Linear profiling in Swedish Warmblood horses

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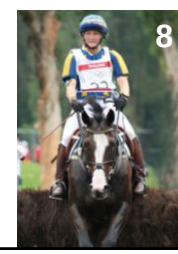
Swedish Warmblood

"Internationally competitive horses in dressage, show jumping or eventing"

≈65,000 horses
3,800 covered mares (2015)



Introduction of linear profiling

2010
Student thesis comparing conventional scoring in SWB and LP

2010-2011
Theoretical introduction of LP to judges and breeders

2012-2013
Extensive theoretical and practical training of judges with assistance from international judges experienced in LP

Information in Swedish horse media and directly to breeders

2013-
Implementation

Continued training of judges

Introduction of linear profiling

2013
field performance test for 3-year-olds

2014
field performance test for 4-year-olds
foal inspections
stallion performance test
mares for conformation grading

How was it received by judges*?

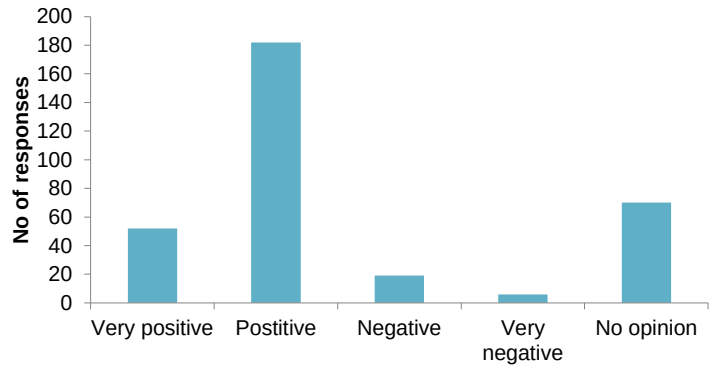
+ positive
More clear and detailed description of the horses
More uniform description of the horses
Good overview

- negative
Time consuming – temporary problem?
Some traits on valuating scale - not descriptive
Risk of focusing in details and forget the whole picture

*questionnaire to judges, 27 responses

How was it received by horse owners*?

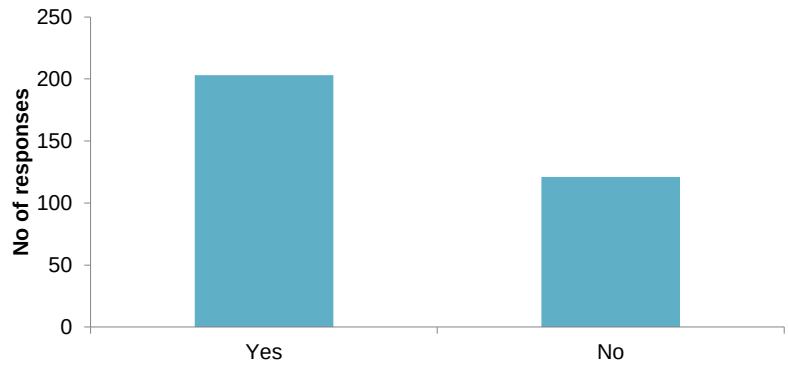
What do you think about the linear profiling as a complement to the traditional scoring?



*questionnaire to 858 horse owners in 2013, 329 responses (38%)

How was it received by horse owners*?

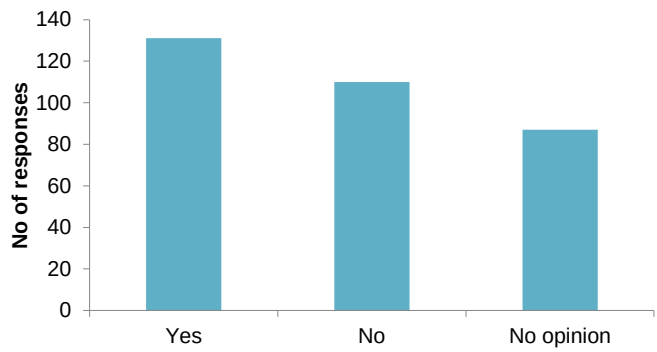
Do you think the linear profile should be presented online for all horses?



*questionnaire to 858 horse owners in 2013, 324 responses (38%)

How was it received by horse owners*?

Did you find the information from the linear profile valuable?



*questionnaire to 858 horse owners in 2013, 328 responses (38%)

Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

Analyses of linear profiling protocols for 3-year-old Swedish Warmblood horses 2013-14

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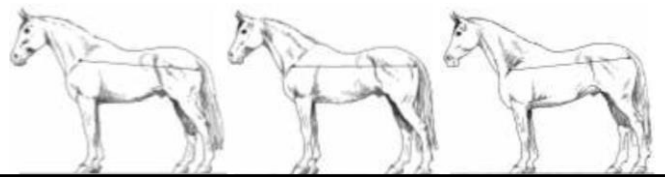
Test for 3-year-old horses

Introduced in 1999
40% of all 3-year-olds (>17,000 horses)
8 traits: conformation, gaits, jumping – scale 1-10

Included in annual genetic evaluation since 2006

Linear profiling protocol introduced in 2013
1,889 horses 2013-14



Linear profiling protocol

Linear profile **Height of withers** _____

	CONFORMATION	Obvious	Average A B C D E F G H I	Obvious	Comment
1	Type	refined (i.e. light)		heavy	☐ good proportions
2	Body: shape a	long		short	
3	Body: shape b	long legged		short legged	
4	Body direction	uphill		downhill	
5	Length of neck	long		short	☐ wide connection
6	Position of neck	vertical		horizontal	☐ low connection
7	Shape of neck	arched		straight	☐ heavy head-neck connection
8	Withers	high		low	
9	Position of shoulder	sloping		straight	☐ deep chest
10	Line of back	straight		swayback	
11	Loins	long		short	☐ roached back
12	Shape of croup	sloping		straight	
13	Length of croup	long		short	
14	Foreleg	over at knee		back at knee	☐ tied in ☐paral.displ.can ☐ misplaced cannon bone
15	Foreleg	toed in		toed out	☐ thin legs in prop.to body ☐outward rotated forelimb
16	Pastern, front	upright		weak	☐ long ☐ short
17	Hind leg	sickle		straight	☐ tied in
18	Hind leg	cow hocked		bowlegged	
19	Pastern, hind	upright		weak	☐ long ☐ short
20	Correctness in movement	winging		paddling	
21	Hoofs	big		small	☐ uneven ☐ low heels

conformation traits

Linear profiling protocol

	MOVEMENT	Obvious	Average A B C D E F G H I	Obvious	Comment
22	Walk: cadence	even		uneven	
23	Walk: stride length	long		short	
24	Walk: suppleness	supple		stiff	
25	Walk: elasticity	elastic		unelastic	
26	Trot: length of stride	long		short	☐ irregular
27	Trot: elasticity	elastic		unelastic	☐ movement tight to the ground
28	foreleg activity	shoulder free		Short	
29	Trot: hind leg position	under the body		behind the body	
30	Trot: hind leg activity	active		Inactive	
31	Canter: rhythm	even		Uneven	
32	Canter: stride length	Long		Short	
33	Canter: action	round		Flat	
34	Canter: elasticity	elastic		stiff	
35	Canter: balance	well balanced		unbalanced	
36	Movement: direction	uphill		downhill	

movement traits

Linear profiling protocol

	JUMPING	Obvious	Average A B C D E F G H I	Obvious	Comment
37	Take off	powerful		weak	
38	Take off: quickness	quick		slow	
39	Take off: direction	upwards		forwards	
40	Technique: foreleg	bent		hanging	☐ under the body ☐ stretched out
41	Technique: back	rounded		hollow	
42	Technique: haunches	open		tight	
43	Scope	much		little	
44	Elasticity	elastic		stiff	
45	Care	too careful		not careful	
46	Distance estimation	secure		insecure	
47	Balance	balanced		unbalanced	
48	Reaction	quick		slow	
49	Approach to assign.	focused		unfocused	
50	Behaviour	relaxed		tense	

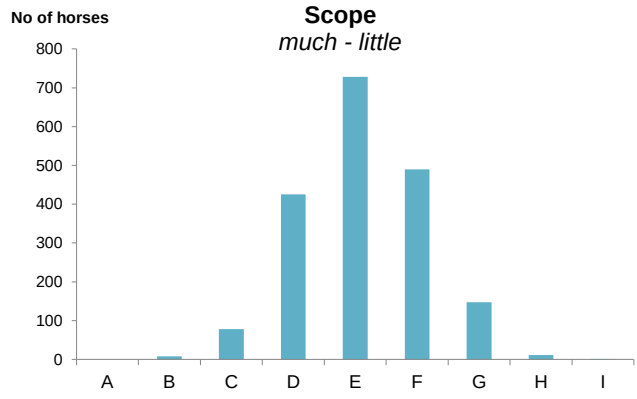
jumping traits

Aim of the analyses

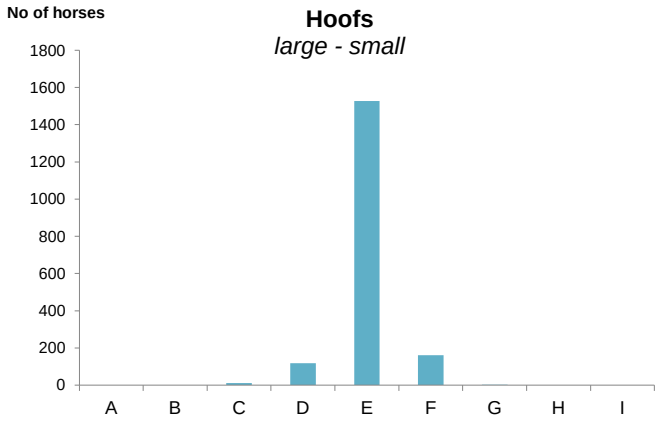
Investigate suitability of linear scored traits in genetic evaluation

- descriptive statistics
- genetic parameters for linear traits
- correlations between linear scored traits and traditionally scored traits

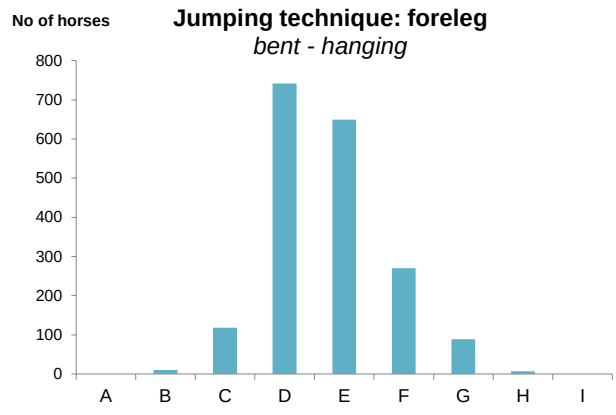
Distribution of linear traits



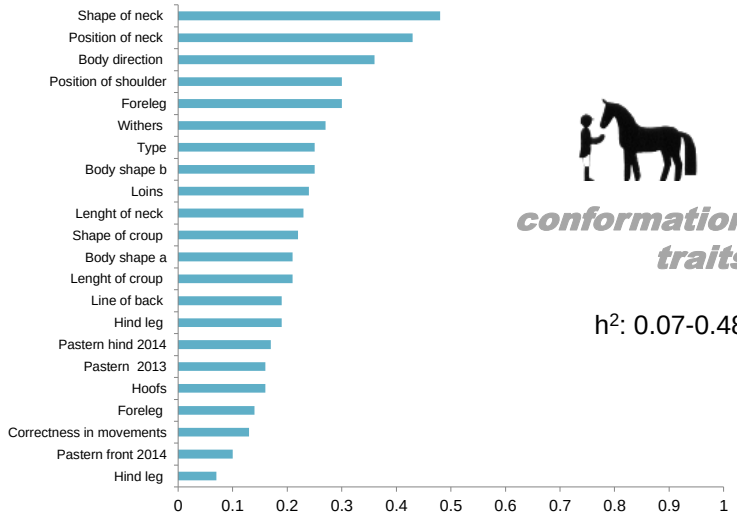
Distribution of linear traits



Distribution of linear traits



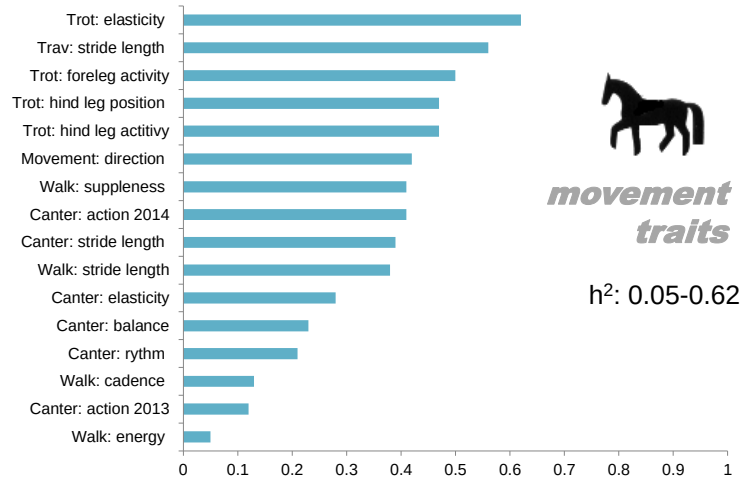
Heritabilities of linear traits



conformation traits

h^2: 0.07-0.48

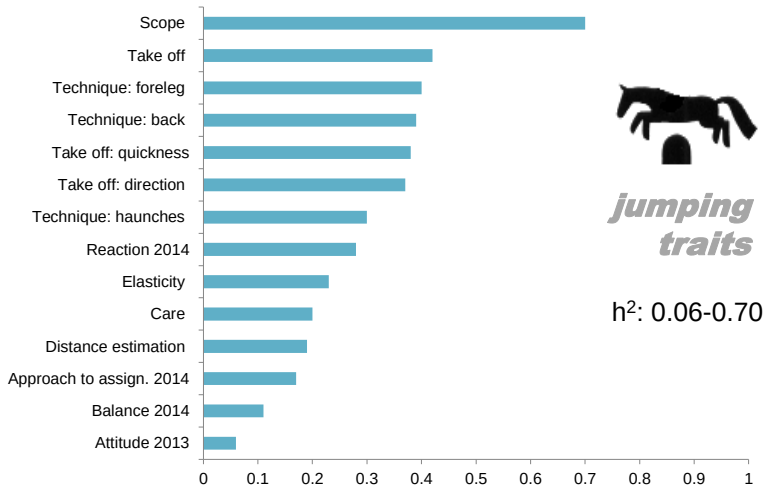
Heritabilities of linear traits



movement traits

h^2: 0.05-0.62

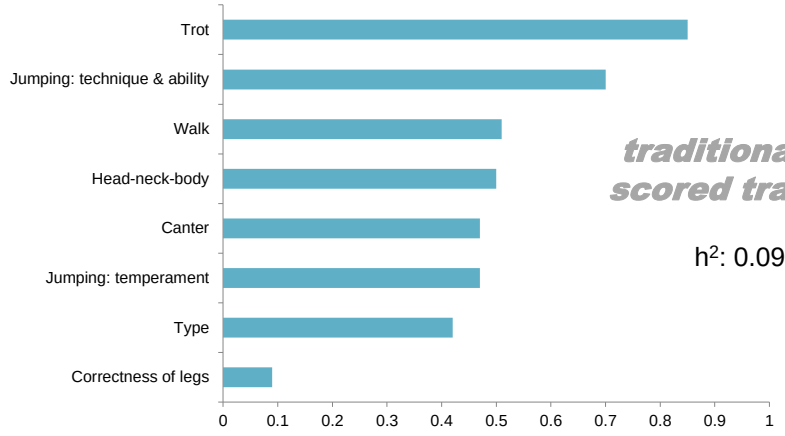
Heritabilities of linear traits



jumping traits

h^2: 0.06-0.70

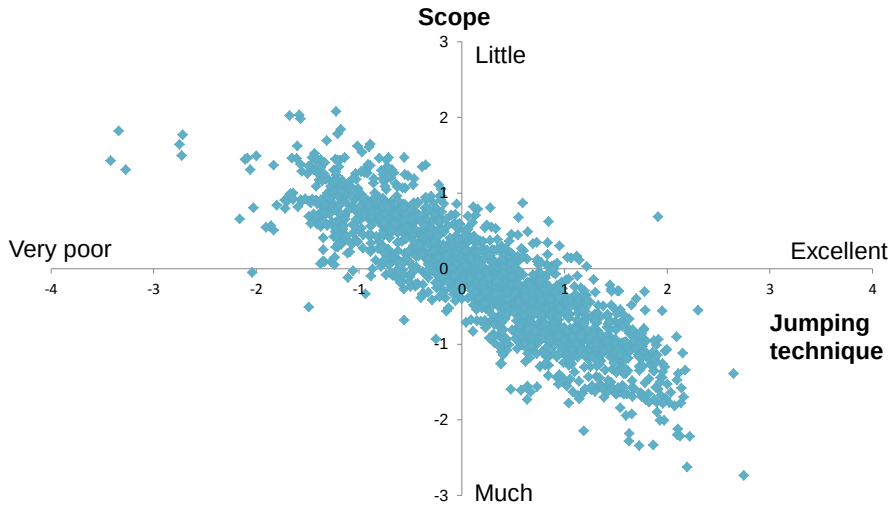
Heritabilities



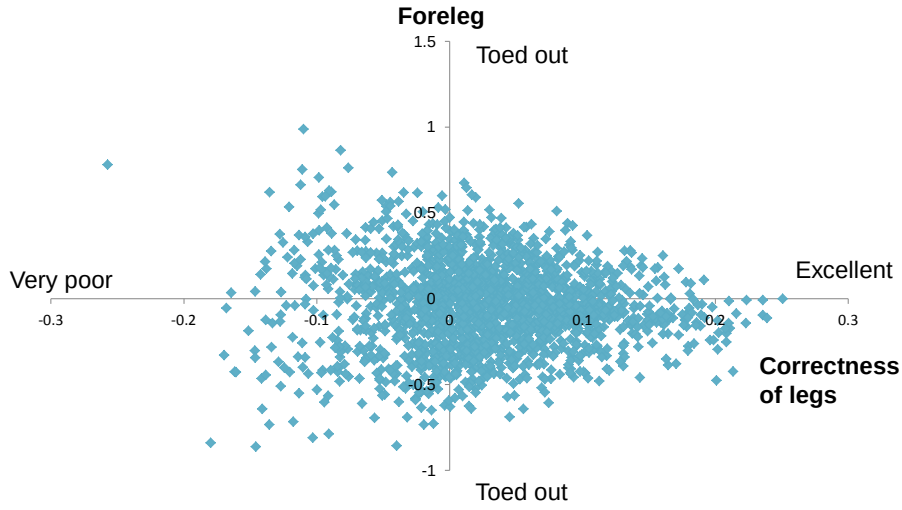
traditionally scored traits

h^2: 0.09-0.85

Correlations between traits



Correlations between traits



Concluding remarks

Possible to include linear scored traits in genetic evaluation

Linear protocol good complement to traditional scoring

Higher heritabilities for traditionally scored traits

Linear profile useful for breeders

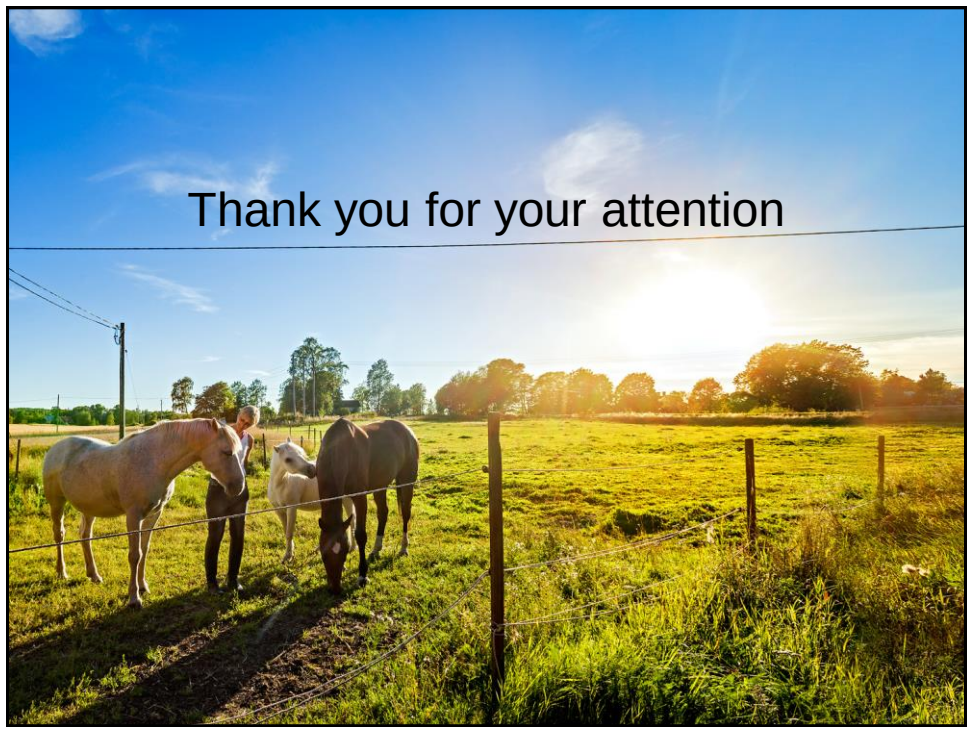
Linear information can be used in genomic studies

On-going activities

Publish breeding values for linear traits 2016

Genomic studies

Bachelors student thesis
- -conformation and movements
- -conformaiton and jumping technique



Genetic correlations

traditionally scored traits – linear traits

Traditional traits	Weakest corr.	Strongest corr.
Walk	-0.67 energy *(hurried – slow)*	(< -0.99) cadence *(even – uneven)*
Trot	-0.94 hind leg activity *(active – inactive)*	(< -0.99) hind leg position *(under body - behind body)*
Canter	-0.83 stride lenght *(long – short)*	-0.94 elasticity *(elastic – stiff)*
Jumping: technique & ability	-0.65 foreleg *(bent – hanging)*	(< -0.99) scope *(much – little)*

Trait	Mean	SD
Conformation	4.6 - 5.2	0.4 – 0.9
Movement	4.7 - 5.2	0.5 – 0.9
Jumping	4.6 - 5.2	0.6 – 1.1
Trad. scores	6.9 - 7.8	0.5 – 1.2