



# Investigations of Locomotion Score in dairy cows

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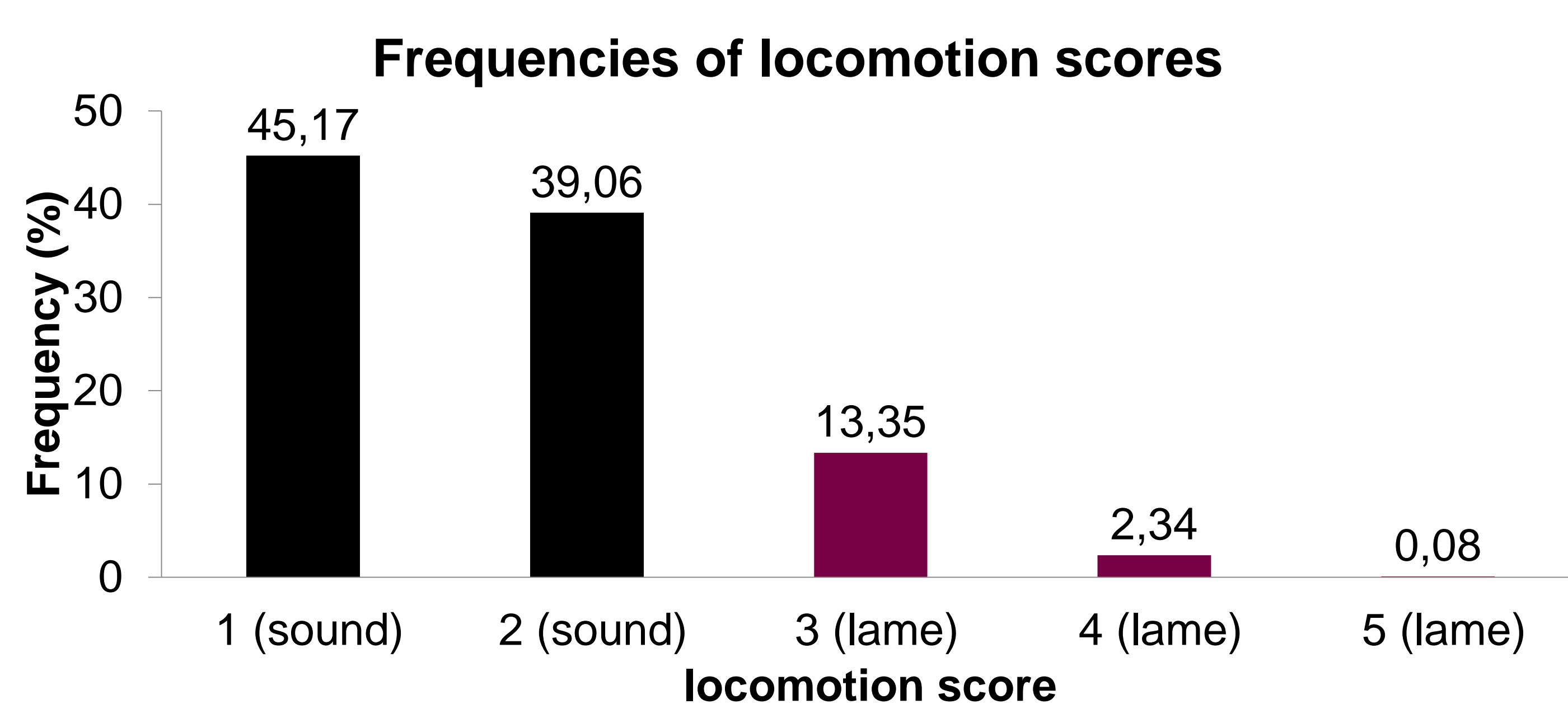
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## Aim

- Estimation of genetic parameters for lameness (locomotion score  $\geq 3$ ) and claw and leg diseases

## Materials and Methods

- Weekly examination for locomotion score (Sprecher et al., 1997) and claw and leg diseases between September 2010 and February 2012 on the dairy research farm Karkendamm
- Definition of the binary traits: Each day with at least one claw or leg diagnose or treatment and the following eight days: '1', all other days: '0'; observations of clinical lame cows (score  $\geq 3$ ): '1', sound cows: '0'
- Genetic parameter estimations: DMU package (version 6, release 5.0) (Madsen and Jensen, 2010)



## Incidences of claw and leg diseases and lameness (score $\geq 3$ ) for cow and cow days

Trait	Cows days		Cow (lactations)	
	total	affected (%)	total	affected (%)
claw and leg diseases	73,433	6.7	335 (420)	52.8 (60.0)
claw and leg diseases without dermatitis digitalis	73,433	5.0	335 (420)	36.4 (32.9)
lameness (score $\geq 3$ )	8,299	15.4	326 (404)	47.2 (43.3)

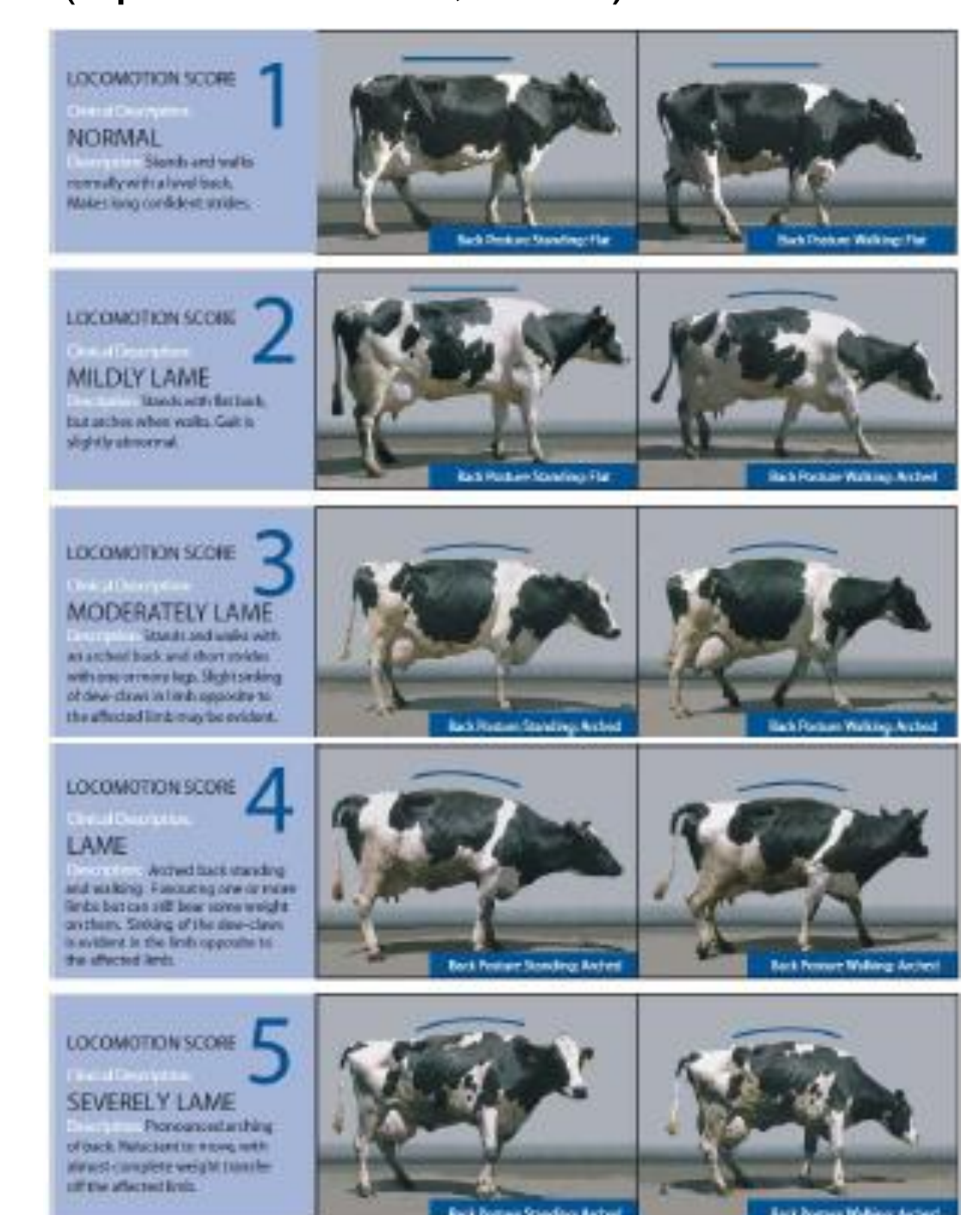
## Results

- Heritabilities are twice as large for lameness and even higher for claw and leg diseases if the threshold model was applied
- Correlations are quite high and even increase after exclusion of the claw disease digital dermatitis

Additive genetic variance ( $\sigma^2_a$ ), permanent environmental variance ( $\sigma^2_{pe}$ ), random residuals ( $\sigma^2_e$ ), heritability estimates ( $h^2$ ) for lameness (score  $\geq 3$ ) and claw and leg diseases and genetic correlations ( $r_g$ ) with standard errors in parentheses

Traits in bivariate models	$\sigma^2_a$	$\sigma^2_{pe}$	$\sigma^2_e$	$h^2$	$r_g$
<b>Linear</b>					
lameness (score $\geq 3$ )	0.011	0.052	0.074	0.081 (0.076)	0.939 (0.268)
claw and leg diseases	0.001	0.007	0.055	0.019 (0.019)	
lameness (score $\geq 3$ )	0.011	0.048	0.074	0.085 (0.073)	0.951 (0.281)
claw and leg diseases without digital dermatitis	0.001	0.005	0.041	0.021 (0.018)	
<b>Threshold</b>					
lameness (score $\geq 3$ )	0.432	1.799	0.610	0.152 (0.145)	0.597 (0.308)
claw and leg diseases	0.419	0.652	0.681	0.239 (0.103)	
lameness (score $\geq 3$ )	0.550	1.401	0.604	0.215 (0.146)	0.716 (0.297)
claw and leg diseases without digital dermatitis	0.398	0.923	0.510	0.218 (0.129)	

## Locomotion Scoring (Sprecher et al., 1997)



## Conclusions

- The moderate heritabilities estimated with a threshold model indicates that direct selection for reduced lameness as well as for claw and leg health could be moderately successful.
- Based on the positive genetic correlations, lameness (locomotion score) seems to be a good indicator for claw and leg disease.

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