

Estimation of growth rates in Warmblood foals and the incidence of osteochondrosis

Ingrid Vervuert¹, Angela Borchers¹, Maike Granel¹, Sarah Winkelsett¹, Ludwig Christmann², Ottmar Distl³, Erich Bruns⁴, Bodo Hertsch⁵ and Manfred Coenen¹

Institute of Animal Nutrition¹, Department of Animal Breeding and Genetics³, University of Veterinary Medicine Hannover Foundation, Hannover, Hanoverian Breeders Association, Verden², Department of Animal Breeding and Genetics, Göttingen⁴ and Clinic for Horses, FU Berlin⁵, Germany

Introduction

Rapid growth in foals is associated with a higher risk of osteochondrotic lesions. To date, there is only limited new information about the optimal growth rate in Warmblood foals. Available data usually encompass only a small number of foals and may not reflect growth rates under normal conditions and the occurrence of osteochondrotic lesions. The presented study was performed to obtain information on growth rates and the incidence of osteochondrotic lesions in Hanoverian Warmblood foals under typical field conditions. This investigation was part of a larger project in which feeding, housing, and genetics were evaluated with special reference to the development of osteochondrosis in foals.

Material and methods

629 Hanoverian Warmblood foals born between December 26, 2000 and July 01, 2001 (308 males, 321 females) from 83 farms in Germany were included in this study. Over a period of six months foals were weighed monthly on a portable electronic scale. The withers height was measured at the highest point of the withers using a standard measuring stick. Furthermore feeding practice and the level of nutrient intake (DE, DCP, major minerals and trace elements) of the mares and the foals were evaluated during this observation period. Information on osteochondrosis (OC) was obtained between the fifth and tenth month after birth using x-ray (fetlock joints, hocks, and stifles). The effects of sex, birth month, and growth rates on the incidence of OC were tested by analysis of variance. All results are presented as means \pm SD.

Results

Radiographic diagnosis showed 226 foals with signs of osteochondrotic lesions (Krekeler 2003). In 107 foals osteochondrotic lesions were exclusively diagnosed in the fetlock joints, 59 foals revealed osteochondrotic lesions exclusively in the hocks, 28 foals had osteochondrotic lesions exclusively in the stifles, and 32 foals exhibited osteochondrotic changes in varying joints. Fillies revealed a higher inci-

dence of OC in the fetlock joints, whereas colts had a higher manifestation of OC in the hocks.

Mean birth weights of the foals were 57.3 ± 8.1 kg (N = 166). The patterns of growth rate are shown in Table 1 and Figure 1. A proper model to describe body weight development (0 - 250 day of life) seemed to be the Boltzmann function with the following equation: $y = A2 + (A1 - A2) / (1 + \exp((x - x0)/dx))$, where y = bodyweight [kg], x = age [days], $A1 = -280.8$, $A2 = 348.5$, $x0 = 19.44$, and $dx = 116.2$.

Table 1 Body weight [kg] in the warmblood foals.

| age [d] | body weight [kg] | | | | | |
|-----------|------------------|----|-----|------------------|----|-----|
| | OC neg. | | | OC pos. | | |
| | mean | SD | N | mean | SD | N |
| 0 - 30 | 81 ^A | 17 | 302 | 84 ^A | 15 | 165 |
| 31 - 60 | 120 ^B | 19 | 361 | 122 ^B | 18 | 195 |
| 61 - 90 | 155 ^C | 20 | 376 | 155 ^C | 21 | 203 |
| 91 - 120 | 187 ^D | 22 | 370 | 186 ^D | 23 | 209 |
| 121 - 150 | 216 ^E | 23 | 353 | 214 ^E | 26 | 209 |
| 151 - 180 | 242 ^F | 26 | 296 | 236 ^F | 27 | 170 |
| 181 - 210 | 263 ^G | 27 | 89 | 256 ^G | 28 | 56 |

means lacking a common superscript differ (P < 0.001) within a column

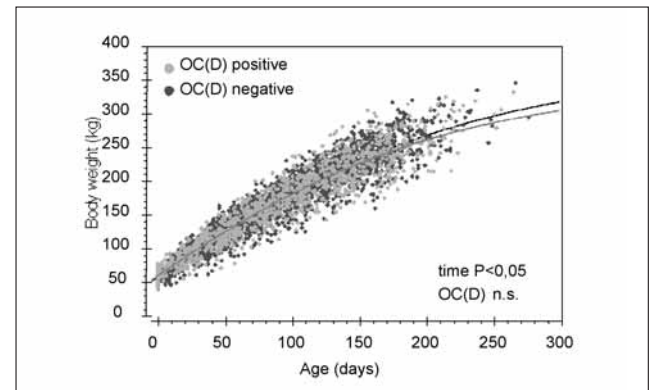


Fig 1 Body weight development and the incidence to osteochondrosis in foals.

Sex, birth month, the development of body weight, and withers height were not statistically different between healthy foals and those foals that developed osteochondrotic lesions. In the fetlock joints osteochondrotic lesions were associated with a lower body weight, whereas changes in the hocks were linked with a significantly higher body weight in the fourth and fifth month of life when compared to healthy foals (Table 2).

Table 2 Body weight [kg] in foals with regard to the location of osteochondrotic lesions.

| age [d] | body weight [kg] | | | | | | | | | | | |
|-----------|-------------------|----|-----|------------------|----|----|------------------|----|----|-------------------|----|----|
| | OC neg. | | | OC fetlock | | | OC hock | | | OC stifles | | |
| | mean | SD | N | mean | SD | N | mean | SD | N | mean | SD | N |
| 0 - 30 | 81 ^a | 17 | 302 | 82 ^a | 15 | 79 | 87 ^a | 14 | 41 | 87 ^a | 17 | 18 |
| 31 - 60 | 120 ^a | 19 | 361 | 119 ^a | 17 | 90 | 122 ^a | 21 | 48 | 124 ^a | 19 | 22 |
| 61 - 90 | 155 ^{ab} | 20 | 376 | 150 ^a | 20 | 93 | 160 ^b | 23 | 54 | 157 ^{ab} | 20 | 21 |
| 91 - 120 | 188 ^a | 22 | 370 | 178 ^b | 21 | 95 | 195 ^c | 25 | 58 | 190 ^{ac} | 19 | 21 |
| 121 - 150 | 216 ^a | 23 | 353 | 206 ^b | 23 | 98 | 223 ^c | 30 | 55 | 216 ^{ac} | 20 | 21 |
| 151 - 180 | 242 ^a | 26 | 296 | 231 ^b | 24 | 86 | 246 ^a | 34 | 43 | 235 ^{ab} | 25 | 14 |
| 181 - 210 | 263 ^a | 27 | 89 | 244 ^b | 25 | 24 | 269 ^a | 30 | 16 | 254 ^{ab} | 18 | 4 |

Discussion and conclusions

The body weights used by the German recommendations (GEH 1994) to calculate nutrient requirements for foals seemed to be appropriate. The present study did not indicate sig-

nificant differences in body weight and withers height between OC affected or OC unaffected Warmblood foals. Differences in body weight were noticed with regard to the location of osteochondrotic lesions. These findings were confirmed by *Jelan et al. (1996)* in Thoroughbred horses (N=798). It is assumed that there are different pathogenic factors for the development of osteochondrotic lesions in horses. In consequence, a high body weight might be detrimental in those foals who were genetically predisposed with osteochondrotic lesions in the hock. However, in this Hanoverian foal population growth rates were quite moderate and body weight should not be overestimated as several etiological factors might play a role in osteochondrosis.

References

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- I. Vervuert
Institute of Animal Nutrition
University of Veterinary Medicine Hannover, Foundation
Bischofsholer Damm 15
30173 Hannover
Germany
Ingrid.Vervuert@tiho-hannover.de*