




IT-Solutions for Animal Production

7th International Workshop on
Linear Profiling in the Warmblood Horse
on 29-30 March 2023 in Grebin / Plön, Germany



Lessons learned from working with linear data – how to let the equine community benefit from collaborative initiatives

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Outline

- ❖ background / motivation
 - ◆ why starting with a 'lessons learned'?!
 - ◆ how and why our initiative was started and how it developed
- ❖ working with linear data
 - ◆ linear profiling in research and routine → requirements
 - ◆ data interpretation and use → challenges and needs
- ❖ implications for the equine community

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Why starting with 'lessons learned'?

- traditional valuating scoring still in place in many studbooks
- different levels of knowledge about linear profiling
- counteract basic rumors by basic facts

- different opportunities to build up diversified experience in linear data management and use
- hints on pitfalls, tips for monitoring
- notes on what to keep an eye on in the practical part (and in practical linear description further on)

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Engagement for linear profiling I

- methodological development in animal breeding → **CHANCES**
- necessary improvement of phenotyping → **CHALLENGES**
 - better, i.e. more targeted, decision support (competitive situation)
 - basis for genomic applications
- enable **exchange of experiences** and provide **community support to overcome the implementation challenges of linear description**



review paper (presentation at the EAAP 2018 conference)


From ideas to realization

- lack of transparent information on key facts and procedures
 - **systematic information collection**
- lack of validated methods / systems and of applications supporting interpretation of results
 - **scientific investigation as basis for recommendations** on procedures and possibly actions to improve
- lack of regular exchange between equine science and practice to reflect on topics of (potential) importance
 - **coordination of reports, flow of information, discussions, etc. to systematically work on closing the gap**
 - initial phase (survey / review, pilot projects) → continued development on scientific basis

INTERSTALLION as permanent working group of the EAAP Horse Commission since 2006

Improving transparency ...

- **by making information more comparable (1)**
 - support of harmonization and standardization
 - independent and general recommendations
 - e.g. stable and reference population for publication of EBVs (Nov. 2005)
 - targeted support in important fields of practical work
 - e.g. engagement in promoting the use of linear profiling
- **helping the practice to improve effectiveness and efficiency of work**



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Engagement for linear profiling II



■ chronology:

- 15 Dec 2011 workshop on linear profiling (overview of recording systems) in Arlanda, Sweden, formation of the linear profiling working group of INTERSTALLION
- 23 Apr 2012 practical workshop in Dublin, Ireland
- 29 Aug 2012 meeting of the linear profiling WG in Bratislava, Slovakia
- 21 Jan 2013 mobile system demonstration mobile in Hanover, Germany
- 28 Nov 2013 workshop on linear profiling (theory, practice) in Vechta, Germany = 1st Internat. Workshop on Linear Profiling in the Warmblood Horse
- 2012 - 2014 review of existing linear systems for horses (science, practice), publication of the [linear trait inventory](http://equinephenotypes.org) on equinephenotypes.org
- since 2014 continuation of the IWSLP series (EAAP HC, support of WBFHS)

■ publications on linear profiling and its perspectives

- presentations (nationally and internationally, scientific and non-scientific)
- publications (scientific review article, website with trait inventory etc.)

Research & routine requirements I






- good to be aware of theoretical chances
- better to search for feasible ways to use **well-defined and practice-proven routines as link** to the new evaluation routines

content of your trainings for judges or young breeders?
notes of experienced judges?

- as a studbook, check available systems, but in the end define YOUR linear scheme which fits YOUR and YOUR BREEDERS needs and is accepted by YOUR evaluators (practice- and use-oriented rather than academic decision!)
- science-practice partnerships may be helpful (pilot)

Research & routine requirements II

- realize the fundamental difference between 'old' and 'new' system, don't underestimate what it means to change routine procedures and accept the **possible need to compromise** in order to start

certain age groups of horses?

certain type(s) of events and/or selected events?

less evaluators than judges ('kernel team linear profiling')?




reduction or replacement of valuating scores?

 - as a studbook, define YOUR way to implement linear profiling and integrate it in the breeding program
 - science-practice partnerships may be helpful (pilot)

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Research & routine requirements III

- realize the fundamental difference between 'old' and 'new' system, don't underestimate what it means to change routine procedures and accept the **possible need to compromise** in order to start
- **be strong in your decision** and don't compromise in every respect, so don't tolerate indications of 'valuating linear profiling' and don't blindly adopt the typical misconceptions about linear profiling

too many different schemes to end up with improved comparability?

NO, differences between schemes are mostly minor. Consistency of linear data recorded with different linear schemes has been shown.


too many traits to work with on a daily basis?



NO, comprehensive linear description is possible on a routine basis; reconsidering organization (evaluation teams) and digitalization (technical tools) may help to overcome challenges. Taking detailed notes may take more time.

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Monitoring of linear data collection I




- standard distribution parameters
 - mean, standard deviation (phenotypic variance), use of the full scale
 - plausible and balanced use of the linear scale across traits
- annual overview statistics plus stratified analyses
 - evaluators
 - if applicable: assistances and evaluation teams (evaluator + assistance)
 - age groups of horses, types of events, ...
- remarkable findings to discuss and possibly react to
 - overall mean far from the middle value?
 - obvious differences of distribution parameters between evaluators?
 - absolute vs. relative linear description?
 - definition of the reference ('average horse')



long and sometimes difficult discussions!
presented horses may be (regarded as) not
representative for the whole population

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Monitoring of linear data collection II






- remarkable findings to discuss and possibly react to
 - ...
 - avoidance of the middle value (or plausible for the evaluated sample)?
 - avoidance of extremes (or just too few horses evaluated to see them)?
 - obvious description focusses of single evaluators (e.g., legs, top line)?
 - not yet clear understanding of the linear description principle?
 - need of more intense (or different) training?
 - limited experience?
 - need of stronger mentorship?

new system implying that everyone has to learn
(ask, discuss, ...) a lot!
team members may need to learn coping with the
'beginner feeling' and may be hesitant to ask
→ explain in your training sessions also if not asked
to feed the discussion

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Monitoring of linear data collection III








- remarkable findings to discuss and possibly react to
 - ...
 - patterns of phenotypic correlations of linear traits within trait groups:
 - dissimilar across evaluators?
 - very high correlations between distinct aspects, e.g., of trot?
 - unexpected / 'implausible' correlation patterns between distinct aspects, e.g., of jumping?
 - estimation of genetic parameters revealing
 - very low heritabilities?
 - implausibly high heritabilities?
 - implausibly close genetic correlations?
 - lack of experience with linear profiling vs. valuating scoring? 'pedigree-bias'?
 - required harmonization of linear trait definition?

implementing a new system properly is much more than deciding which linear system to use - the 'how' is what matters!
working with more detailed data collection requires more intense exchange and continued work on data quality

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Determinants of the development

- **close collaboration of science and practice**
as key to fast progress and successful implementation
 - smooth transition from R&D to routine
 - transparency and exchange, flexibility of applications
→ acceptance and use
- **early use of linear data**
as important driver of innovation
 - continued engagement for optimization of the whole system (data quality management)
 - high motivation of maximize information output (internal use → publication of consolidated information)

23 Jan 2019 IWSLP, Flyinge, Sweden: Breeding support by genetic linear profiles (STOCK et al.)
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Implications



- invest enough time in information, education and training to meet the high expectations in the information value of linear data
 - in the beginning
 - in parallel to the routine (regularly)
- establish the understanding that transfer to linear description means taking over long-term responsibility for the expected (and needed) improvement of the phenotypic data basis of horse breeding
 - investment in the future, own interest in proper monitoring
- don't blame anyone (too) familiar with traditional valuating scoring, but be proactive and implement education and training routines that consider results of real data analyses
 - start analyzing your linear data early, **exchange on how to improve** (dialogue in the practice and between practice and science)

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Thank you!

Take home messages

- increased importance of high quality phenotypic data implying responsibility
- investment in education, training, data quality
= investment in the future, own interest in proper monitoring
- start analyzing your linear data early, **exchange on how to improve** (dialogue in the practice and between practice and science)