

**Genetic analysis of temperament traits
assessed by riders and judges at Icelandic
horse field tests**

H. Sigurðardóttir¹, S. Eriksson¹, E. Albertsdóttir²

**¹ Swedish University of Agricultural Sciences, ² The
Farmers Association of Iceland**



Breeding goal for Icelandic horses

Beautiful five-gaited horses that should be suited both for leisure and professional riders at all ages

- Conformation and riding ability traits assessed at field tests
 - Performance on a straight track
- Subjective scoring on an objectively defined linear scale 5-10; 0.5

Spirit

- Part of the selection criteria since 1950
- Composite trait

Spirit				9							
1	Fiery, indefatigable	4	Cooperative			C	Tenseness	F	Stubborn	I	Uncooperative
2	Eager, enthusiastic	5	Alert	A	Lazy	D	Aggressiveness	G	Nervous	J	No enterprise
3	Willing			B	Out of control	E	Cold	H	Apathetic, dull		

- Included in the breeding evaluation
- Estimated heritability is 0.37
- Considerable genetic gain

Spirit



- Controversial trait

“The horse should be fiery, cheerful and brave, but extremely easy to handle. All the time, the horse tries to please the rider.”

<https://www.youtube.com/watch?v=J4omG8evgls>

- Does the current assessment method for spirit support breeding of well-tempered riding horses suited for the general rider?
- Trial project involving additional assessments pertaining to temperamental suppleness of breeding horses

Additional temperamental suppleness of breeding horses

Trait		1	2	3	4	5	6	7	
Head carriage	Unstable head carriage								Stable head carriage
Rein contact	Stiff/heavy								Light/supple
Top line	Stiff								Supple
Cooperation	Uncooperative Aggressiveness Out of control								Cooperative Lightness
Nerve strength	Tenseness Nervousness Fearfulness								Composed Determination Courage

Overall suppleness 1-7

Aim of the study

Is the assessment of spirit a proper/good indicator of well-tempered riding horses?

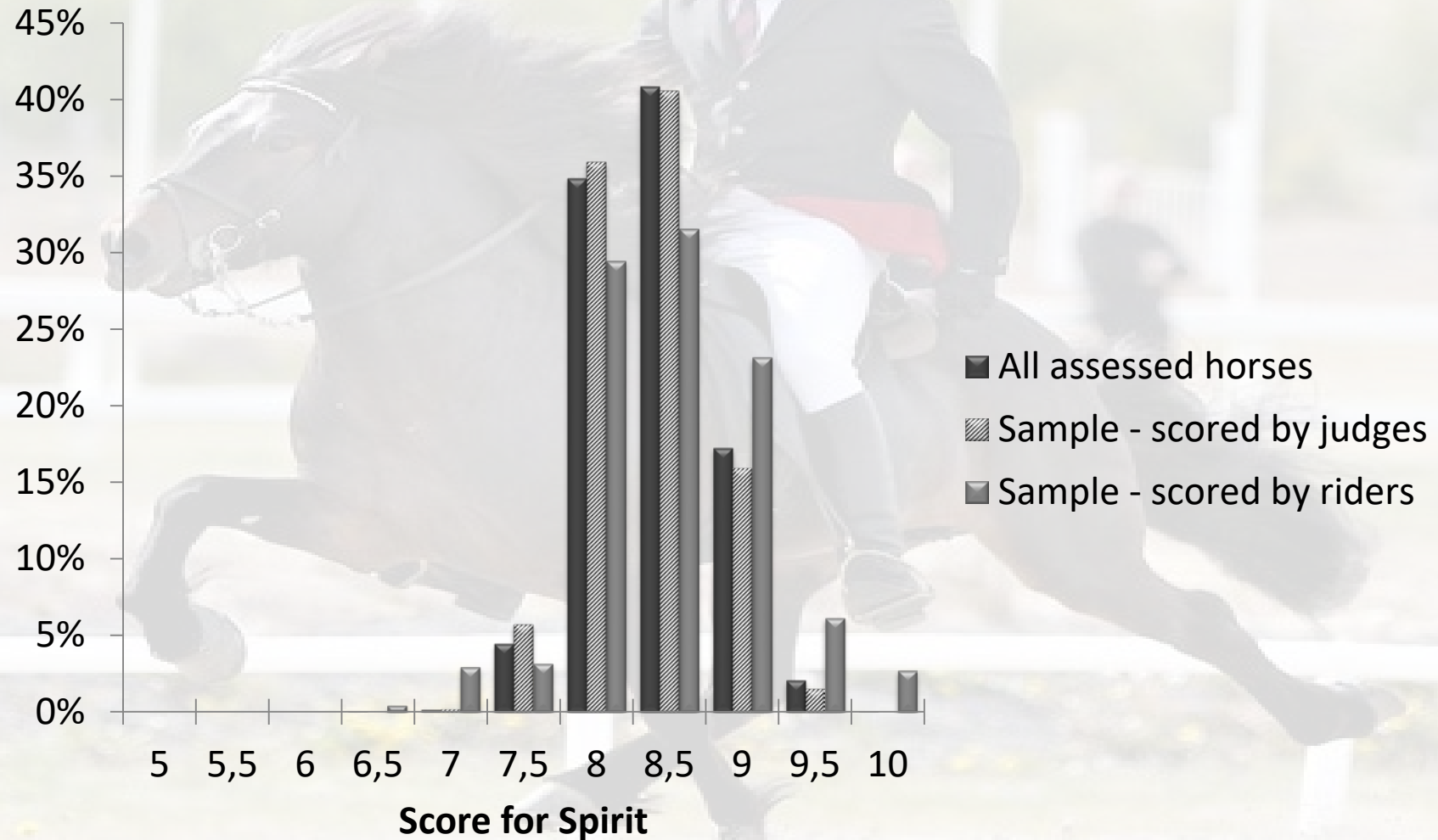
- Evaluate consistency between temperament assessments made by breeding judges and riders at breeding field tests
- Estimate genetic parameters for temperament traits

Data

A background image showing a rider in formal equestrian attire (dark jacket, white breeches, tall boots, and helmet) riding a dark-colored horse at a gallop on a track. The horse is in full stride, and the rider is leaning forward. The background is a blurred white fence and a bright, overcast sky.

- Breeding field tests
 - Riders and judges assessed the same horses
 - Spirit and the new suppleness traits
 - 440 horses – 67.0%

Data from breeding field tests



Principal component analysis

- Temperament traits assessed at breeding field tests

Physical constitution
component

Head carriage

Rein contact

Top line

Overall suppleness

State of mind component

Spirit

Cooperation

Nerve strength

Overall suppleness

Genetic analyses

- Genetic parameters estimated for:
 - Temperament traits assessed by breeding judges for all horses presented at breeding field tests in Iceland in 2014 and 2015
 - Temperament traits assessed by both breeding judges and riders
- Models included
 - age and sex of the horse
 - field test

$$Y_{ijk} = \mu + \text{age_sex}_i + \text{field test}_j + \text{individual}_k + \text{pe}_k + e_{ijk}$$

Genetic analyses

- Estimated heritabilities:
 - Temperament traits at breeding field tests

	All horses (judges)	Sample Riders	Judges
Spirit	0.14	0.08 – 0.15	0.15 – 0.20
Cooperation	0.07 – 0.11	0.23 – 0.49	0.00 – 0.05
Nerve strength	0.15 – 0.16	0.34 – 0.40	0.04 – 0.12
Overall suppleness	0.19	0.36 – 0.46	0.00 – 0.07
Head carriage	0.00 – 0.04	0.02 – 0.35	0.01 – 0.52
Rein contact	0.19	0.19 – 0.24	0.21 – 0.23
Top line	0.03 – 0.06	0.04 – 0.31	0.00 – 0.76

Genetic analyses

A background image showing a rider in formal equestrian attire (dark jacket, white breeches, tall boots, and helmet) riding a dark-colored horse at a gallop on a track. The horse is in full stride, and the rider is leaning forward. The track has a white fence in the foreground and a blurred background of trees and a building.

- Estimated phenotypic correlations:
 - Between assessments made by riders and judges
 - 0.22 – 0.61
 - Between temperament traits at breeding field tests
 - 0.35 – 0.87


Genetic analyses

A background image showing a rider in formal equestrian attire (dark jacket, white breeches, tall boots, and helmet) riding a dark-colored horse. The horse is in a collected movement, possibly a piaffe or passage, on a grassy field. A white fence is visible in the foreground. The image is slightly faded to allow text to be overlaid.

- Estimated genetic correlations:
 - Between assessments made by riders and judges
 - 0.45 – 1.00
 - Between temperament traits at breeding field tests
 - 0.26 – 1.00

Conclusion

- Considerable genetic variance of the new suppleness traits
 - Provide additional information supporting the assessment of spirit
 - Trait definitions need to be improved
 - Development of the assessment
 - So judges are better able to assess the aspects of traits

A rider in formal equestrian attire, including a helmet, dark jacket, white breeches, and tall boots, is riding a dark-colored horse at a gallop in a paddock. The horse is captured in mid-stride, with its front legs tucked and its tail slightly raised. The background shows a white fence and a blurred landscape, suggesting an outdoor riding arena or paddock. The overall image has a soft, slightly faded appearance.

Thank you for your attention!

Questions?