Collaboration of studbooks advancing development of genomic selection for sport horses

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Overview

- Genomic selection – how it works
- Potential of genomic selection in horses
- Requirements of implementation
- Realization
  - Collaboration (science, practice)
  - Financing
- Prospects

29 Aug 2018   EAAP 69th Annual Meeting, Dubrovnik, Croatia: Genomic selection in sport horses (Wobbe et al.)
Principle of genomic selection

- long generation interval in horses
  - genomics supporting selection decisions at younger age
- challenging breeding goal traits in horses
  - low heritability and/or
  - recording with high efforts and/or
  - recording only possible late in life
  - genomics enabling better inclusion in breeding programs
- potential to accelerate and increase the breeding progress
Requirements of implementation

- appropriate target traits
- meaningful reference population
  - large enough (many horses with phenotypes + genotypes)
  - phenotypes of high quality
  - representative (no closely related individuals, ...)

→ possible ways to achieve this:
  a) own solutions (single studbook) → efficiency? strength?
  b) cooperation of studbooks → efficiency! strength!

Realization: Finances

- no (or hardly any) public funding for equine research
- joint studbook initiative: company formation in 2017
  - Verband der Züchter des Oldenburger Pferdes e.V. (OL)
  - Springpferdezuchtverband Oldenburg-International e.V. (OS)
  - Westfälisches Pferdestammbuch e.V. (WESTF)
  - Trakehner Verband e.V. (TRAK)
  - Verband der Züchter des Holsteiner Pferdes e.V. (HOL)

→ International Association of Future Horse Breeding GmbH & Co. KG (IAFH)
Realization: Consortium

- cooperation partners from practice and science
  - Kiel University
  - University of Goettingen
  - Leibniz Institute for Farm Animal Biology, Dummerstorf
  - Werlhof Institute, Hanover
  - IT-Solutions for Animal Production (vit), Verden

- close collaboration among studbooks and of practice and science implying optimum starting point for successful introduction of genomic selection in horse breeding
Data collection

- high quality phenotyping of enough horses
  - joint basis for meaningful reference population

- suitable target traits
  - refined linear profiling
  - same linear scheme across studbooks within IAFH
    - conformation, gaits, jumping, behavior
    - seven-point scale from -3 to +3,
      four-point scale from 0 to +3
    - for special remarks (defect traits)
  - mobile system (tablet PC)

Project activities

- continuous phenotypic data screening
  - quality control
  - within and across studbooks (harmonization)

- DNA sampling and stepwise genotyping
  - favorable course of sample collection (hairs) and DNA extraction
  - already genotyped: 1st and 2nd cohort (approx. N = 1,300 horses)

- preliminary analyses
  - structure of the reference population (pedigree-based, genomic)
  - linking of genotypes and phenotypes (search for associations)
Prospects

- increasing number of studbooks working with linear profiling
  - in Europe and worldwide
  - regular meetings for exchange of experiences, practical training, ...

- similarity / comparability of linear traits as basis of closer collaboration in research and routine

- genomic applications as valuable tool for horse breeding
  - synergies through joint reference population and joint genomic evaluation systems
  - motivation for new approaches of collaboration

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Thank you!

Take home: genomic applications as motivation for new approaches of collaboration

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