Linear type traits show pronounced phenotypic relationships to foot and claw health

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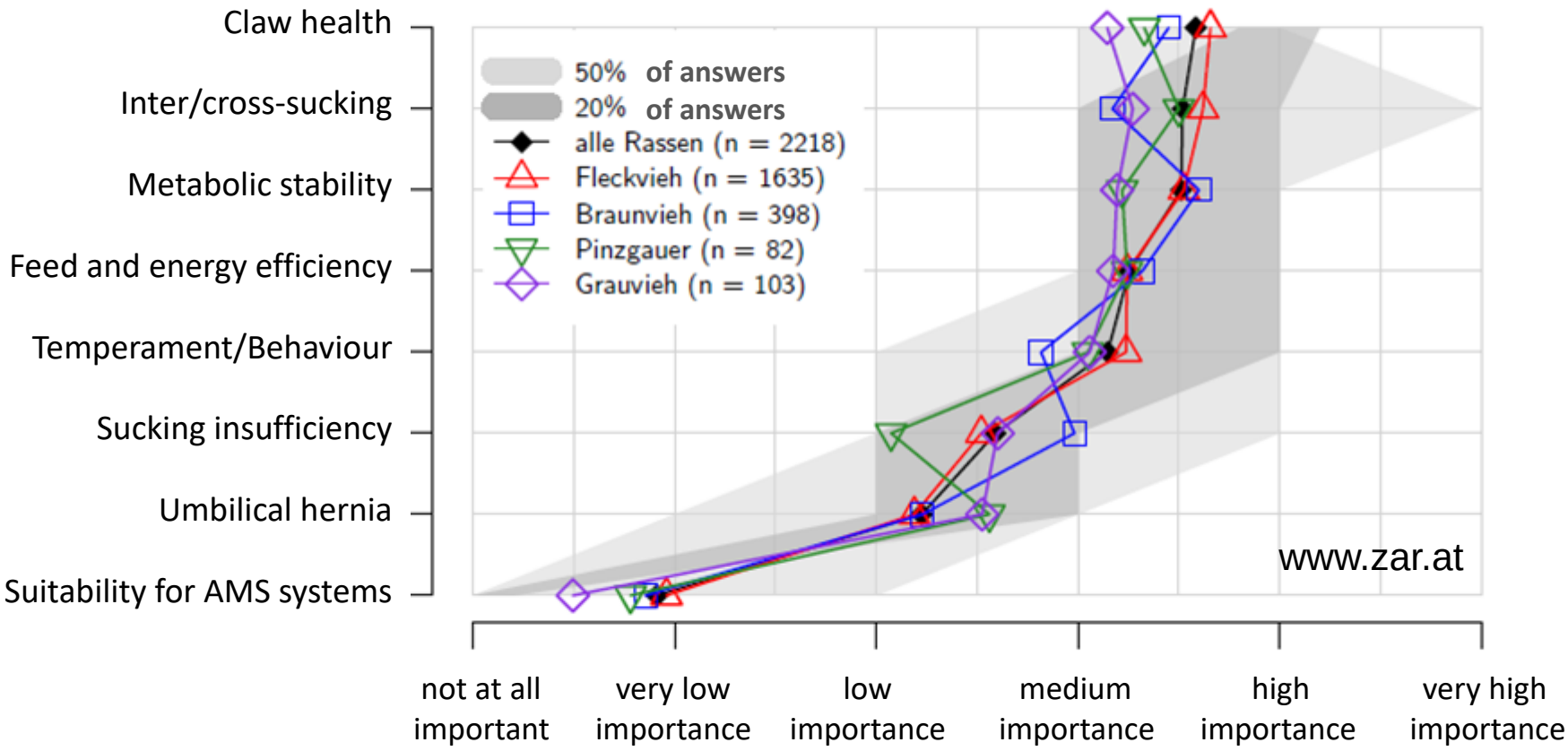
Background (1)

- Problems relating to **feet and legs** rank **third** among most important **disposal reasons** in Austrian cows
- **Direct** and **indirect costs,** (considerably) **reduced welfare** of affected animals
- **Routine genetic evaluation for health traits** since 2010 (Fleckvieh) und 2013 (Brown Swiss); Traits: **Mastitis**, **Early reproductive disorders**, **Cysts, Milk fever**
- **Claw health** only **indirectly** considered by type traits

Background (2)

Which traits without routine genetic evaluation should be improved by breeding?



Questionnaire: Breeders demand improvement!

Question

- Relationship between **foot** and **claw health** with **conformation traits**?

  - **phenotypic**
  - **(genetic)**

Data (1)

- Fleckvieh and Brown Swiss cows (Project ”Efficient Cow”) in 2014
- **Linear Scoring** for all cows
  Lamness scores (1 = not lame, 5 = severely lame) in the course of each performance testing
  Hoof trimmer protocols
  Claw diagnoses since 2012
- Genes of other breeds < 50%

Data (2)

	Fleckvieh		Brown Swiss	
	N	%	N	%
No. of records	8,716		3,373	
No. of cows	4,129		1,678	
Proportion claw diagnoses	6,260	3.8	2,474	4.5
Proportion pos. trimmers‘ results	2,779	49.5	1,103	40.0
Proportion lameness score >= 2	3,891	47.0	1,582	45.7
Proportion lameness score >= 3		20.4		19.5

Model

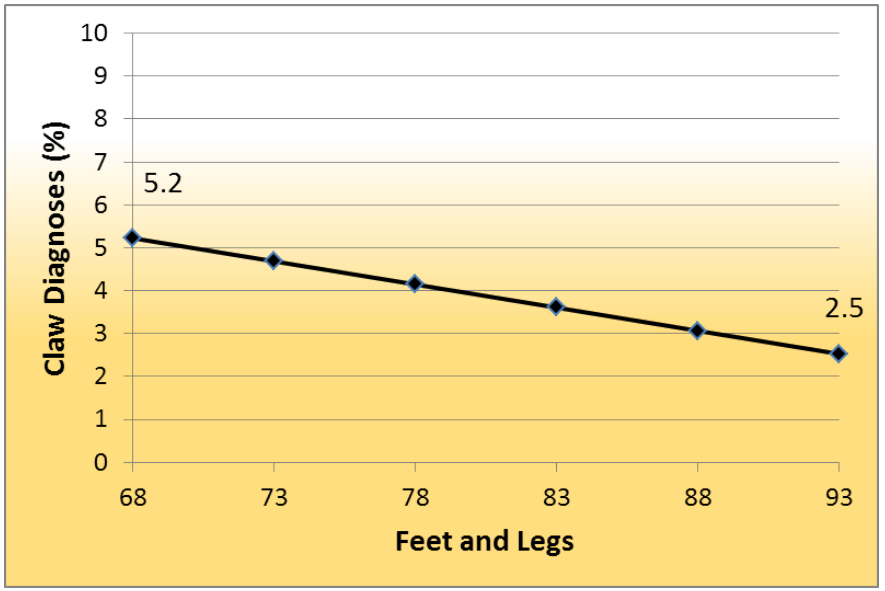
- Herd (random)
- Lactation
- Calving year
- Calving month
- Type of recording/Claw trimmer/Scorer
- Type trait (linear, quadratic; pre-corrected)

Phenotypic Relationships

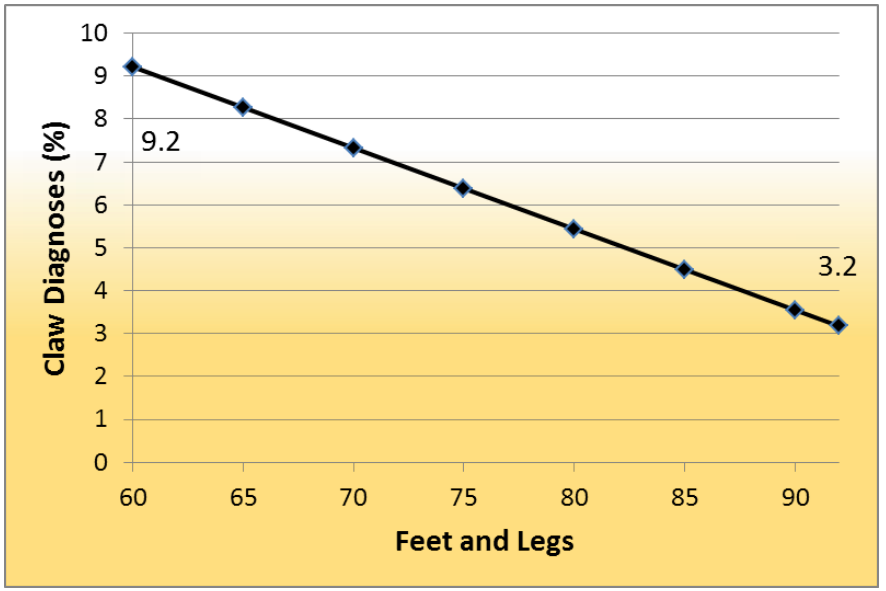
Feet and Legs
Frame

Feet and Legs Score – Claw diagnoses

Fleckvieh

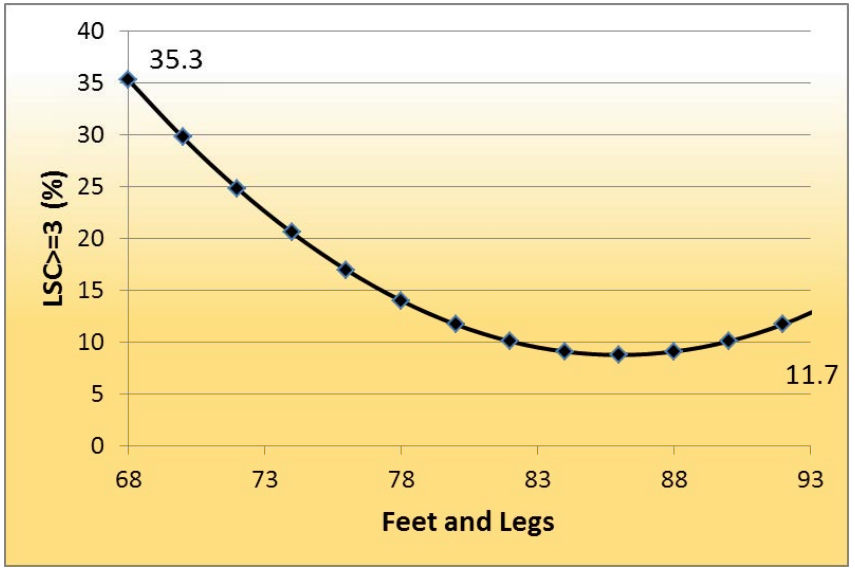


Brown Swiss

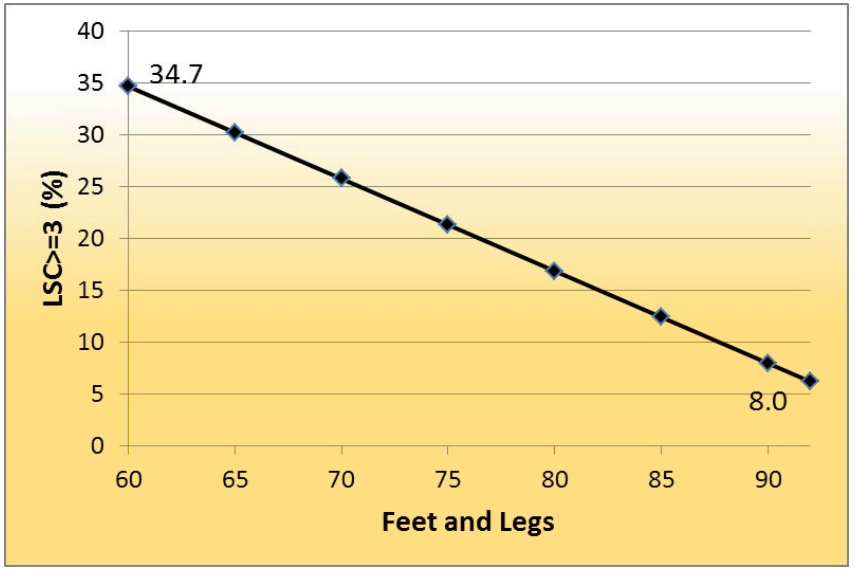


Feet and Legs Score – Lameness scores >=3

Fleckvieh



Brown Swiss



Phenotypic relationships

Feet and Legs/Frame

- Animals **with higher feet and legs scores** have
  - lower proportions of claw diagnoses
    (by both veterinarians and hoof trimmers)
  - lower proportions of lame animals

- Animals **with higher frame scores** show
  - higher proportions of lame cows (significant in Fleckvieh only)
  - in tendency higher proportions of claw diagnoses

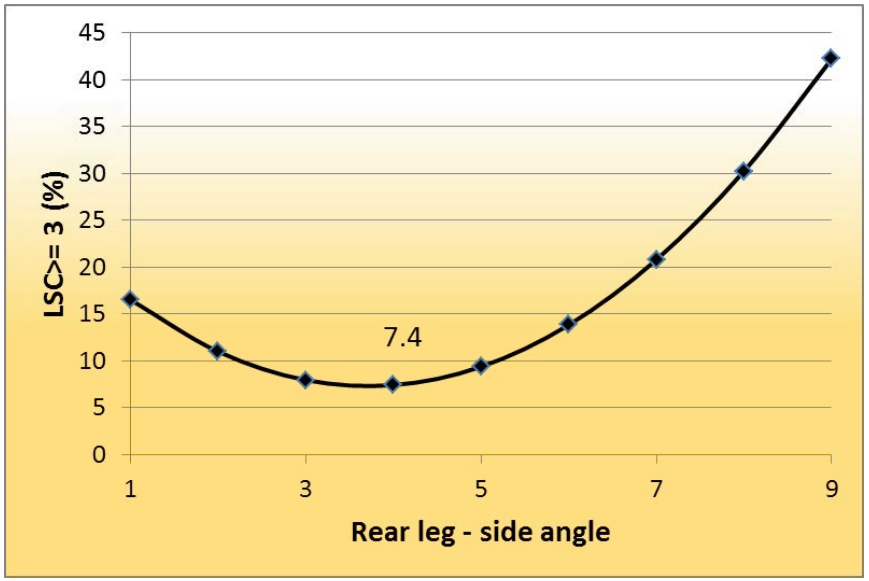
Phenotypic Relationships

Rear leg - side angle

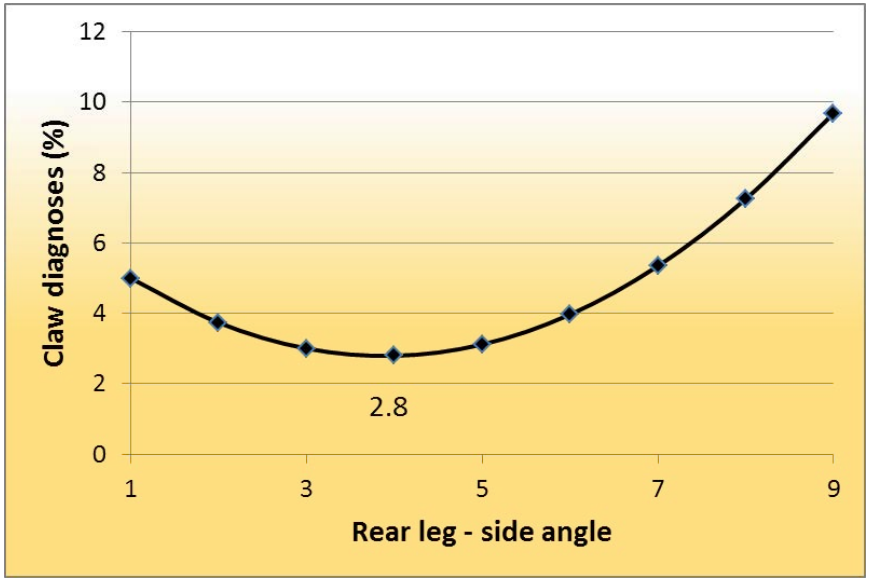
Pasterns

Rear leg – side angle - Fleckvieh

Rear leg - side angle - Claw diagnoses



Rear leg - side angle – LSC>=3

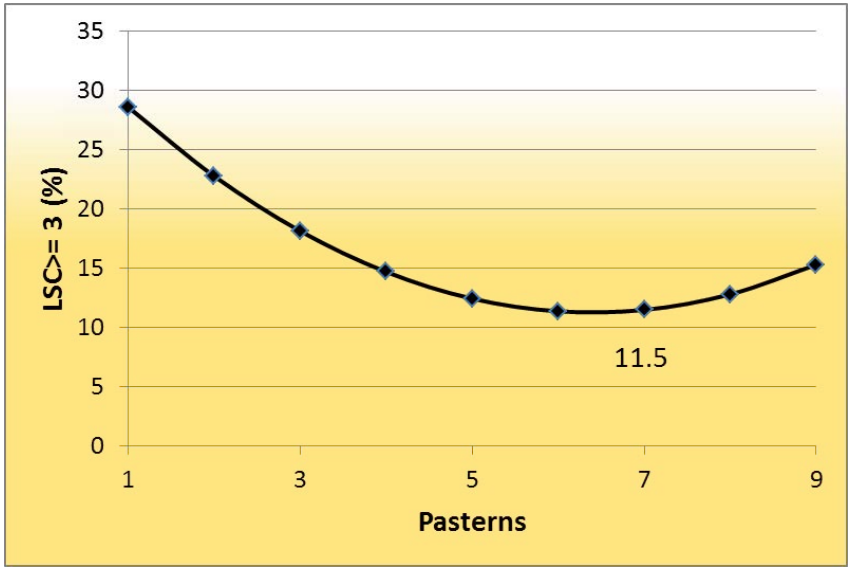


1 = straight, 9 = extremely sickled

Pasterns

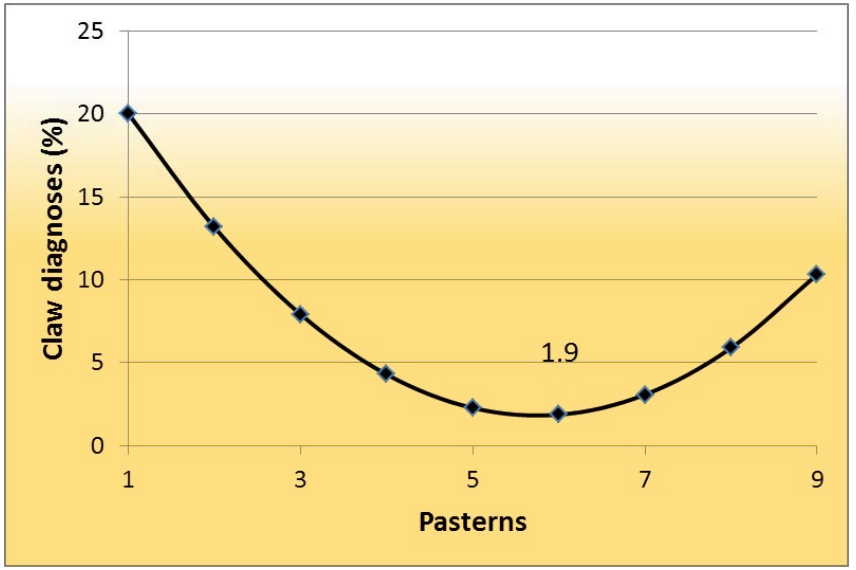
Fleckvieh

Lameness score >=3

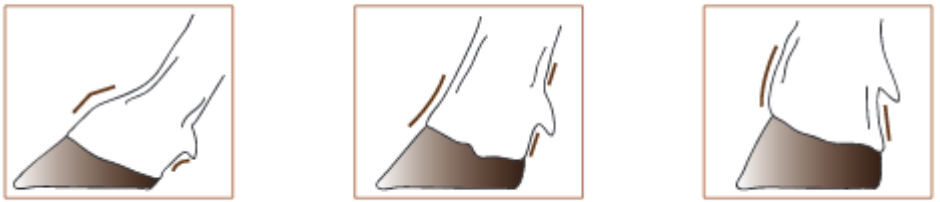


Brown Swiss

Claw diagnoses



1 = weak, 9 = steep



Phenotypic relationships

Linear type traits

- Animals of both breeds having a **somewhat straighter hock angle** (rear leg - side angle) had significantly **less** feet and legs problems
- Slightly **steeper pasterns** also resulted in **less problems**; significant for lameness (Fleckvieh) and claw diagnoses (Brown Swiss) only
- No effect of **hock development** or **hoof height**

Conclusion

- Strong relationship between **conformation** and **claw health** and **lameness**
- Further **genetic analyses necessary**
- **Non-linear relationships to linear type** traits may complicate the interpretation of genetic correlations
- Breeding for **conformation only** is **not sufficient** to **improve hoof** and **claw health**!

Conclusion

- Strong relationship between **conformation** and **claw health** and **lameness**
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- Breeding for **conformation only** is **not sufficient** to **improve hoof** and **claw health**!

Combination of veterinarian diagnoses, claw trimming protocols and conformation traits preferable!

Thank you for your attention

Funding and partners are gratefully acknowledged

Data (3)

	Fleckvieh (N = 3,235)		Brown Swiss (N = 1,405)	
	Mean	Min-Max	Mean	Min-Max
Frame	82.4	68-93	78.2	61-94
Feet and legs	80.8	68-93	76.9	60-92
Rear leg – side view	5.6	1-9	5.8	1-9
Hock development	5.8	1-9	5.6	1-9
Pasterns	5.4	1-8	4.8	1-9
Hoof height	5.3	1-9	5.1	1-9

EBV correlations

Fleckvieh sires; r^2 >= 50%, more than 20 daughters

Trait genetic evaluation	Claw (EBV)
Frame	-0.17
Feet and legs	0.23
Rear leg – side view	-0.03
Hock development	0.16
Pasterns	0.08
Hoof height	0.09

For claws positive EBVs desireable

Heritabilities
Fleckvieh

Trait	h^2
Vet diagnoses	0.03
Claw trimmer results	0.03
LSC>=2	0.10

Genet. corr	feet and legs-vet diagnoses	-0.34
	feet and legs-LSC>=2	-0.61