

Animal hospital data for studies of osteochondrosis and osseus fragments of Swedish Warmblood horses



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Growth of bone tissue



Normal vs. abnormal growth

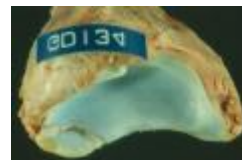


Foto: Göran Dalin

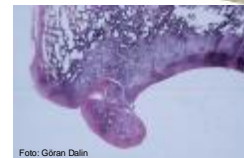


Foto: Göran Dalin



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Why conduct study?

- 60-70 % of culled riding horses have locomotion disturbance, e.g. osteochondrosis (OC)
- OC can result in lameness and/or loss in value of the horse
- Animal hospital data is the only source of information, except for specific scientific studies
- The heritability of OC in the Swedish Warmblood has not yet been studied



Foto: Göran Dalin



Foto: Göran Dalin

Horses included in the study

- Radiographic limb examination at an animal hospital in Sweden, in years 1992-1998, age 0.5 – 22 years

1) Horses with clinical signs e.g. lameness
n = 3639 (2651 with pedigree)

2) Normal horses examined:

- break-in
- prior to sale
- export
- breeding evaluation

n = 879 (724 with pedigree)



Documented data at Helsingborg Animal hospital

Screened horses (Sales horses/breeding evaluation)

Examination date
Horse-unique examination number
Name
Year of birth
Radiographic results
Father
Maternal grandfather



Foto: Göran Dalin

Clinically affected horses

Examination date
Horse-unique examination number
Name
Year of birth
Radiographic results
Father
Maternal grandfather
Gender

Identification number

- Less errors
- Easier to use in large datasets
- UELN - world unique



Photo: Flyinge

Studied sites

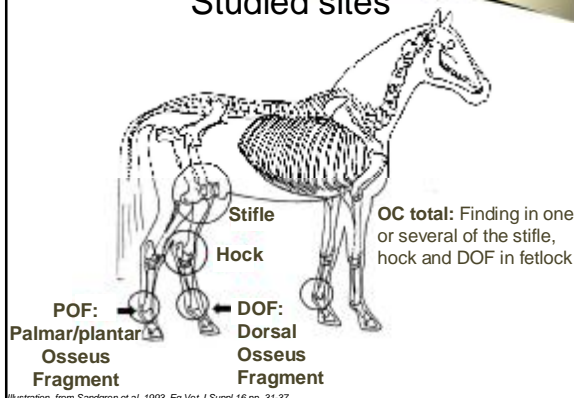


Illustration from Sandgren et al. 1993, Eq Vet J Suppl 16 pp. 31-37

Prevalence



Foto: Göran Dalin

| | Clinical horses | | Screened horses | | Pooled data | |
|------------------------|-----------------|------|-----------------|------|-------------|------|
| | n | % | n | % | n | % |
| OC, total ^a | 2651 | 10.9 | 724 | 18.9 | 3199 | 12.5 |
| OC, stifle | 1106 | 11.9 | 709 | 3.4 | 1734 | 8.5 |
| OC, hock | 1146 | 6.6 | 714 | 6.7 | 1785 | 6.2 |
| DOF, fetlock | 1347 | 7.0 | 686 | 11.4 | 1932 | 8.5 |
| POF, fetlock | 1347 | 10.7 | 686 | 13.7 | 1932 | 11.2 |

^a Finding in one or several of the stifle, hock and DOF in fetlock

Genetic analysis

Analysis 1:

- Stifle
- Hock
- DOF fetlock
- POF fetlock

Factor in model:
year of examination

Analysis 2:

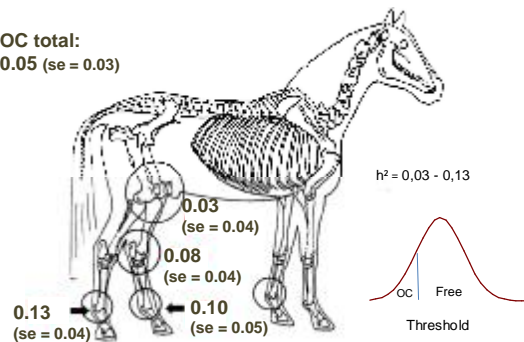
- OC total

Factor in model:
year of examination



Heritability, observed scale

OC total:
0.05 (se = 0.03)



$h^2 = 0.03 - 0.13$

Illustration from Sandgren et al. 1993, Eq Vet J Suppl 16 pp. 31-37

Heritability, underlying quantitative scale

OC total:
0.13 (se = 0.07)

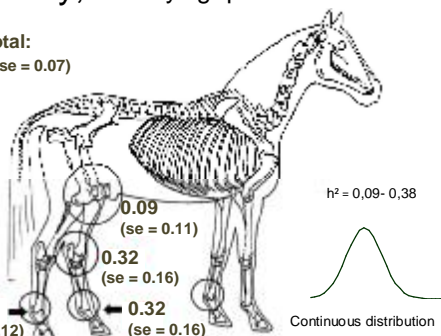


Illustration from Sandgren et al. 1993, Eq Vet J Suppl 16 pp. 31-37

Relationship between findings in different locations

| | OC, stifle | OC, hock | DOF, fetlock | POF, fetlock |
|--------------|------------|----------------------|-----------------------|-----------------------|
| OC, stifle | 0.05 | 0.31 ^{0.55} | 0.92 ^{0.59} | 0.30 ^{0.47} |
| OC, hock | 0.05 | 0.05 | -0.07 ^{0.35} | -0.26 ^{0.29} |
| DOF, fetlock | 0.06 | 0.02 | -0.04 | 0.33 ^{0.28} |
| POF, fetlock | 0.01 | 0.05 | -0.04 | 0.33 ^{0.28} |

— Genetic correlations above diagonal
— Phenotypic correlations below diagonal

Use of animal hospital data

- Selected animals?
- Recording & documentation of diagnoses
 - Document results of each examined joint
 - Specify
 - degree/character of lesion
 - position within joint and in which limb
 - possible history of lameness and cause of radiologic examination
- Identification of horses linked to diagnosis
 - Identification number checked and documented
- Ideally:
 - central documentation
 - standardised classification of severity
 - standardised radiographic projections



Conclusions

- Animal hospital data can be used for genetic studies of OC and POF.
- There is a significant genetic variation of OC and POF, predominantly for lesions in the hock and fetlock.
- Recommended to consider all OC lesions (all joints) in breeding programs; positive correlations present, in particular between DOF & stifle OC.
- POF should preferably be selected against due to highest prevalence and heritability and the decrease in value of an affected horse. Although, it does not necessarily cause lameness.



Questions?

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OC hock 0.270.08 793
OC hock 0.290.14 325 Standardbred, 18-24 months STM (Schougaard et al., 1990)
OC stifle 0.060.06 2407 Germ. Rid. Horses, 3-8 years LSM (von Winter et al., 1996)
OC stifle 0.580.15 144 Germ. Rid. Horses, 6-24 months LSM, DL (von Wilms et al., 1999)
OC hock 0.600.19 401 ATM
OC stifle 0.090.24 360 ATM
OC distal 0.600.21 3725 LAM, DL
fetlock?
OC hock 0.300.04 3748 Hanoverian Warmblood, all ages LAM, DL (Stoek and Distl, 2006a)
OC distal 0.170.03 5702 LAM, DL
OC fetlock 0.320.19 152 German Warmblood, 0-21 mo LAM, DL (Waller et al., 2008)
OC distal 0.160.12 167 LAM, DL
OC distal 0.350.19 828 German Warmblood, 0-21 mo LAM, DL (Waller et al., 2008)
OC distal 0.000.00 LAM, DL
OC distal 0.360.11 811 LAM, DL
OC OC distal 0.100.08 811 LAM, DL
    
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