



## Original Research

# Bodyweight Estimation From Linear Measures of Growing Warmblood Horses by a Formula



Veronika Čoudková<sup>a,\*</sup>, Vincent Sachello<sup>b</sup>, Hana Štěrbová<sup>c</sup>, Anna Kleinová<sup>d</sup>, Zita Papoušková<sup>e</sup>, Miroslav Maršálek<sup>f</sup>, Jan Kovanda<sup>g</sup>

<sup>a</sup> Department of Zootechnical Sciences, University of South Bohemia, Veselí nad Lužnicí, Czech Republic

<sup>b</sup> Ecole supérieure des Techniques aéronautiques et de Construction automobile, Sucé sur Erdre, France

<sup>c</sup> Department of Zootechnical Sciences, University of South Bohemia, Zemský hřebčinec Písek, Písek, Czech Republic

<sup>d</sup> Department of Zootechnical Sciences, University of South Bohemia, Lhenice, Czech Republic

<sup>e</sup> Department of Zootechnical Sciences, University of South Bohemia, České Budějovice, Czech Republic

<sup>f</sup> Department of Zootechnical Sciences, University of South Bohemia, České Budějovice, Czech Republic

<sup>g</sup> Department of Vehicles and Ground Transport, Czech University of Life Sciences Prague, Praha 6, Czech Republic

## ARTICLE INFO

## Article history:

Received 22 June 2015

Received in revised form 15 September 2015

Accepted 18 September 2015

Available online 9 October 2015

## Keywords:

Weight estimation

Estimation formula

Warmblood horse

Growth

## ABSTRACT

Formulas for the estimation of bodyweight (BW) are generally used when no scale is available. The objective of this study was to develop a suitable formula for the BW estimation of warmblood horses of different age that were based on linear relations. Five hundred twenty-four warmblood horses from 97 to 1,290 days were weighed, and 13 body measurements, BW, and body mass index were taken. Because of the closest linear correlation with weight, four measurements were selected for weight estimation: body length (BL), heart girth (HG), sternum height (SH), and front pelvis width (FPW). The formula value =  $[(2 \times SH + HG) \times 2 \times BL \times BL \times FPW] / 10,000,000$  was developed from the four selected parameters. Taking into account the variable growth intensity during horse maturation, four age groups with boundary values of 365, 650, and 950 days were created. Using the coefficients of linear correlation between the value and actual weight, the formula for BW estimation was adjusted for each age group: mass = coefficient\_1  $\times$  value + coefficient\_2 (horse age < 365 days: coefficient\_1 = 4.46, coefficient\_2 = 91.12; 365 days < horse age < 650 days: coefficient\_1 = 3.83, coefficient\_2 = 135.87; 651 days < horse age < 950 days: coefficient\_1 = 3.60, coefficient\_2 = 168.09; horse age > 950 days: coefficient\_1 = 3.23, coefficient\_2 = 221.55). In comparison with past BW estimation formulas, the new equation is the most suitable for BW estimation in warmblood horses of different age ( $P$  value < .001).

© 2015 Elsevier Inc. All rights reserved.

## 1. Introduction

Horse bodyweight (BW) is not always a parameter which horse owners and breeders are able to accurately estimate. However, it is an important parameter describing body development and is a rough equivalent of

physiological functions of an organism [1]. A horse's BW can be an important health indicator. Knowing how much a horse weighs and whether it is currently gaining or losing weight can help identify health issues. Low BW in a horse can be caused by health problems (disease or hormone imbalance), old age, parasites, overwork, an unbalanced diet, insufficient feed access (sometimes caused by a low pecking order in the herd), or genetics [2]. Knowing the BW of a horse is important in many facets of horse care, including designing feeding programs and administering

\* Corresponding author at: Veronika Čoudková, Mázice 33, 391 81 Veselí nad Lužnicí, Czech Republic.

E-mail address: [nika.13@seznam.cz](mailto:nika.13@seznam.cz) (V. Čoudková).

medication. However, horse owners and veterinarians working in the field do not generally have access to a livestock scale for the purpose of obtaining a horse's weight [3]. Drugs and anthelmintic preparations are potentially toxic and should be limited to the dosages dictated by the weight of the animal [4,5]. Sendel [2] found that incorrect BW estimation may result in overdosing or underdosing the animal. Overdosing medicinal products may cause toxicity and colic or other serious complications, including death [2]. Underdosing will not produce the desired effects and, in the case of antibiotics, may lead to antibiotic resistance [2]. Johnson et al [6] found that 88% of horse owners underestimated actual BW by an average of 84.37 kg.

Several researchers have developed BW estimation formulas using body measurements of adult horses [3–5,7–14] and ponies [15–17]. Stanier et al [18] predicted BW of growing Thoroughbreds. Bodyweight of foals at 2 months of age is reaching 25% to 30% of the weight of the adult animal and after the 6 months of age 45%. Height at withers (HWs) of yearlings is corresponding to 91% to 93% of adults, but their weight corresponds to only 62% to 76% of the weight in adulthood. In the second year of life, the growth rate slows down. Two-year-old horses reach 84% to 90% of BW of adult animals [19–21]. Dušek et al [1] described changes in the body constitution of growing horses. Body framework of foals is similar to standing rectangle because HW is greater than body length (BL). Within 12 to 18 months of age, the body framework is changing into the square format. During further growth, BL is increasing faster than HW, so the body frame is similar to a rectangle lying on the longer side.

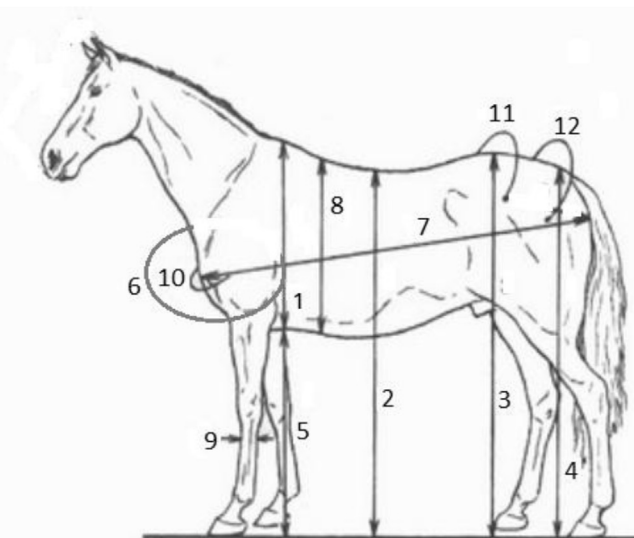
The objective of this research was to develop a simple formula to estimate the BW of different age groups of warmblood horses based on body measurements.

## 2. Materials and Methods

Measurement and weighing of horses were done on five farms across the Czech Republic in 2010 to 2012. A total of 524 horses at 97 to 1,290 days of age were measured and weighed on a portable livestock scale KERN UFA 1.5T0.5 (Kern & Sohn GmbH, Balingen, Germany) to the nearest 0.5 kg. In total, 15 variables including 13 body measurements (Fig. 1), body mass index, and BW were determined. Thirteen body measurements including:

- Height at withers measured by the stick
- Height at withers measured by the tape
- Heart girth (HG)
- Carpus circumference (CC)
- Sternum height (SH)
- Height at sacrum
- Height at cross
- Height at root of the tail
- BL
- Front pelvis width (FPW)
- Medium pelvis width
- Breast width of the shoulder joints
- Width of the heart

We first examined the relation between BW and age of horses expressed in days by regression analysis. Next, we evaluated the influence of each of the 13 determined body measurements on horse BW independently of the others. Subsequently, we evaluated the influence of combinations of girth, height, and length measurements on BW. Taking into account the growth physiology of horses, four age categories were created with boundary values of 365, 650,



**Fig. 1.** The representation of body measurements used for the calculation (1 = height at wither measured by the stick/tape; 2 = height at croup; 3 = height at sternum; 4 = height at root of the tale; 5 = sternum height; 6 = width of the heart; 7 = body length; 8 = heart girth; 9 = carpus circumference; 10 = breast width of the shoulder joints; 11 = front pelvis width; and 12 = medium pelvis width) [1].

Download English Version:

<https://daneshyari.com/en/article/2394760>

Download Persian Version:

<https://daneshyari.com/article/2394760>

[Daneshyari.com](https://daneshyari.com)