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Estimates of repeatability for conformation traits in Arabian horses

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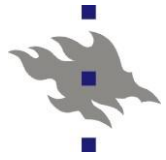
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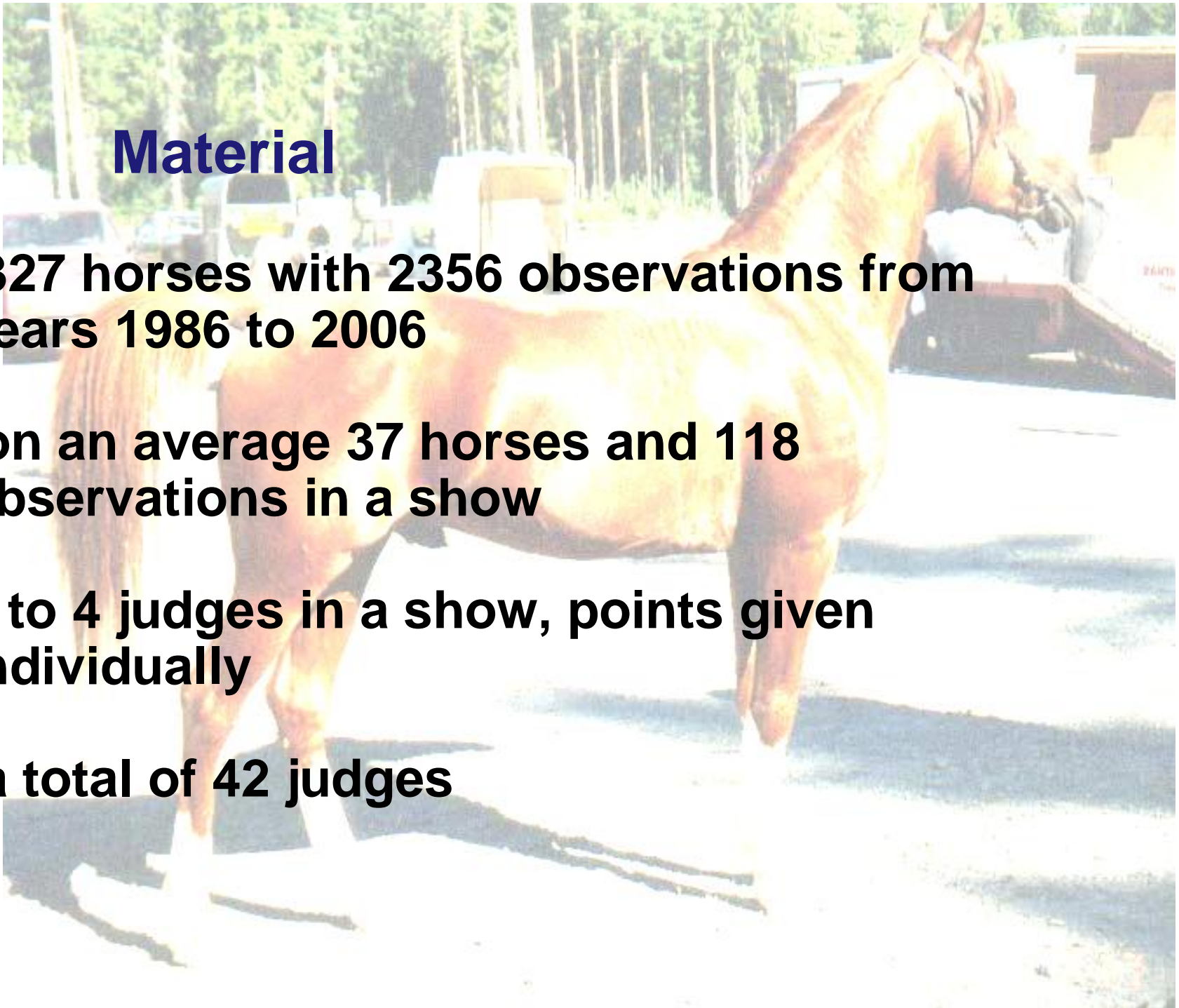
Introduction

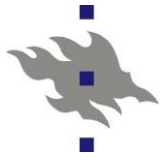
- n Purebred Arabs bred in Finland since 1982
- n Population size ca. 500 horses at present
- n Annual shows in August
- n Aim of this study:
 - n to estimate repeatabilities and other genetic parameters for the conformation traits and walk and trot
 - n and the variation due to judges



Material

- n 327 horses with 2356 observations from years 1986 to 2006
- n on an average 37 horses and 118 observations in a show
- n 1 to 4 judges in a show, points given individually
- n a total of 42 judges





Judging scales and traits

n 3 different judging scales during the years:

n 5-point scale from 1986 to 1992

n type

n head & neck

n body & upperline

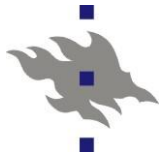
n legs

n **movements**

n total score: all 5 traits

n 145 horses and
786 observations





Judging scales and traits

n 10-point scale 2003 and 2004

n type

n head & neck

n body & upperline

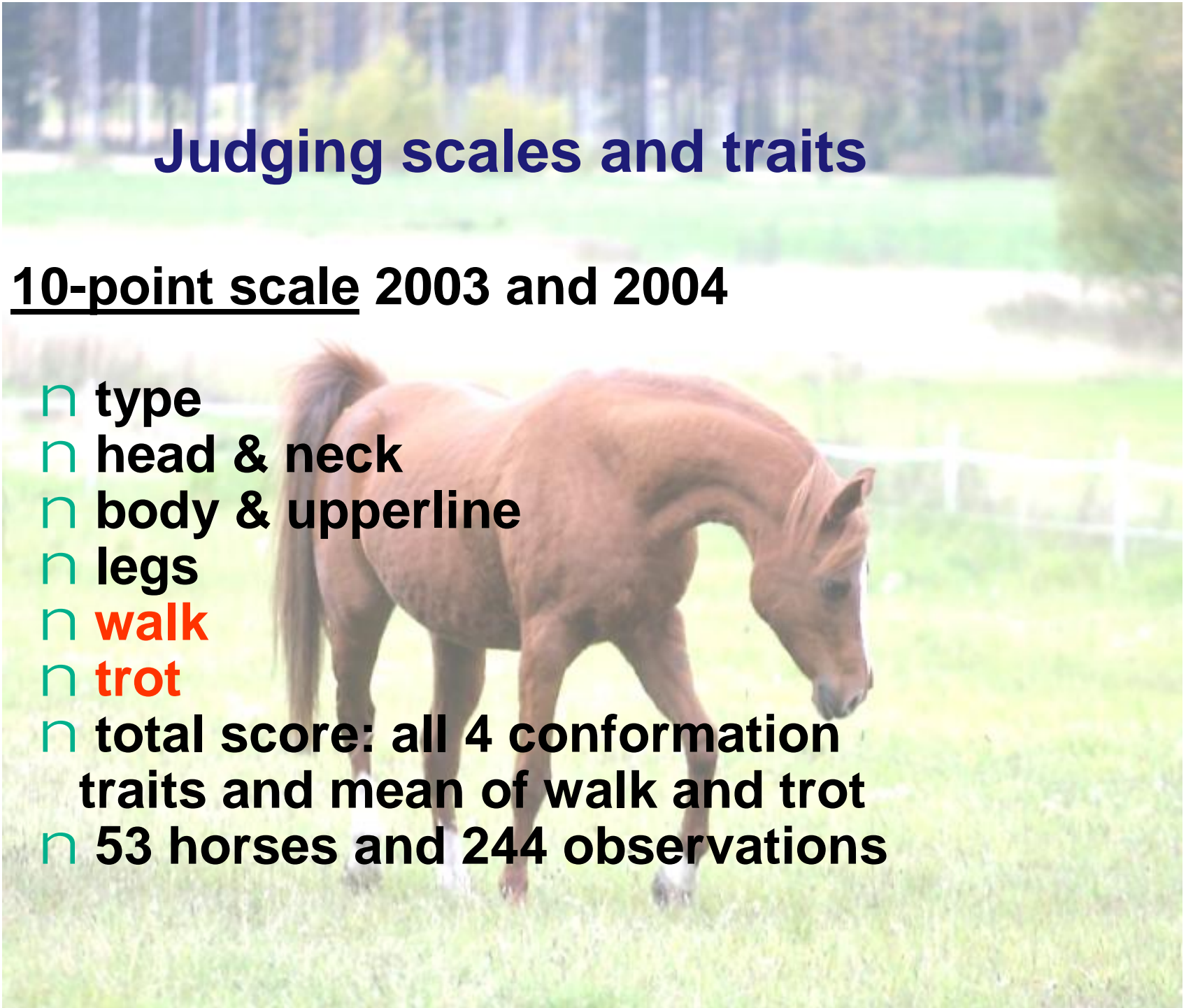
n legs

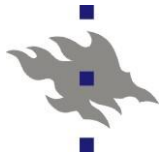
n walk

n trot

n total score: all 4 conformation traits and mean of walk and trot

n 53 horses and 244 observations





Judging scales and traits

- n 20-point scale from 1993 to 2002, and 2005 and 2006

- n type

- n head & neck

- n body & upperline

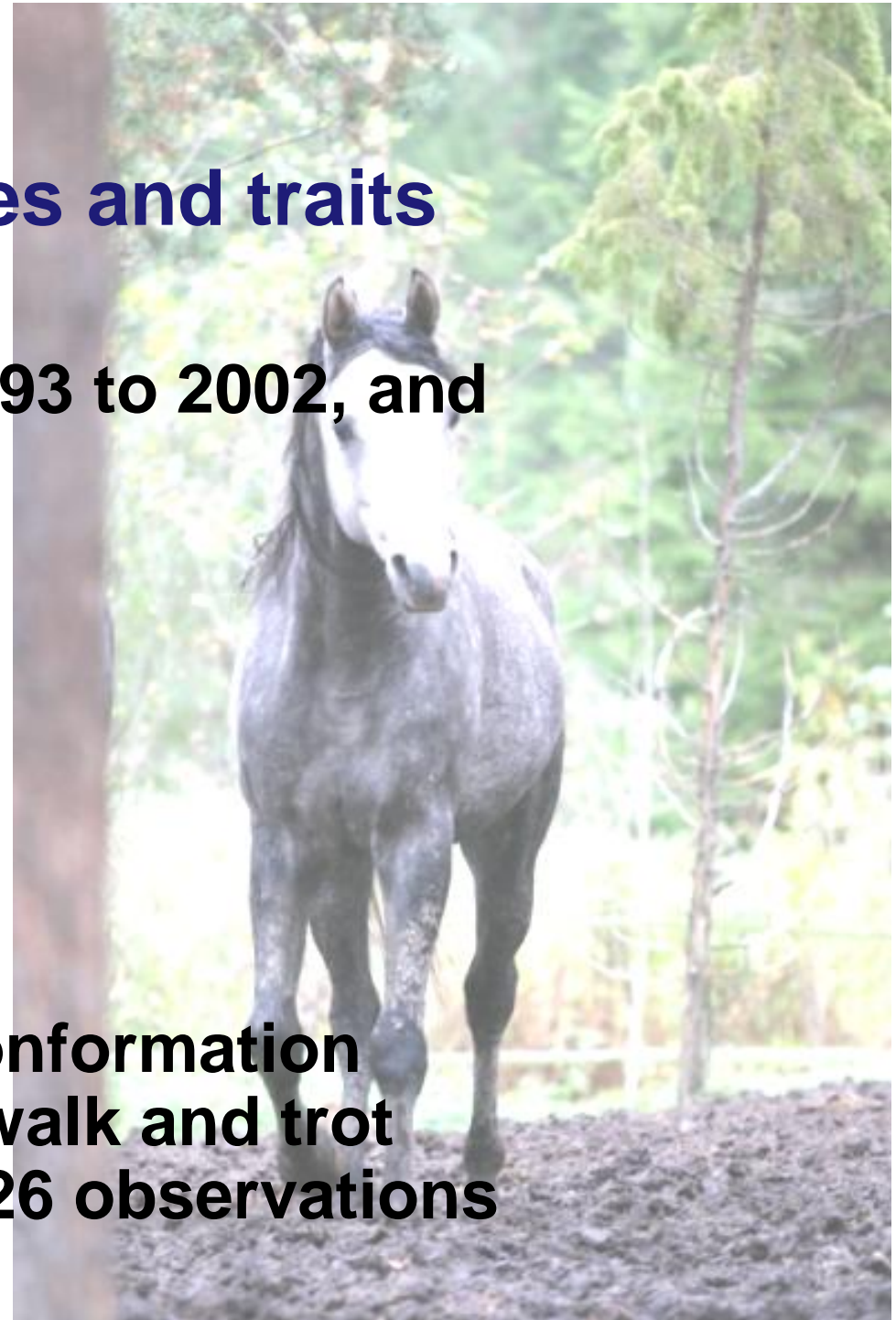
- n legs

- n walk

- n trot

- n total score: all 4 conformation traits and mean of walk and trot

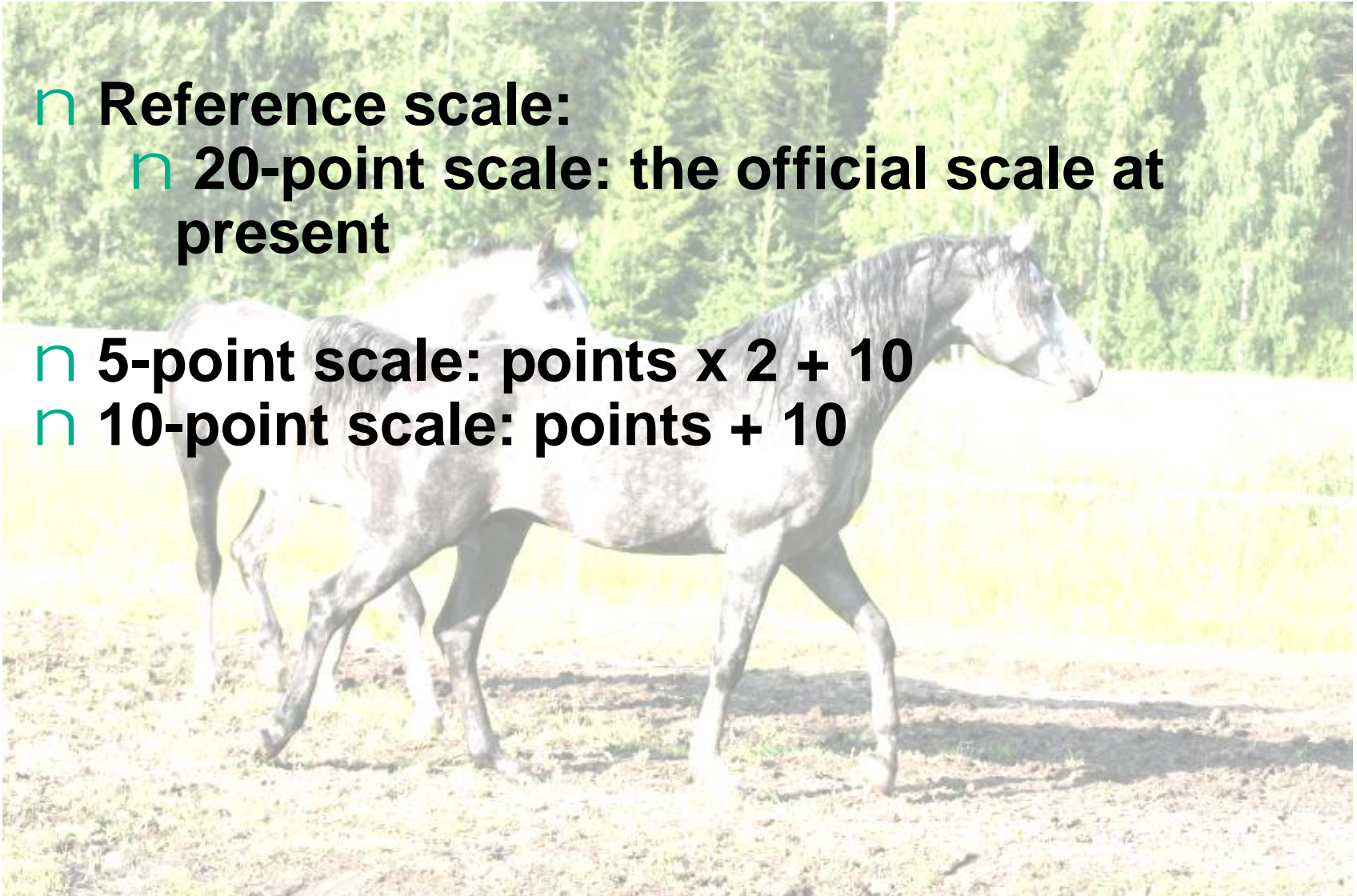
- n 220 horses and 1326 observations





Correction for the scale

- n Reference scale:
 - n 20-point scale: the official scale at present
- n 5-point scale: $\text{points} \times 2 + 10$
- n 10-point scale: $\text{points} + 10$





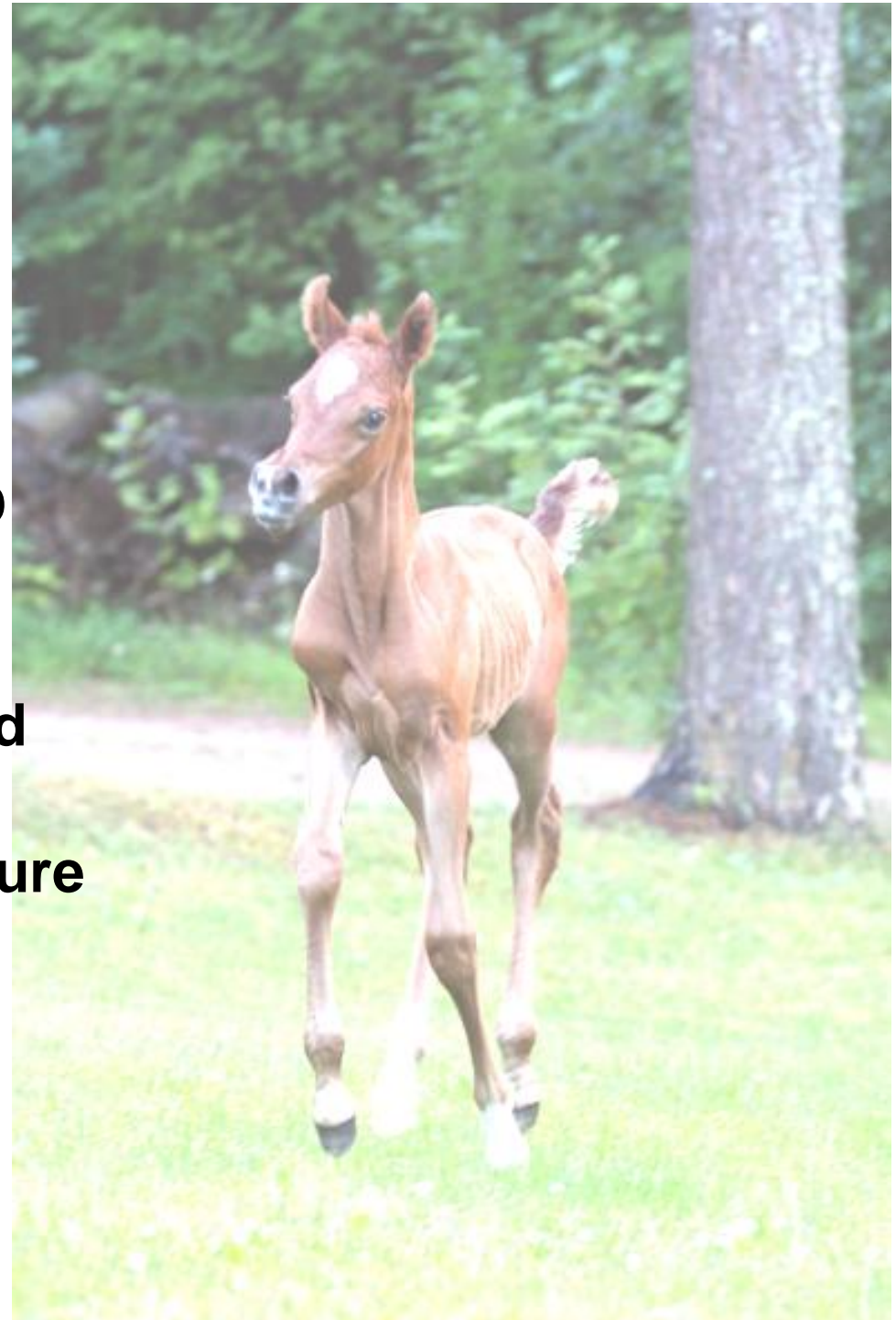
Data in summary

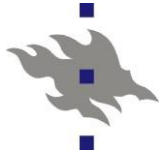
Trait	Horses	Observations	Ave.no.obs./ horse
Type	327	2356	7.2
Head and neck	327	2356	
Body and upperline	327	2356	
Legs	327	2356	
Movements	145	786	5.4
Walk	233	1570	6.7
Trot	233	1570	
Mean of walk and trot	233	1570	
Total score	327	2356	



Methods

- n Editing and preliminary LS-analyses
 - n WSYS-L and WSYS-D program packages
- n Variance components and genetic parameters
 - n VCE-5, REML-procedure





Model

$$y_{ijklm} = \mu + scale_i + age_j + jd_k + \alpha_l + pe_l + \varepsilon_{ijklm}$$

Fixed effects:

scale = scale of judgement, $i = 1, 2, 3$

age = age class of horse, $j = 1, \dots, 6$

Random effects:

jd = judge

α = additive genetic effect

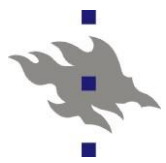
pe = permanent environmental effect

ε = residual



Effect of a judge, and estimates of repeatability and heritability

Trait	Judge	r	h ²	SE of h ²
Type	0.20	0.42	0.33	0.04
Head and neck	0.20	0.44	0.35	0.04
Body and upperline	0.33	0.29	0.19	0.03
Legs	0.37	0.17	0.10	0.02
Movements	0.07	0.45	0.29	0.08
Walk	0.40	0.18	0.10	0.03
Trot	0.34	0.29	0.10	0.03
Mean of walk and trot	0.42	0.23	0.11	0.03
Total score	0.35	0.35	0.27	0.04



Genetic correlations

Trait	H&N	B&U	Legs	Mov.	Walk	Trot	W/T	Total
Type	0.98	0.89	0.52	0.34	0.33	0.71	0.57	0.96
Head&Neck		0.94	0.57	0.32	0.29	0.65	0.51	0.96
Body&Upp.			0.77	0.52	0.25	0.89	0.64	0.99
Legs				0.48	0.16	0.76	0.49	0.72
Movements					0.26	0.67	0.53	0.62
Walk						0.74	0.93	0.43
Trot							0.94	0.87
W/T mean								0.71



Summary and conclusions

- n The results showed that

- n effect of a judge was

- n moderate (0.37 to 0.42) for legs, walk and mean of walk and trot

- n low (0.20) for type, and head and neck

- n estimates of heritability were

- n moderate (0.33 to 0.35) for type, and head and neck

- n low (0.10) for legs, walk and trot



...summary and conclusions

- n estimates of genetic correlations were
 - n high (0.87 to 0.99) among type, head and neck, body and upperline, and total score
 - n low (0.16 to 0.33) among walk and other traits

- n The results provide useful information for future planning, and for construction of indexes for individual traits and an overall index.



Thank You!