



# Linearly scored traits associated with sport performance in Swedish warmblood horses

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A dark purple background with a faint, abstract pattern of lines and shapes. The SLU logo is in the top left corner. The title is in large white font, and the authors' names and affiliation are in a smaller white font below it.



## Sandra Bonow

- **Breeding of Swedish Warmblood horses towards specialization in show jumping and dressage**
- Licentiate seminar April 14 at 13.00
- Possible to participate by zoom



## Background

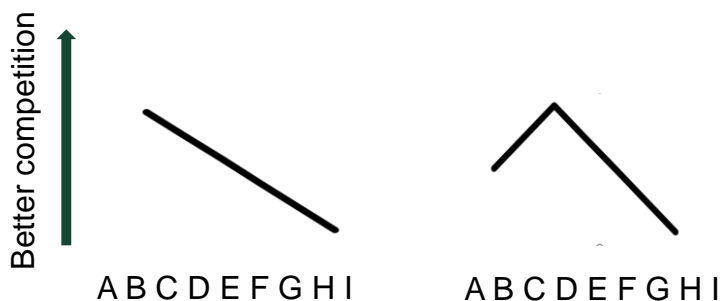
- Linear scoring introduced in 2013
- EBVs for linearly scored traits since 2017
  - Young Horse Test for 3-y-olds
  - Riding Horse Test for 4-y-olds
  - Stallion Performance Test
- Specialization within population
- Oldest horses with linear scores born 2010
  - competition data available!

Technique and ability										
Property		88	92	96	100	104	108	112	Security	
Take-off	powerful								weak	Average
Take-off: quickness	quickly								slowly	Average
Take-off: direction	upwards								forwards	Average
Technique: foreleg	bent								hanging	Average
Technique: back	rounded								hollow	Average
Technique: hindquarters	open								tight	Average
Scope	stort								little	Average
Elasticity	elastic								stiff	Average



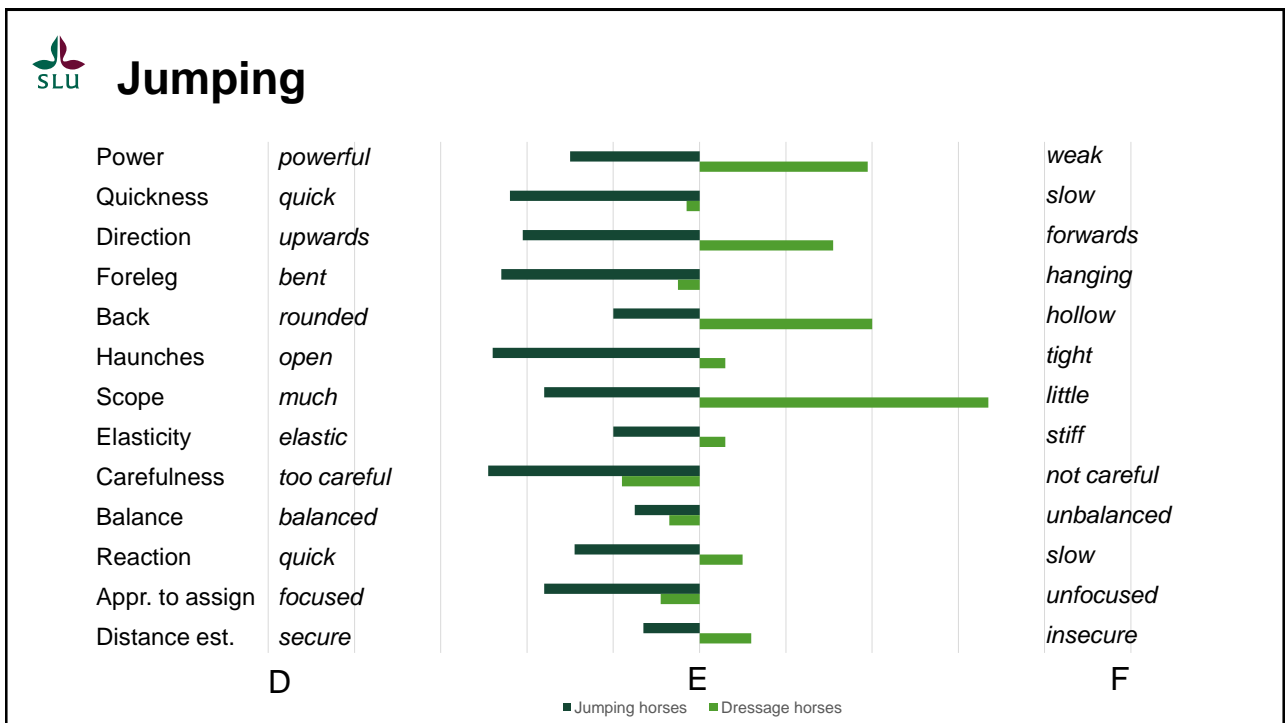
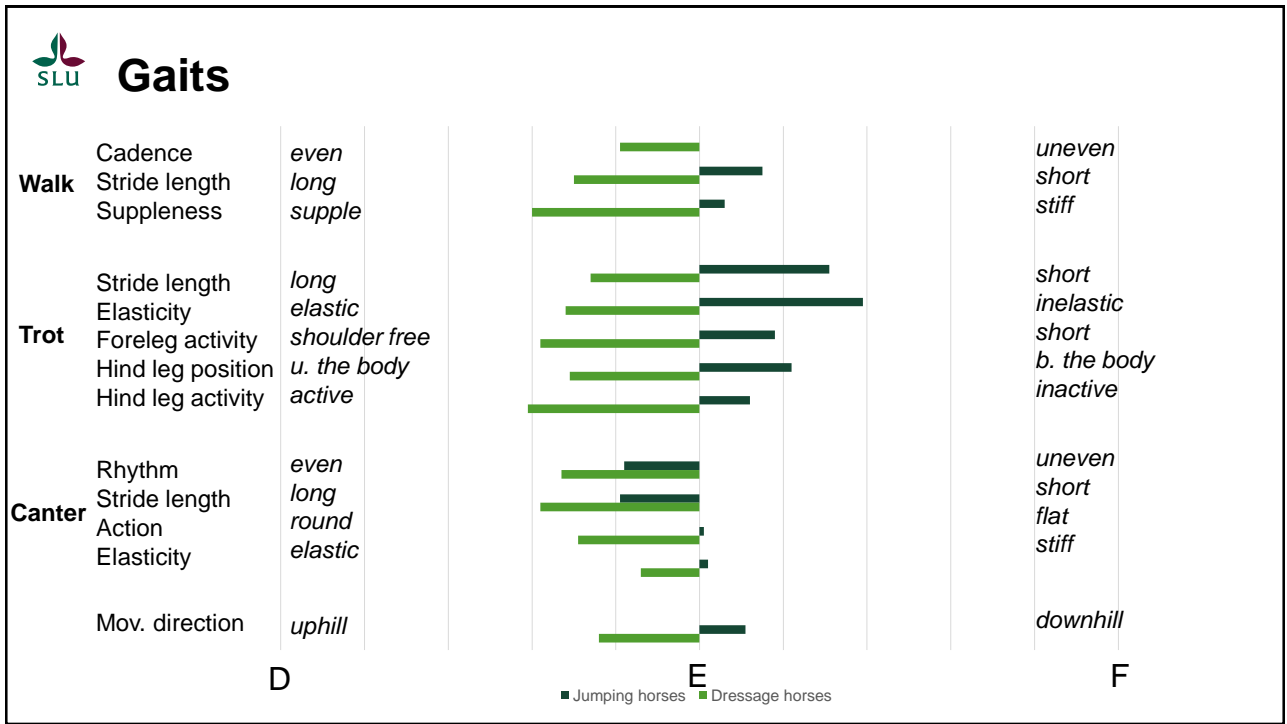
## We wanted to investigate...

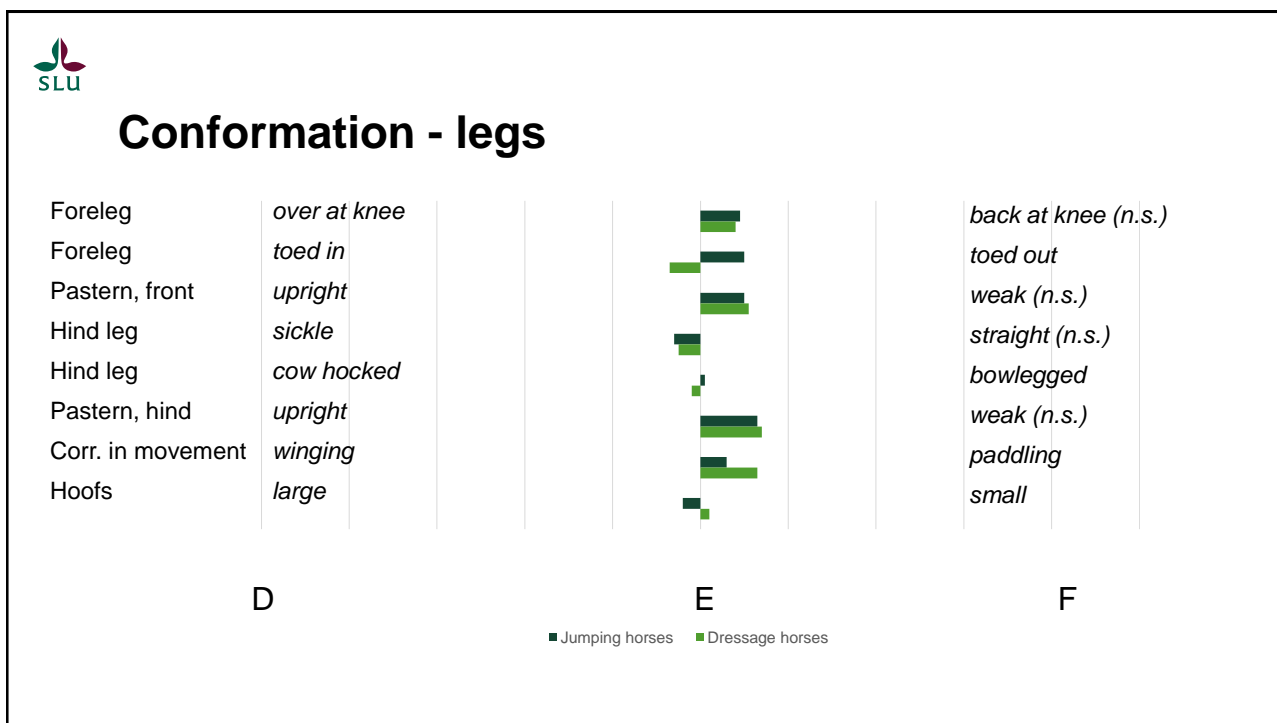
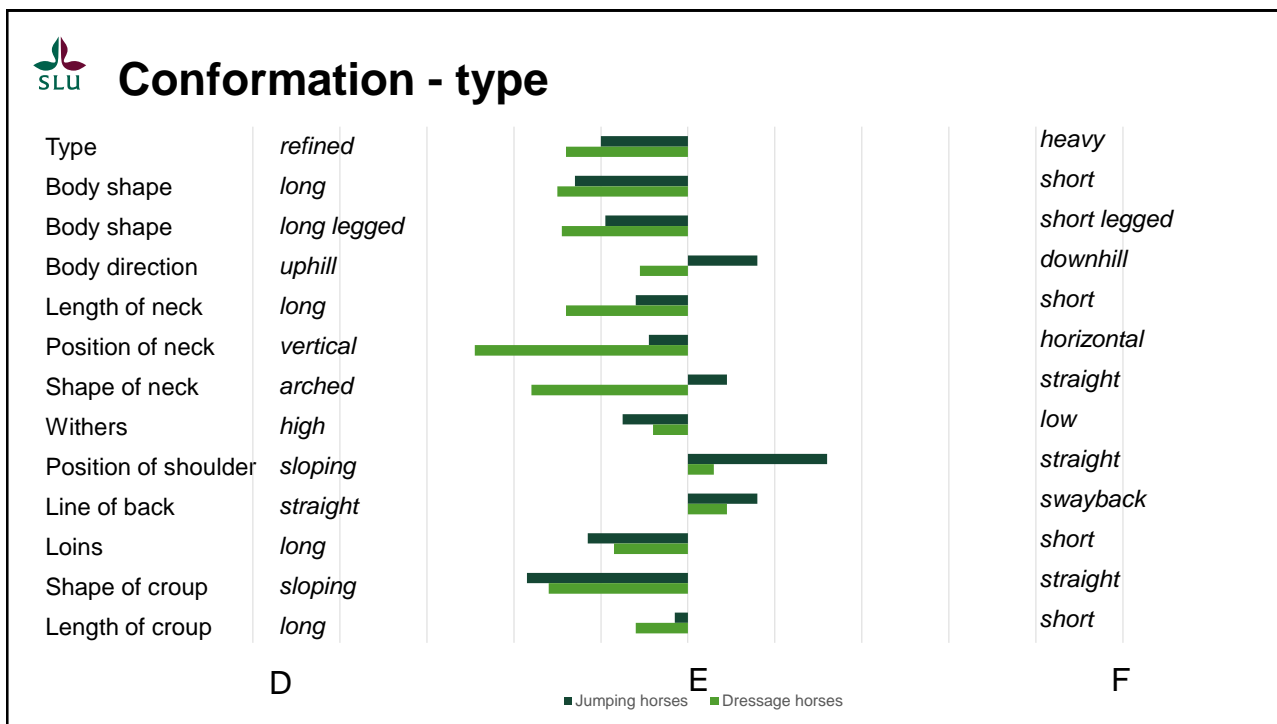
- Phenotypic differences between show jumping and dressage horses
- Which linearly scored traits have a significant effect on competition results?
- Are there intermediate optima?



## Data

- 8102 horses with linear scoring from YHT or RHT
  - 4216 jumping horses
  - 3152 dressage horses
- Competition data up to October 2021
  - 2414 jumping horses with competition start in show jumping
  - 1178 dressage horses with competition start in dressage
- Competition performance was defined as accumulated points in competition
  - Placed horses receive points
  - Higher points for better placing, placing at more advanced level
  - log-transformed due to skew distribution
- Competition performance = sex + birth year + linearly scored trait (one at a time)



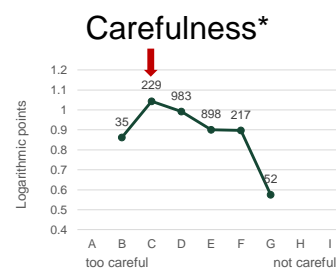
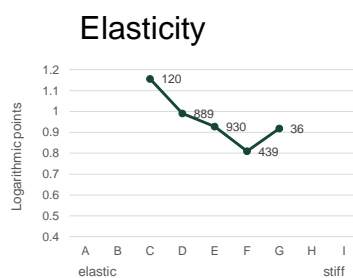
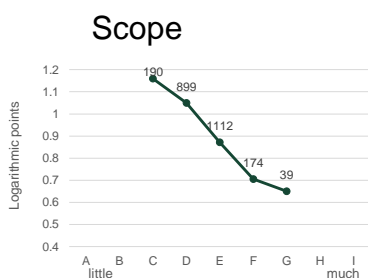




## Significant traits for show jumping (1/2)

\* =

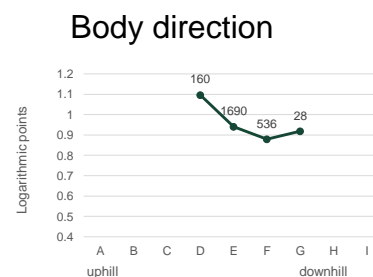
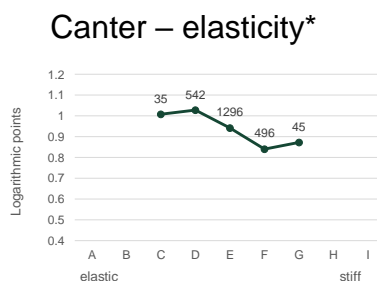
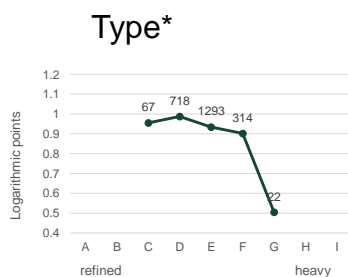
- Powerful, quick and an upward take off
- Bent forelegs, rounded back and haunches that open up
- Much scope, elastic, balanced and careful\*
- Quick reaction, secure distance estimation and focused approach\*



## Significant traits for show jumping (2/2)

\* =

- Refined type\*, uphill body direction and vertical positioned neck
- Elastic canter\* and uphill movements

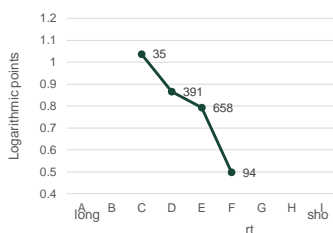




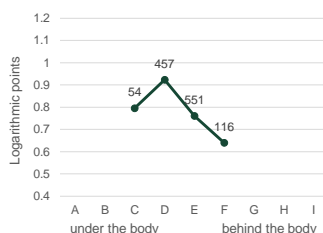
## Significant traits for dressage competition (1/2) \* =

- Trot: long stride length, elastic, shoulder free\*, active\* hind legs under the body\*
- Canter: round and elastic with a long stride length\*
- Gaits overall: uphill movements

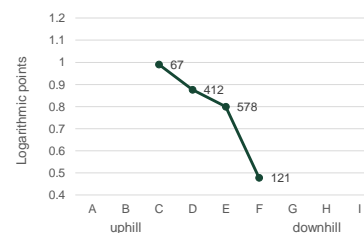
Trot: stride length



Trot: hind leg position\*



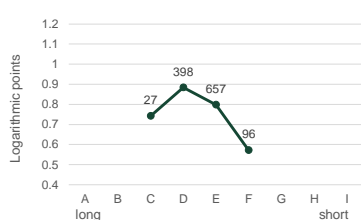
Movement: direction



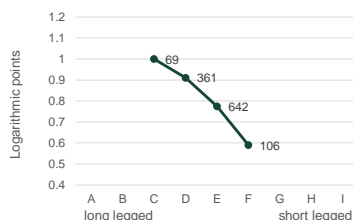
## Significant traits for dressage competition (2/2) \* =

- Long legged, uphill body direction, sloping shoulder
- Long\*, arched and vertical positioned\* neck
- Neither sickle or straight hind legs\*

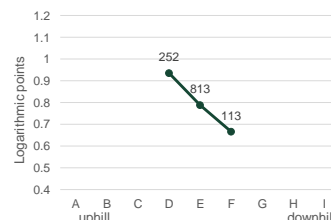
Length of neck\*



Body shape



Body direction





## Summary (1/2)

- Clear differences between jumping and dressage horses
- An number of linearly scored traits have significant effect on competition performance
- Show jumping:
  - all jumping traits, a few conformation and gait traits
  - linear relationship most common (advantage to be close to extreme)
- Dressage:
  - all trot traits, a number of conformation and canter traits
  - both linear relationships and traits with intermediate optimum (better to a certain level)



## Summary (2/2)

- An uphill body direction and uphill movements significant for both show jumping and dressage
- Walk traits had no effect on competition performance
- Correctness of legs had no effect on competition performance
- Traits with intermediate optimum
  - average population have not reached optimum yet
  - important to monitor to avoid breeding for extreme horses
- Linearly scored traits are valuable tools in developing the modern sport horse!





## To be continued...

- Genetic correlations
- Follow up when more horses have reached advanced classes
- Investigate linearly scored traits effect on health and durability
  - same or different optimum as for performance?



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Thanks for your attention!