may reduce the prevalence of claw lesions.

❑   Genetic correlations confirm the existence of two groups of claw traits: One related to horn disorders and the other related to infection lesions.

❑   Results are in accordance with other studies. Therefore data recorded can be considered reliable.

❑   In order to implement a future genetic evaluation, further studies regarding the most appropriate model (linear or threshold) are in process.