



THE GLOBAL STANDARD  
FOR LIVESTOCK DATA



Dialogue of practice and science on claw health at EuroTier 2016,  
on 18<sup>th</sup> November 2016 in Hanover, Germany

## Genetics of claw health traits

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### Why the importance of claw health?

- Farm economy
- Animal welfare



Photo: Katrine Haugjord



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Functional Traits WG  
and Claw Experts

## To breed for improved claw health



- Routine recording of claw health traits
  - Including normal claws
- Information to correct for environmental effects
  - Claw trimmer, herd, season etc.
- Pedigree information
- Genotype information improves the predictions further



## Difficult traits



- Recorded as affected or unaffected (binary trait)
- Require large datasets for estimation of genetic parameters
- Important with standardized definitions of the traits



## Recording of claw health at claw trimming

- Date of claw trimming
- ID of animal
- Normal claws or one or more claw disorders
- Other disorders or remarks
- Claw trimmer ID

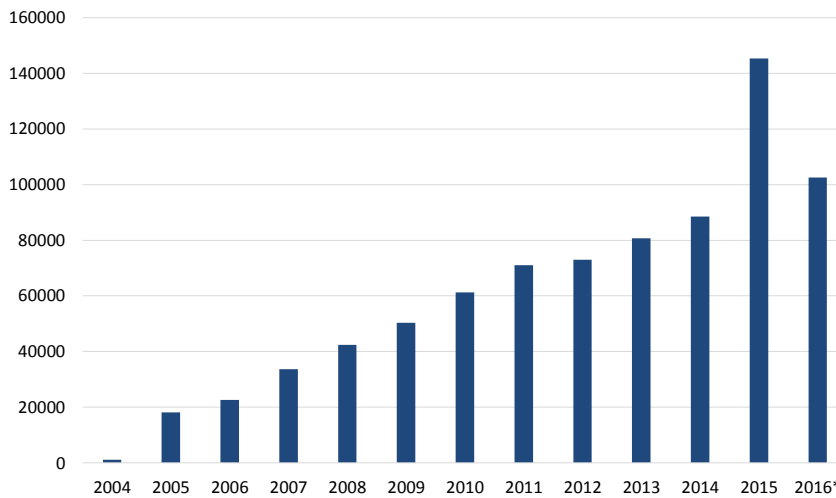


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## Total number of claw health records in Norway



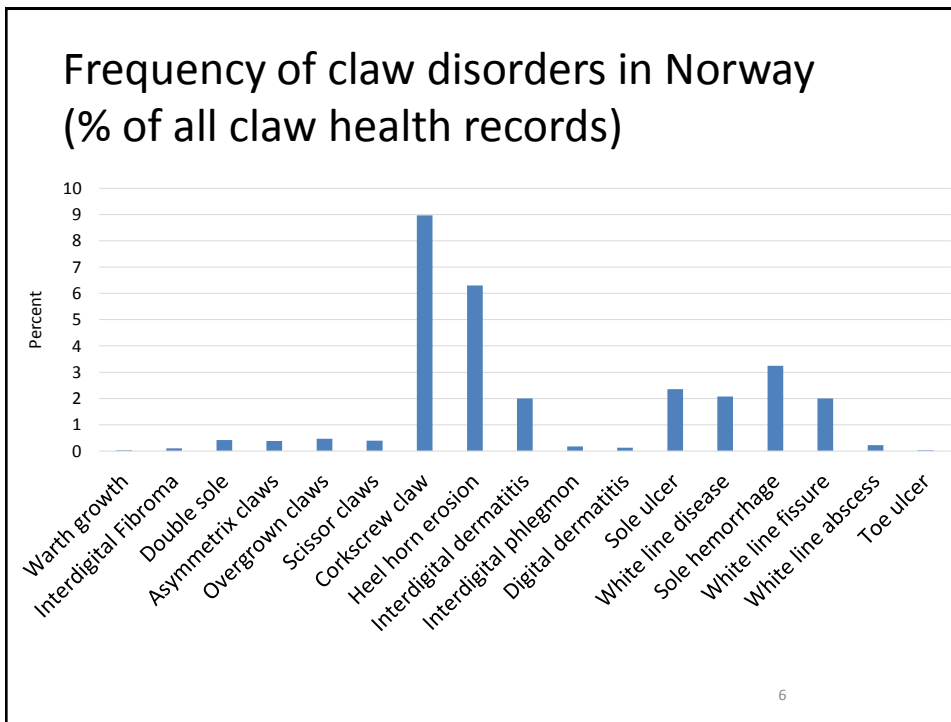
\* per Sept. 2016



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### Heritability of claw health traits

Trait	Heritability
Corkscrew claw	0.07 <sup>1</sup>
Heel horn erosion	0.04 <sup>1</sup>
Sole ulcer	0.03 <sup>1</sup>
Digital dermatitis	0.07 <sup>2</sup>
Interdigital dermatitis	0.015 <sup>2</sup>
Sole hemorrhage	0.04 <sup>2</sup>
White line disease	0.02 <sup>2</sup>

<sup>1</sup>Ødegård et al. (2015), <sup>2</sup>Malchiodi et al (2015)

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## Genetic correlations among claw health traits

	Heel horn erosion	Sole ulcer	Sole hemorrhage	White line disease	Interdigital hyperplasia
Digital dermatitis/ interdigital dermatitis	0.65 <sup>1</sup>	0.19 <sup>1</sup>	-0.45 <sup>2</sup>	0.04 <sup>1</sup>	0.66 <sup>2</sup>
Heel horn erosion		0.42 <sup>1</sup>	-0.07 <sup>3</sup>	0.22 <sup>1</sup>	
Sole ulcer			0.38 <sup>3</sup>	0.79 <sup>1</sup>	0.04 <sup>2</sup>
Sole hemorrhage				0.39 <sup>3</sup>	

<sup>1</sup>Ødegård et al. (2013), <sup>2</sup>Van der Spek et al. (2013), <sup>3</sup>Häggman and Juga (2013)

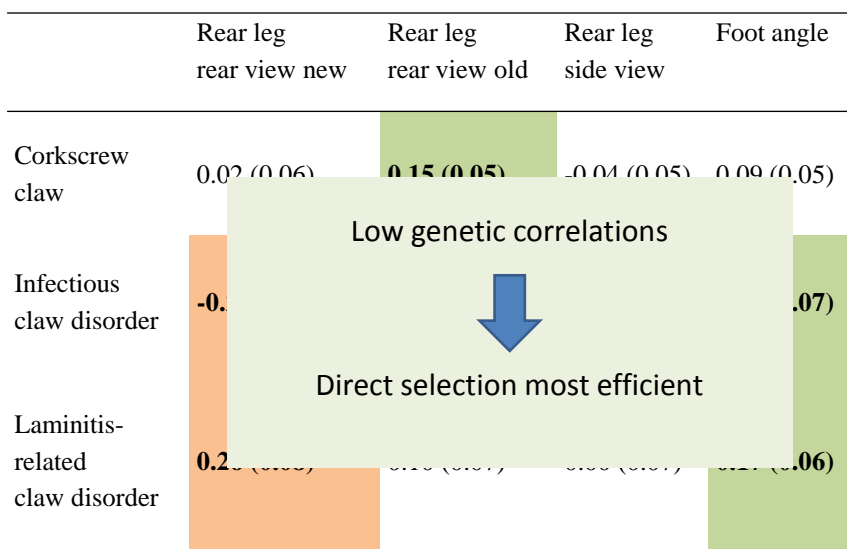
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## Genetic correlations among claw health traits and foot and leg conformation traits



Ødegård et al. 2014

## Claw health index in routine genetic evaluations

### Denmark, Sweden and Finland<sup>1</sup>

- Included since 2011
- Data from claw trimming
- Seven traits included
  - sole ulcer
  - sole hemorrhage
  - heel horn erosion
  - digital dermatitis
  - interdigital dermatitis
  - skin proliferation
  - white line separation
  - corkscrew claw

### The Netherlands<sup>2</sup>

- Included since 2010
- Data from claw trimming
- Six traits included
  - sole hemorrhage
  - digital dermatitis
  - interdigital dermatitis
  - sole ulcer
  - interdigital hyperplasia
  - white line disease

<sup>1</sup> Johansson et al. (2011), <sup>2</sup>Stoop et al (2010)



## Claw health index for Norwegian Red

- Claw health at claw trimming recorded in the Norwegian Dairy Herd Recording System since 2004
- Routine genetic evaluation of claw health since 2014
- Claw health index included in the total merit index

Claw health index	Weight %
Corkscrew claw	50
Infectious claw disorder	30
Laminitis-related claw disorder	20

### Infectious claw disorders:

- Digital dermatitis, interdigital dermatitis, heel horn erosion and interdigital phlegmon

### Laminitis-related claw disorders:

- Sole ulcer, toe ulcer, sole bleeding, white line fissure and white line abscess



## Summary

- Claw health can be improved by breeding
  - Low heritability – need large scale routine recording
  - Low genetic correlation to confirmation traits – direct selection most efficient
- Standardization – ICAR claw health atlas – compareable high quality data across countries



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**Thank you!**