
THE ANALYSIS OF BODY CONFORMATION OF HUCUL HORSES BREED IN CZECH REPUBLIC WITH PLACE OF MEASURING INFLUENCE ASSESSMENT

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ABSTRACT

The aim of this work was to compared the biggest breeders of Hucul horses in Czech republic and found out the influence of place of measuring effect on body conformation of Hucul horses. We measured 14 body dimensions at every place of measuring. The resultings of measures were analysed statistically and compared with each other. From 14 body dimensions, 12 were highly significanted. Breeders from Janova Hora have the largest horses at average, breeders from Zmrzlik have the smallest horses at average.

Key words: hucul horse, body dimensions, place of measuring

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INTRODUCTION

Hucul horse is one of the primitive breeds of horses belonging to the protected genetic resources of FAO and horse genetic resources of Czech Republic also (ŠPHK, 2009). Hucul belongs to the smaller primitive mountain horse breeds (Purzyc, 2007) with very well-defined type and typical certain walk in overcome mountainous obstacles. The exterior is mostly correct with longer body conformation on short, bony legs with a tough hoof horn (ŠPKPH, 2006). World Wars and effort of breeders to improve Hucul horses by crossing them with another breeds such as Thoroughbred, Arabian, Noriker, Fjord or Haflinger caused a severe decline in the number of them. After the end of the war, only 300 Hucul horses remained on the all round the world (RADVAN, 2001). In 1970s breeders established an organization, Hucul Club, to prevent the extinction and in 1982 they established a stud book. The gene pool of these horses is a valuable source of genetic diversity. Therefore is it extremely important to constantly monitoring, compare and decline Hucul horses to prevent the significant deviations from the breed standard and to maintain its unchanged original character with valuable genetic material.

MATERIAL AND METHODS

Background material for the processing of this work was the results of our own terrain measurements. We measured 100 Hucul horses of these breeders in the Czech Republic:

- I. a M. Karbusičtí - Vítkovice v Krkonošoch (Janova Hora) in number of 22 hucul mares, 10 hucul geldings and 4 hucul stallions
- Hucul Club v Prahe (Zmrzlík) in number of 20 hucul mares, 6 hucul geldings and 4 hucul stallions
- M. a Z. Peterovi – Dubová Hora v počte 25 hucul mares, 5 hucul geldings a 4 hucul stallions

We measured 14 body dimensions - 6 height dimensions, 3 linear dimensions, 2 width dimensions, 2 circuit dimensions and 1 depth dimension. For the measurements of the horses we used 2 devices – zoometric cane (three-piece rectangular bar of metal, on which is engraved scale in cm, with two perpendicular arms while one of arms is sliding) and non-elastic measuring tape (wax tape with the scale). All animals were measured within months of August-September 2011 and 2013 with the same devices and same person (results should therefore not be loaded by error) with the assistance of two helpers. One held a horses and second wrote the measuring data. The measurement was carried out three times in each dimension and final average value was included in this work.

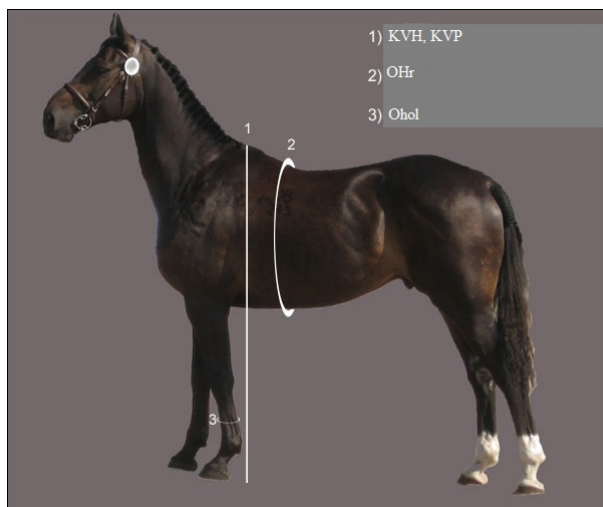
Measured horses stood on a horizontal solid surface, every limb was loaded equally. At the sight of the side, right foreleg hide left foreleg and right hindleg hide left hindleg. For all measurements were made provision for high of the horseshoes and its value was subtracted from the measured values. To assurance the correct and most accurate informations there were used only data for which there is no distortion of the measurement process .

DUŠKO (1999) defined body dimensions as follows:

1. Withers high rod (KVH) – perpendicular distance to the highest point of the withers from the ground
2. Withers high tape (KVP) – distance from outside heel of front left limb to the highest point of the withers

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3. High in saddle (VS) – perpendicular distance from the ground to the deepest point back
4. High in hips (VK) – perpendicular distance from the ground to the highest point on the back (sacral bone)
5. High in tailhead (VKCH) – perpendicular distance from the ground to the tailhead
6. High in breastbone (VHK) – perpendicular distance from the ground to the breastbone
7. Diagonal length of the body (ŠDT) – distance from the shoulder joint to the protrusion of the buttock
8. Length of the head (DH) – distance from the center of the vertex to the line joining the top of the nostrils
9. Heart girth (OHr) – measured behind the shoulders and withers in place of the smallest circuit
10. Circumference of the shank (Oho1) – measured at the weakest point of cannon bone on the left front limb
11. Width of the chest behind the blade-bone (ŠHZL) – measured closely behind the shoulders
12. Front width of the pelvis (PŠP) – measured at the outermost points of the coxas
13. Length of the pelvis (DP) – distance from the coxa to buttock
14. Depth of the chest (HH) – finding with the help of the compute = KVH – VHK



Obr. 1: Basic body dimensions of horses (<http://www.agropress.cz/zakladni-miry-koni.php>)

Data were collected in the program MICROSOFT EXCEL 2000.

With the help of the database we were able to determined relationships between measured body dimensions and place of measuring. Data about body composition were statistically analyzed by the statistical program UNISTAT version 5.1.:

- statistically evaluated by general linear model (GLM)

Model equation of general linear model (GLM) with consistent effects

$$y_{ijklm} = \mu + a_i + b_j + c_k + d_l + e_{ijklm}$$

Where:

y_{ijklm} = observation of body rate or index

μ = overall average

a_i = consistent effect of age ($i = 3, 4 \dots 20$)

b_j = consistent effect of sex ($j = 1, 2, 3$)

c_k = consistent effect of line ($k = 1, 2, 3, 4, 5$)

d_l = consistent effect of place of measuring ($l = 1, 2, 3$)

e_{ijklm} = random residual error

If there was some statistically significant effect, we analysed the body dimension by Scheffe's multiple comparison.

RESULT AND DISCUSSION

After statistical processing of data using Unistat vision 5.1. we were found statistically significant and highly significant differences. For making the basic summary we created Table 1, which shows the rate based on the effect statistically significant.

Tab. 1: Summary results of the statistical analysis

Rate/Effect	Place of measuring
KVH	*
KVP	**
VS	
VK	**
VKCH	**
VHK	**
ŠDT	**
DH	**
OHr	**
OhoI	**
ŠHZL	**
PŠP	**
DP	**
HH	**

* statistically significant

** statistically high significant

The most statistically significant differences were found in the effect place of measuring. From the 14 measured body size, 12 became statistically high significant (KVP, VK, VKCH, VHK, ŠDT, DH, OHr, Ohol, ŠHZL, PŠP, DP, HH) and 1 statistically significant (KVH). Statistically non significant was in the effect place of measuring only VS. In body dimensions of KVH, VK, VKCH, ŠDT, OHr, Ohol, DP and HH reached an average maximum value horses from Janova Hora, in body dimensions of KVP, PŠP, ŠHZL and DH reached an average maximum value horses from Dubová Hora. Almost in all dimensions except VHK, DH and Ohol achieved the smallest average horses from Zmrzlík. The averages of KVH, OHr and Ohol of every breeders (Dubova Hora, Janova Hora and Zmrzlik) are up to breeding standard except for Janova Hora, where average value of OHr exceed the limit in breeding standard in 5 cm. It could be caused also because Janova Hora have the most number of measured geldings which (as we found) reached the largest average value in OHr.

It could be concluded that the highest and longest horses have breeders from Janova Hora, the widest horses have breeders from Dubová Hora and the smallest horses have breeders from Zmrzlík. This may have several causes. Horses from Janova Hora live in the highest height above sea level (1100 m). These horses live year-round on rich pasture, in the winter they are fed by hay sometimes oats. Pastures are in strongly hilly terrain, this fact has certainly a strong influence on the condition of horses (horses because of it does not grow so much in width). However chest, with increasing height above sea level, rise (the markedly highest dimensions in Ohr reached horses from Janova Hora- by more than 8 cm compared to the second highest average value of Dubová Hora).

Janova Hora and Zmrzlík existed for decades, so the impact of geomorphological and climatic conditions can be observed on the horses, whereas Dubová Hora is relatively new. Huculs from Dubová Hora live at about the same height above sea level as the horses from Zmrzlík (330 m). However Dubová Hora achieves higher dimensions as Zmrzlík, which is probably due to richer pasture, higher rations and the fact that Dubová Hora has quite a lot of horses purchased from Lucina in Romania.

Horses from Zmrzlík reached almost in all dimensions the lowest average values. They live in a small height above sea level and do not have so rich pasture and also do not have any rations, only pasture or hay in the winter (comparison with Huculs from Dubová Hora). On the other hands, Huculs from Zmrzlík work relatively intensive (children's camps, hippotherapy, tourism ...). This fact could lead to a higher value in circumference of the shank compared to Huculs from Dubová Hora.

CONCLUSIONS

From these results it can be concluded that between the populations of Hucul horses exist some differences, but a clear distinction is mainly between place of measuring (but also genetics, age and sex have the influence on horse body conformation). The largest horses have breeders from Janova Hora, the smallest horses have breeders from Zmrzlík. To raise the level and improve the breed I'd recommend especially higher level of selection and breeding and also change the breeding conditions of Hucul horses to suit their requirements and will not change their precious exterior because of improper conditions of breeding. I would also recommend to unite the HIF breed standard of Hucul horse (breed standard should be the same for all countries rearing this breed) and agree on the direction of breeding. Hucul horse is a horse resistant sturdy hard conditions, unpretentious, modest on feeding, with good health and a calm temperament and we should do everything possible to save it the same for future generations.

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