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Systematization of recording and use of equine health data and its potential for horse breeding

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Background: demands

- increased demands of sustainable and balanced breeding programs
  - performance
  - health, welfare and longevity
- new traits as factors of competitiveness among studbooks
  → relevance of **health** as breeding goal ↑

Background: demands & status quo

- increased demands of sustainable and balanced breeding programs
  - performance
  - health, welfare and longevity
- new traits as factors of competitiveness among studbooks
  → relevance of **health** as breeding goal ↑
- **breeding measures to improve health** in German riding horses
  - mainly indirect selection (indicator traits: conformation, performance)
  - some direct selection (extreme phenotypes / stallions)
- legal framework
  - animal breeding act (national)
  - breeding organization directive of the German FN (national)
  - regulations of the breeding societies (N=16 for riding horses)

Interdisciplinary national initiative

- aim: improved information basis on equine health
  - epidemiological figures
  - genetic parameters, breeding strategies

  → comprehensive approach to improving the health of horses
- research consortium
  - veterinarians
  - German studbooks, German FN
  - universities, IT service providers

Recent developments towards improved consideration of health in horse breeding in Germany:

since 2011	inclusion of defects traits and indications of disease in linear profiling protocols (Oldenburg, Holstein)
2012-2013	harmonization initiative of studbooks and veterinarians: health requirements for stallions (riding horses)
2013 / 2014	**'equine health project'** as national initiative: joint efforts, shared costs and support by private research foundation (all studbooks)
2014	adjustment of regulations of studbooks: role of health in horse breeding; **'central equine health data base'**

Sources of information

- options for health data collection
  - owners and breeders (✓) difficult!
  - veterinary practitioners ✓ **first choice (quality, quantity)**
  - non-veterinary professionals (✓) possible?!

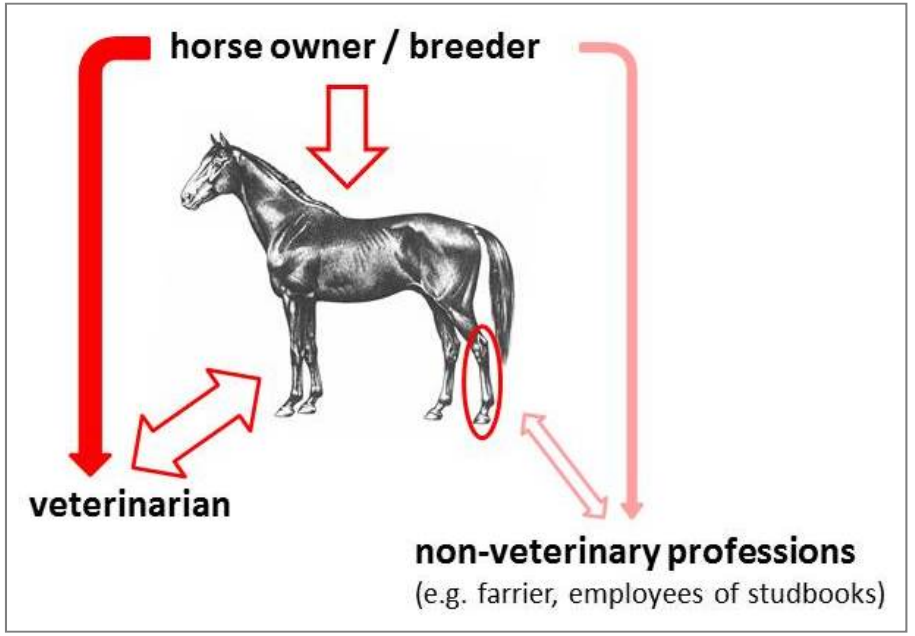


Fig.: Schematic of information flow on some health condition of a horse.

Sources of information

- options for health data collection
  - owners and breeders (✓) difficult!
  - veterinary practitioners ✓ **first choice (quality, quantity)**
  - non-veterinary professionals (✓) possible?!
- requirements for using veterinary health data *
  - agreement with special needs of the veterinary profession
    legally: highly restrictive regarding data usage (conscious agreement of owners),
    practically: user-friendly implementation compatible with daily routines
  - highest standards regarding
    data security, data privacy, data protection
    highly restrictive regulations regarding data access
  - intense involvement of veterinary experts in R&D
    appropriate handling / processing of the data,
    interpretation and use of the results of health data analyses

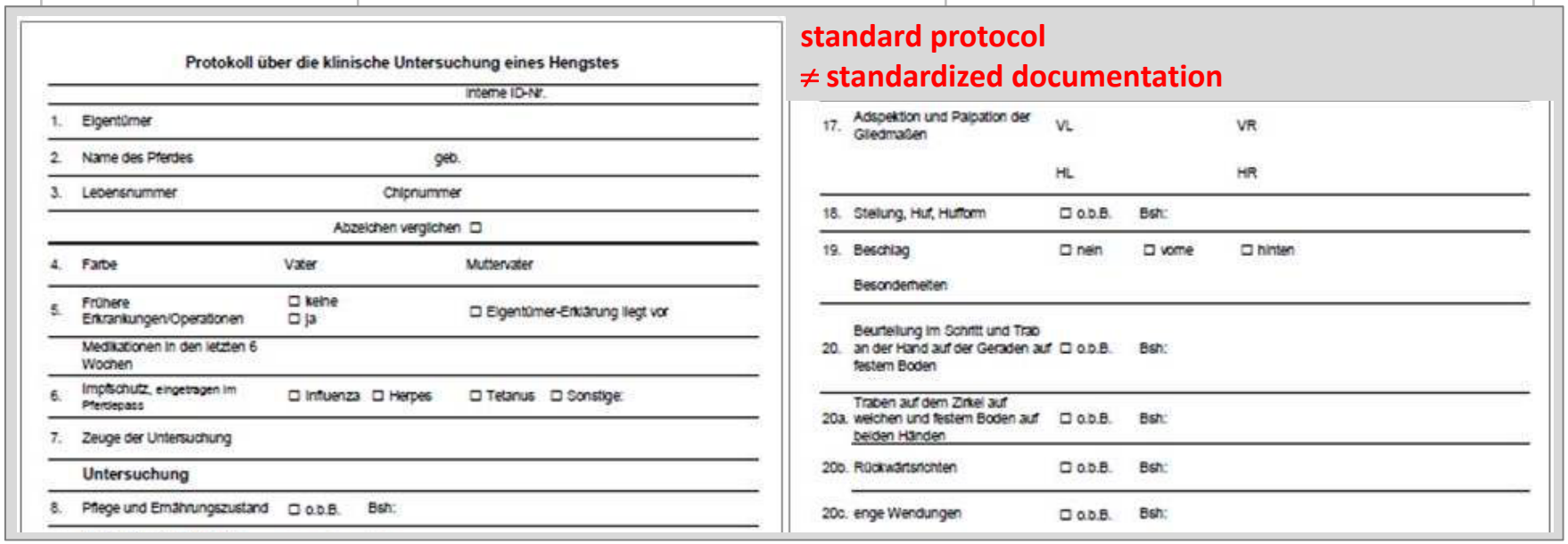
* for general overview (stakeholders in the equine sectors), see Hartig et al. 2013a,b

Veterinary health data

- need for systematization and harmonization of recording

Tab.: Overview of current and prospective role of equine health data from veterinary sources.

Data characteristics	AT PRESENT	SUPPOSED TO BE
general content	routine documentation of work in daily practice (screening, prophylaxis, therapy)	
specific content	heterogeneous in form (mostly free text) and detailedness (context-dependent)	standardized (uniform nomenclature, unambiguous code, clear hierarchy)



Protokoll über die klinische Untersuchung eines Hengstes

interne ID-Nr.

1. Eigentümer
2. Name des Pferdes — geb.
3. Lebensnummer — Chipnummer

Abzeichen verglichen ☐

4. Farbe — Vater — Mutervater
5. Frühere Erkrankungen/Operationen — ☐ keine ☐ ja — ☐ Eigentümer-Erklärung liegt vor
   Medikationen in den letzten 6 Wochen
6. Impfschutz, eingetragen im Pferdepass — ☐ Influenza ☐ Herpes ☐ Tetanus ☐ Sonstige:
7. Zeuge der Untersuchung

Untersuchung

8. Pflege und Ernährungszustand — ☐ o.b.B. Bsh:

standard protocol
≠ standardized documentation

17. Adspektion und Palpation der Gliedmaßen — VL VR HL HR
18. Stellung, Huf, Hufform — ☐ o.b.B. Bsh:
19. Beschlag — ☐ nein ☐ vorne ☐ hinten
    Besonderheiten
20. Beurteilung im Schritt und Trab an der Hand auf der Geraden auf festem Boden — ☐ o.b.B. Bsh:
20a. Traben auf dem Zirkel auf weichen und festem Boden auf beiden Händen — ☐ o.b.B. Bsh:
20b. Rückwärtsrichten — ☐ o.b.B. Bsh:
20c. enge Wendungen — ☐ o.b.B. Bsh:

Veterinary health data

- need for systematization and harmonization of recording

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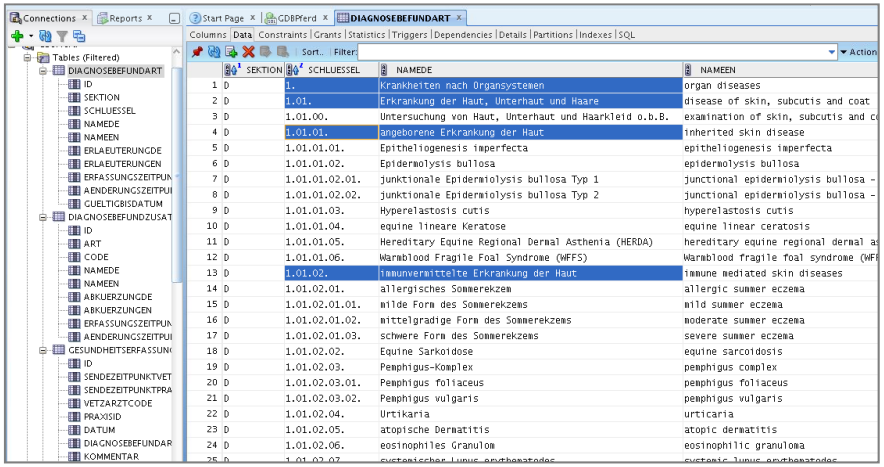
specific content	heterogeneous in form (mostly free text) and detailedness (context-dependent)	standardized (uniform nomenclature, unambiguous code, clear hierarchy)
storage	decentral and heterogeneous (paper forms; practice software)	central and uniform (equine health data base)
use	at most within-practice statistics (vertical), on-request possible support of veterinary research	population-wide statistics (vertical, horizontal), optimum support of research and routines

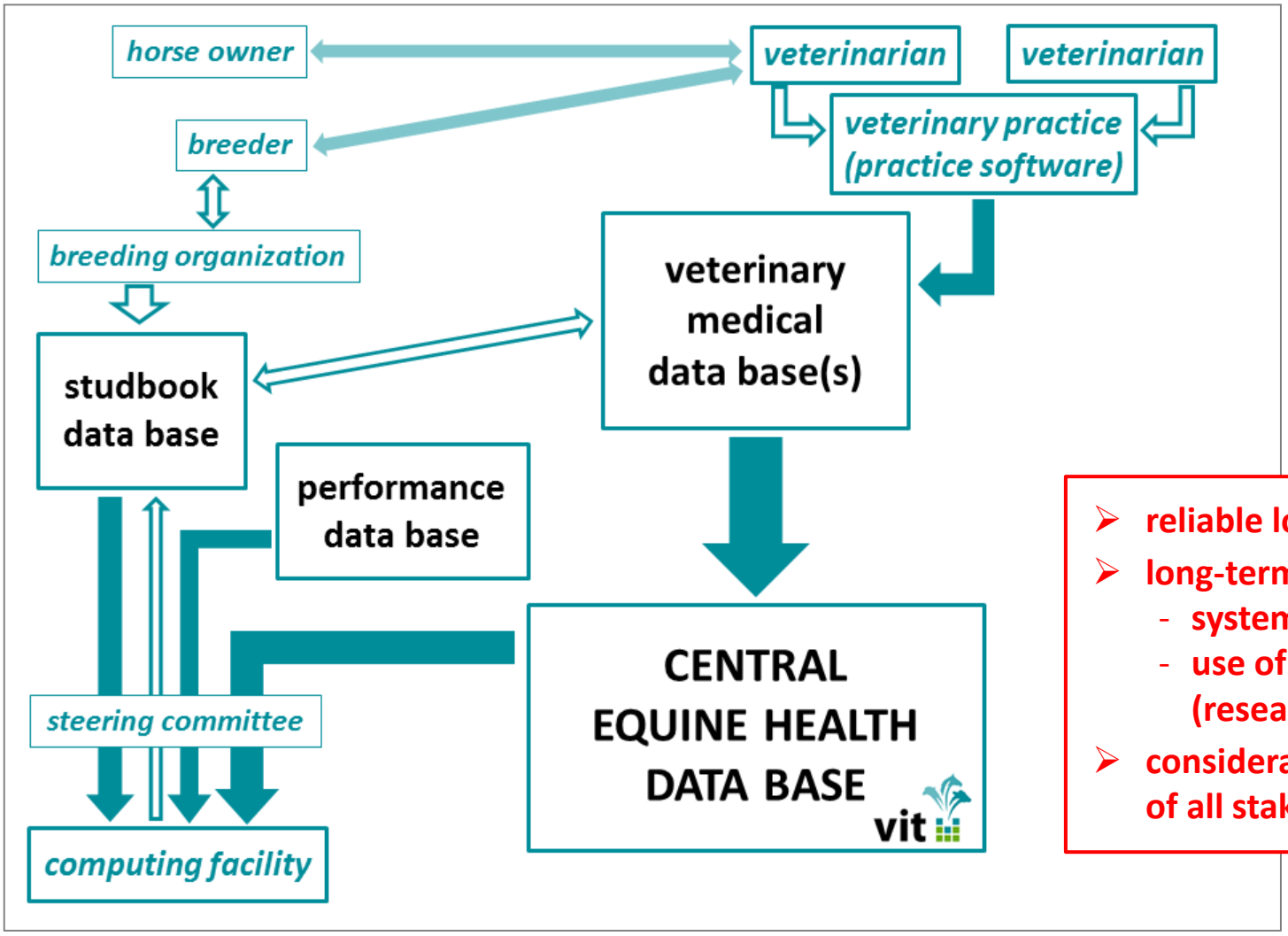
- comprehensive **recording standard** for equine health data
  - tool for standardized and simplified (!) recording
  - uniform coding as base requirement for data centralization

Recording standard

- requirements
  - clear distinction between diseases (diagnoses) and findings of disease = direct outcome of examinations
  - unambiguous definitions of all health items to be recorded
  - unambiguous coding
  - praxis-oriented spectrum of recording options
- realization
  - distinct sections for diagnoses, radiographic and clinical findings
  - hierarchical structure
  - comprehensive reference
    - all organ systems
    - inherited and acquired conditions
    - descriptive and etiological aspects



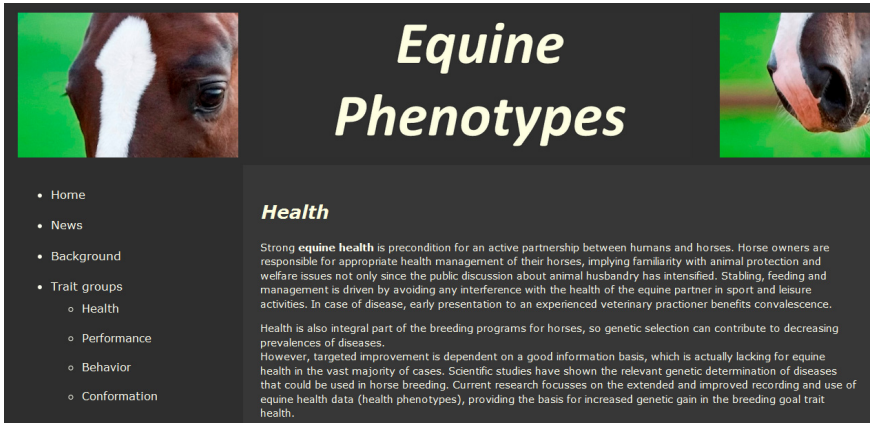
Central equine health data base



- reliable logistics
- long-term perspective
  - system extension
  - use of health data (research, routines)
- consideration of needs of all stakeholders

Key factors of success: data flow

- veterinarians
  - general acceptance of the recording standard
    science-driven development with consultation of experts
    (spectrum of diagnoses and findings, terminology)
  - compliance to the standardized recording
    smart applications in veterinary practice software ensuring
    - ease of documentation (time, clearness),
    - flexibility (extent / detailedness of documentation),
    - coverage (appropriate documentation options, minimum of free text),
    - compatibility with documentation routines in the veterinary practice
- horse owners and breeders
  - understanding of aims and scope
  - trust in the whole system



Key factors of success: data usage

- breeding organizations
  - acceptance of necessary restrictions of data access (phenotypes)
  - support of measures to improve data quality
    accessibility of selected studbook data for participating veterinarians
    (base data to facilitate correct identification of horses)
- steering committee of the interdisciplinary research consortium
  - information policy
  - possible system extensions
    stronger / more direct involvement of 'the practice' (breeders, owners),
    information on potential influences of the individual health status of horses
  - strategic planning (R&D, routine applications)

Conclusions & prospects

- trustful and constructive collaboration of project partners
  - veterinarians of breeding societies as important drivers
  - strong support from the whole German horse breeding sector
    → installation of the central equine health data base
  - mediators between veterinary practitioners, science and breeding
- base work for future health data collection and analyses
  - regulation of conditions of routine use of equine health data
    (data security issues, regulations of breeding societies)
  - generation of mutual benefits of standardized health data recording
    veterinary practice, studbooks and their clients; test phase with pilot veterinary practices

systematization of recording and use of equine health data as first step towards sustainable and targeted health improvement via inclusion of direct health traits in future breeding programs of horses

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Thank you!

H.WILHELM SCHAUMANN STIFTUNG

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Linear schemes

Defect traits & indications of disease

- Oldenburg (OL, OS)
  - umbilical hernia
  - clinical limb status (joint swelling, swelling of tendon sheats, epiphysitis), lameness
  - indications of imbalance (incoordination, tail tone, tail posture)
  - breathing sounds
- Holstein
  - umbilical hernia, scrotal hernia
  - overbite, underbite
  - lameness
  - indications of imbalance (incoordination, tail tone, tail posture)
  - breathing sounds

Recording standards (CATTLE)

- national
  - since June 2008: "Zentraler Diagnoseschlüssel Rind"

    Appendix 1 of the recommendation 3.1.1 of the German Cattle Breeders' Federation (ADR) for recording and use of health data in cattle;
    expert elaboration: Staufenbiel (FU Berlin) & coworkers;
    use as recording standard in herd management software
  - since 2012: "Zentraler Tiergesundheitsschlüssel Rind"

    Working group for health data of the umbrella organization of German milk recording agencies (DLQ); support / updates: Staufenbiel (FU Berlin), Stock (vit)
- international
  - since 2012: "Central Key for Health Data Recording"

    Appendix of the Guidelines for recording, evaluation and genetic improvement of health traits, compiled by the Functional Traits Working Group of the International Committee for Animal Recording (ICAR);
    english version of the German standard (Zentralen Tiergesundheitsschlüssels) as reference;
    support / updates: Stock (vit)

Key of diagnoses (EQUINE)

Diagnosis code	Diagnosis
1.	**Organ diseases**
1.01.	Diseases of skin, subcutis and coat
1.02.	Diseases of trunk and visceral cavities
1.03.	Cardio-vascular diseases
1.04.	Diseases of blood and blood forming organs
1.05.	Respiratory diseases
1.06.	Diseases of head
1.07.	Diseases of oral cavity, tongue, hyoid bone and teeth
1.08.	Gastrointestinal diseases
1.09.	Diseases of liver
1.10.	Metabolic diseases and tumorous disorders of hormone forming organs
1.11.	Diseases of the urinary tract
1.12.	Reproductive disorders
1.13.	Disease of nervous system and eyes
1.14.	Musculosketetal diseases
2.	**Infectious diseases**
3.	**Parasitoses**
4.	**Behavioral disorders**

Structure:

- 4 disease groups
- levels of increasing detailedness (max. 7)
- in total > 2000 recording options

Key of findings (EQUINE)

- distinct sections for
  - radiographic findings
  - clinical findings incl. outcomes of specific examinations (ophthalmological, cardiological, ...)
- general outline
  - clear base structure relating to examination conditions
  - unambiguous, purely descriptive, common terminology

<u>Radiographic findings section</u>

- *documentation by projection*
- *categories of findings independent of projection and location:*
  - *structure changes (radiolucency, increased radiodensity),*
  - *contour changes (exostoses, indentions),*
  - *further changes (specific findings like canales sesamoidales, osseous fragments, ...)*

Key of radiographic findings (EXAMPLE)

Rad. examination of the front limbs

☑ vorne links ☐ vorne rechts ☐ hinten links ☐ hinten rechts

☑ **RöUS Zehe distal** (☑ Oxspring ☐ 90°) ☐ **Zusatzaufnahmen Zehe distal** (☐ Skyline ☐ 0° ☐ 45° / ☐ 315°)

Befundschlüssel (Code) - R1	**Befund**	**Zusatzinformation (Details)**
1.00.	☑ Strahlbein röntgenologisch o.b.B.	
2.00.	☑ Hufbein und angrenzende Strukturen röntgenologisch o.b.B.	
3.00.	☐ Kronbein röntgenologisch o.b.B.	
3.01.	☑ Strukturveränderung des Kronbeins	
3.01.01.	☐ extraartikuläre Aufhellung des Kronbeins	
3.01.02.	☐ Aufhellung im distalen Kronbein	
3.01.03.	☑ Aufhellung im proximalen Kronbein	☐ diffus ☑ umschrieben ☐ lateral ☐ axial ☑ medial ☐ ggr. ☐ mgr. ☑ hgr.
	Krongelenk	

Standardized documentation with 3-6 clicks:

Left front limb (Oxspring)

radiolucency in the proximal short pastern bone,
further characterized as
circumscribed, medially located, severe/marked

circumscribed radiolucency in front left front limb
visible on upright-pedal-view (Oxspring projection)
→ diagnosis: ***cyst-like lesion***