



IT-Solutions for
Animal Production



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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)

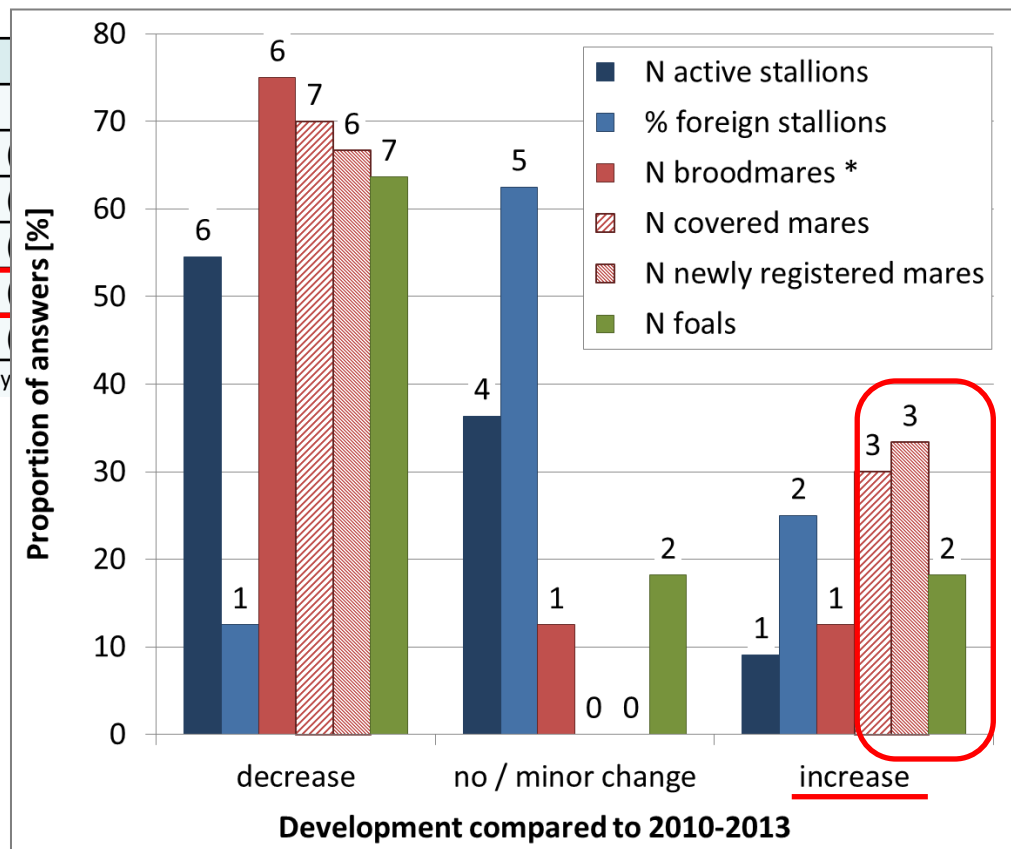
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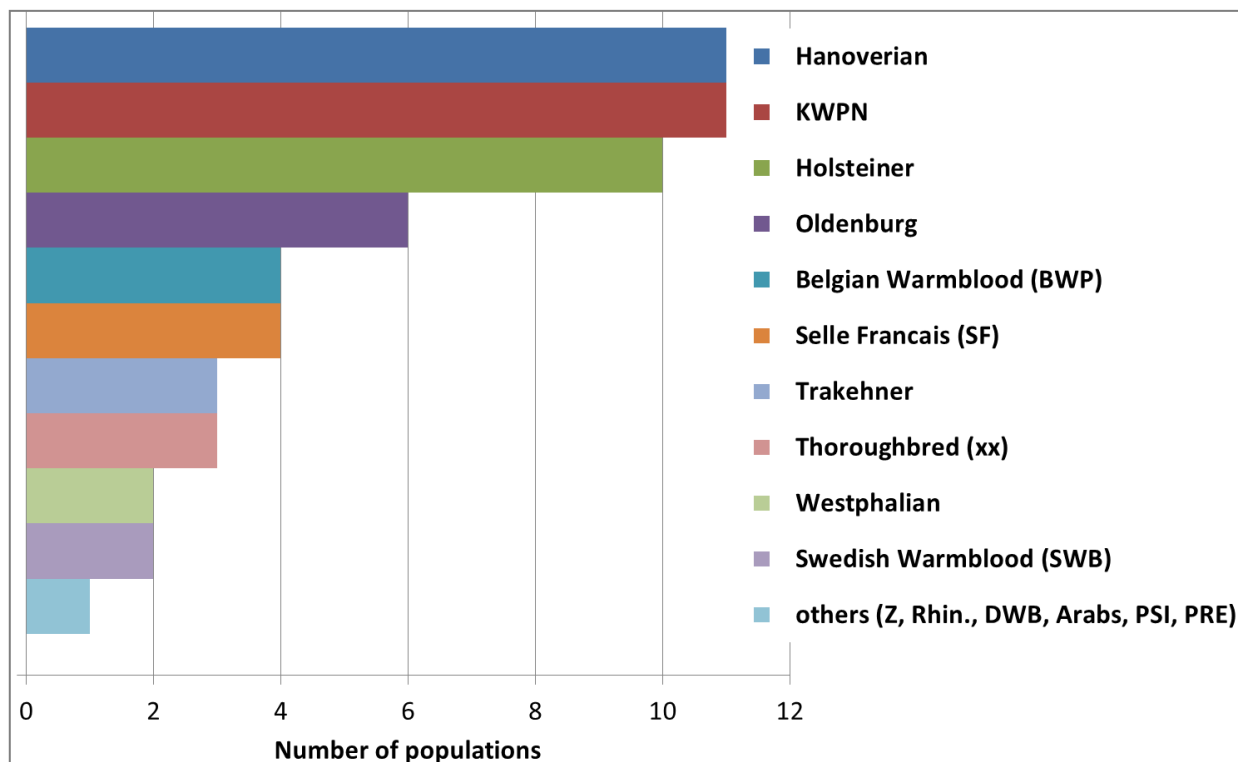
■ recent development

- 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						
				Trait	N	Mean score (scale 0-3)	Score counts		
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^a Including durability and soundness.

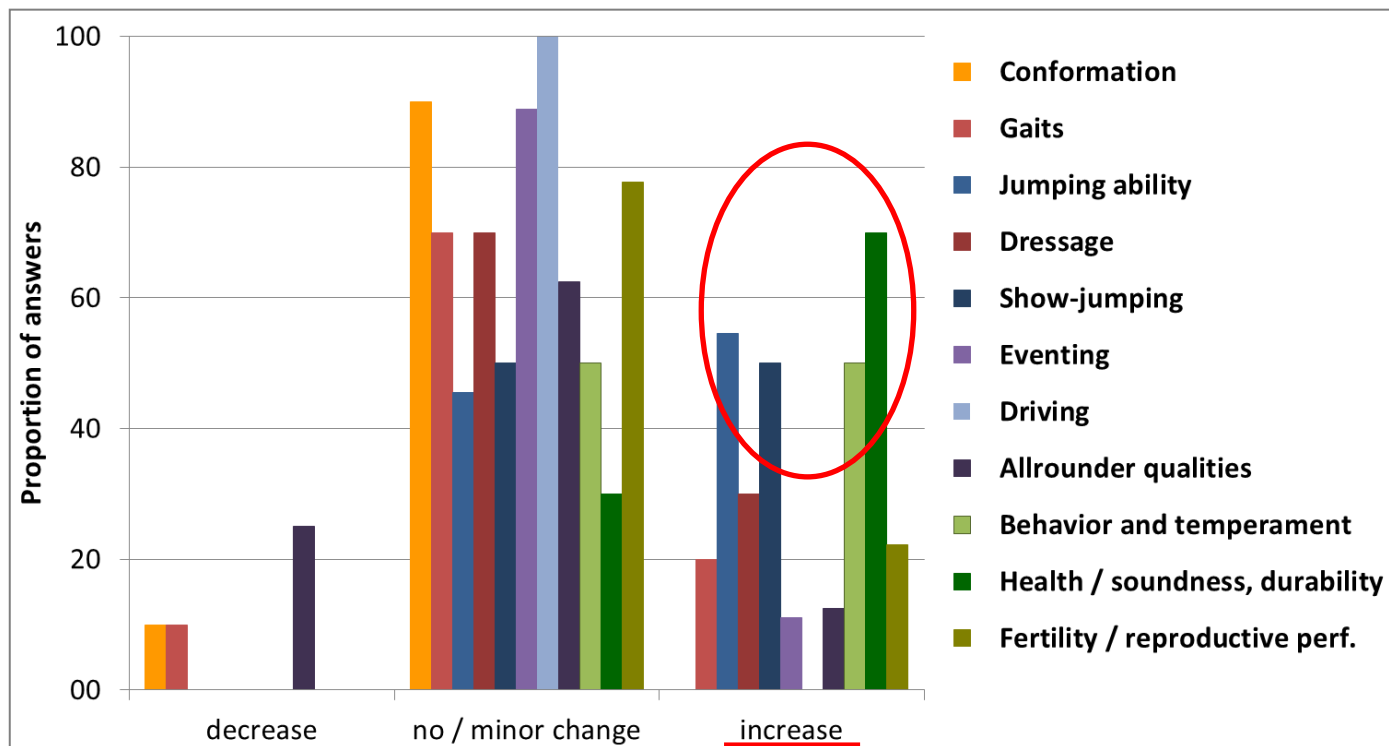
Source: Koenen et al. 2004

➤ 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**



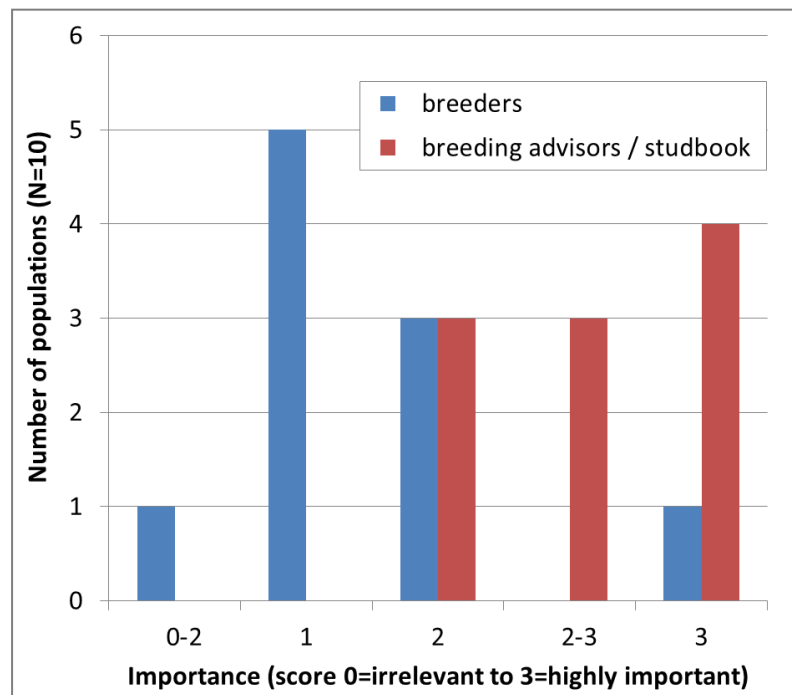
Routine data recording & use

- 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

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<http://www.interstallion.org>



<http://www.equinephenotypes.org>

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

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Basic figures: reproduction

- mostly minor and further decreasing role of natural matings
 - N=9 (70%) <10% natural matings, N=3 >50% (max. 80%)
 - only N=1 increasing importance (N=7 decreasing, N=3 no / minor change)
- mostly low, but increasing proportion of AI with frozen semen
 - N=7 (64%) \leq 10% AI-F, N=4 16-50%
 - importance largely unchanged in N=4, increasing in N=5 populations
- mostly low, but increasing proportion of embryo transfer (ET)
 - N=9 (69%) with 0-22 ET, N=4 with 58-407 ET
(N=3 populations with 18-49% of coverings)
 - importance largely unchanged in N=4, increasing in N=5 populations
- differentiated use of very young and old (proven) stallions
 - max. 40% of matings with just-approved 3-year-olds
 - up to 90% of matings with sport-proven stallions

