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S44 (abstract no. 20707)

66th EAAP Annual Meeting,
31 August - 4 September 2015, Warsaw / Poland

Breeding objectives and practices of sport horse studbooks: results of a worldwide inventory

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Background

- sport horse breeding as worldwide business
  - many breeding organizations / studbooks
  - common breeding goals: focus on competition performance under rider
  - intense exchange of genetic material across countries
- framework of internationalized sport horse breeding
  - lacking transparency of testing procedures, genetic evaluation etc.
  - need of comparable information on selection candidates
- EAAP HC Interstallion working group
  - improvement of correct understanding of available information (overview / description, comparability, recommendations)
  - studbook survey in 2000/2001: population statistics, breeding goals, testing procedures, genetic evaluation systems (Koenen 2002, Koenen et al. 2004)

Study motivation & approach

- update overview
  - changed situation of studbooks:
    economic development, structural changes → pressure ↑
  - (possibly) changed strategies and practices of studbooks
    to ensure long-term competitiveness
- new challenges requiring positioning of studbooks
- Interstallion studbook survey 2015
  - N=22 questions on key determinants of breeding programs
  - distribution by e-mail in June 2015 (ca. 70 breeding organizations), personal contacts, inquiries, reminders in July / August 2015

Survey responses

- overall response rate of 26% (N=19 breeding organizations)*
  - only comments or promised answers from N=6 studbooks
  - N=13 studbooks with completed surveys (N=14)
- country distribution
  - mostly European studbooks (Belgium, Bulgaria, Denmark, Finland, Germany, Norway, Slovenia, Spain, Sweden)
  - N=2 answers from overseas (Australia, Mexico)
- almost all studbooks responsible for only a single sport horse breed (N=1 studbook with two breeds)
- specialization on one of the two major disciplines (dressage, jumping) in 50% of the studbooks
  – range from distinct breeding programs to adjusted testing protocols

* until 26 August 2015 (later responses: N=1 update, N=2 more completed surveys)

Basic figures: breeding populations (I)

- breeding populations 2014

Population parameter	N	Mean	Range	Sum
N active stallions	13	113.6	(7 - 377)	1,477
% foreign stallions	10	59.3	(20 - 90)	
N broodmares *	10	2,220.6	(80 - 6,674)	22,206
N covered mares	12	1,178.0	(29 - 3,601)	14,136
N foals	13	1,057.2	(20 - 3,507)	13,743
N newly registered mares	10	347.6	(18 - 1,516)	3,476

* different documentation systems in the studbooks (figures not directly comparable)

➢ **heterogeneity of sport horse studbooks with regard to size and use of stallions from other studbooks**

Basic figures: breeding populations (II)

- breeding populations 2014

Population parameter	N	Mean
N active stallions	13	113.6
% foreign stallions	10	59.3
N broodmares *	10	2,220.6
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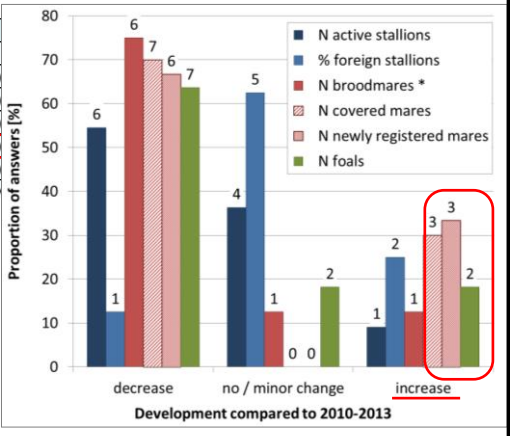


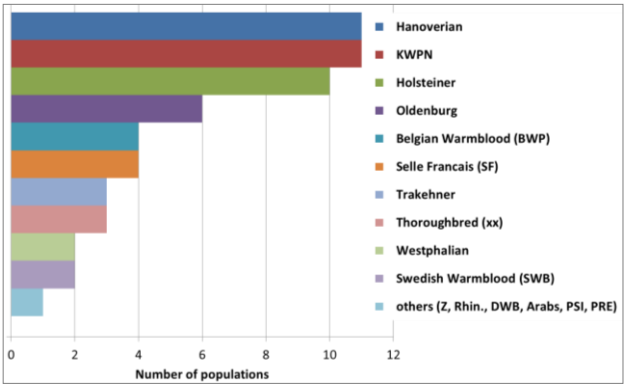
- recent development

➢ **indications of stabilization ?**

➢ **role of foreign studbooks ↑↓**

Basic figures: role of other populations

- origin of imported genetics (studbooks)



➢ **strong influence of German and Dutch genetics**

Koenen et al. 2004, Thoren Hellsten et al. 2008, Ruhlmann et al. 2009

Breeding goal & program: status (I)

- importance of traits / trait groups

Trait	N	Mean score (scale 0-3)	Score counts	
			irrelevant (0)	highly important (3)
Conformation	14	2.286	0	5
Gaits	14	2.286	1	8
Jumping ability	14	2.571	1	11
Dressage	14	2.214	1	8
Show-jumping	14	2.571	1	11
Eventing	13	1.154	4	3
Driving	13	0	13	0
Allrounder qualities	12	1.417	2	1
Behavior and temperament	13	2.615	0	8
Health / soundness and durability	13	2.385	0	7
Fertility / reproductive performance	13	1.769	2	4

➢ **relevance of conformation, strength of health and behavior aspects**

Breeding goal & program: status (II)

- importance of traits / trait groups

Table 3
Traits included in the individual verbal breeding objective definitions presented by 19 breeding organisations in Europe

	Conformation ($n=17$)	Show jumping ($n=16$)	Dressage ($n=14$)	Gaits ($n=14$)	Behaviour ($n=11$)	Eventing ($n=11$)	Health[a] ($n=9$)	Driving ($n=4$)	Fertility ($n=3$)
BAD[b]	X	X	X						
BAVAR	X	X	X						
BWP	X								
DWB	X	X	X						
FWB	X	X	X						
HAN	X	X	X						
HOLST	X	X							
HUN	X	X	X						
ISH	X	X	X						
KWPN	X	X	X						
NRPS	Unspecific								
NWB	X	X	X						
OLD	X	X	X						
SF	X	X	X						
SHBGB	X	X	X						
SI		X							
SWB	X	X	X						
TRAK	X								
WEST	X	X	X						

[a] Including durability and soundness.

Source: Koenen et al. 2004

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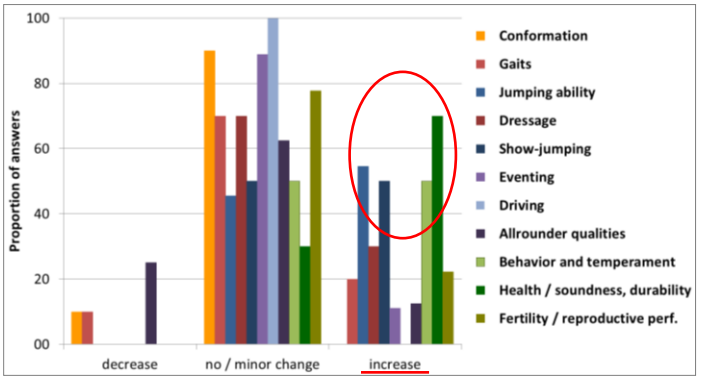
➢ **relevance of conformation, strength of health and behavior aspects**

Breeding goal & program: development

- importance of traits / trait groups
- development of focuses in breeding

➢ **highest expectations with regard to relevance: health**



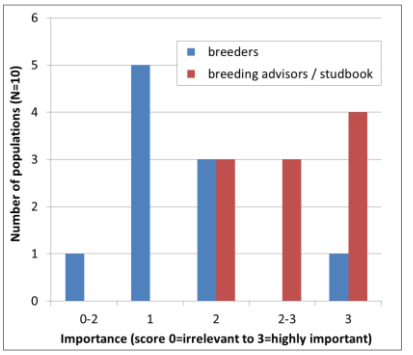
Routine data recording & use

- change of recording systems: gain of importance of linear profiling
  - about 50% in foals, 60-70% in adults (mares, stallions, young horses)
  - mostly in combination with valuating scoring
- variability of health data recording and use
  - often only in stallions (clinical, radiological; 12 of 14 populations)
  - scoring systems, categorization (passed Y/N), descriptive reports, ...
- regulation of health disorders
  - 66% exceptional acceptance of stallions with certain disorders (extraordinary performance and/or pedigree)
  - clinical: roaring (N=11) > over-/underbite (N=10) > eye diseases (N=8) > umbilical hernia (N=4) > others (N=3)
  - radiological: osteochondrosis (OC/OCD; N=11) > navicular bone alterations (N=8) > others (N=5)

Genetic evaluation

- routine genetic evaluation in 8 of 14 populations
  - N=4 conformation + performance
  - N=4 performance
- acceptance and use of breeding values

➢ **'homework' to do for the studbooks!**



Performance information

- performance tests
  - large variability (tested horses, duration, traits, ...)
  - some testing system in 12 of 14 populations
- sport data
  - high and further increasing importance (86%)
  - relevant consideration of external sport information (score ≥ 2):
    60 % national records, 90% international records;
    70% expected increase of future use and importance
  - information exchange across studbooks mostly limited (60%)
    → desired increase / improvement (80%)

Studbook strategies for the future (I)

- expectations regarding strategies for future development
  - N=0 no (major) change in relations between studbooks
  - N=0 increased differentiation
  - N=13 increased collaboration

➢ **time of reconsidering, possible adjustments, changes!**

Studbook strategies for the future (II)

- expectations regarding strategies for future development
- position concerning future use of genomic selection
  - N=1 no opinion / N=5 interest, but no activities yet
  - N=8 ongoing R&D (including N=2 advanced R&D)
- interest in using new breeding methodology as driver of collaboration?
  - N=1 No (within-studbook activities only)
  - N=6 Possibly (some collaboration and/or in the longer term)
  - N=5 Yes (convincing benefits of R&D collaboration)
- collaboration options in genomic R&D
  - N=0 none; N=1 exchange/sharing of genotypes only
  - N=11 exchange/sharing of genotypes and phenotypes

➢ **good prospects for the future (reason for optimism)!**

Summary & conclusions

- relatively low response rate
  ↔ technical issues, time constraints, language, political reasons, ...
- considerable heterogeneity of sport horse studbooks, but
  - common goals and challenges,
  - similar approaches for consolidation and/or improvement,
  - agreement with regard to weak points and options for efficiency increase of sport horse breeding
- openness towards more across-studbook activities
  - clear positioning of studbooks: benefit of strong alliances
  - R&D collaboration on new breeding methods (genomic selection) as major perspective of future sport horse breeding

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Thank you!

Acknowledgement

The Interstallion working group thanks all breeding organizations and country representatives for their collaboration, their great efforts and support which enabled this work!

http://www.interstallion.org

Equine Phenotypes

http://www.equinephenotypes.org

EAAP Interstallion Survey 2015
on the status and development of sport horse breeding

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