

STUDY ON SEVERAL BODY DIMENSIONS IN LIPIZZANER HORSES

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Abstract

The Lipizzaner is one of the oldest modern horse breeds in Europe, with a history of about five centuries, formed in the Lipizza Stud Farm. Lipizzaners are gentle, intelligent, docile, and very sensitive horses, which have skills for academic dressage discipline. In Romania there are two valuable Lipizzaner populations, at Sâmbăta de Jos (Braşov County) and Beclean Stud farm (Bistriţa Năsăud County), but also many valuable horses from breeders that appreciate this breed.

The present paper refers to a morphological study, performed on six adult horses, owned by a breeder from Botoşani County. The study included several body dimensions, including those from the ranking sheet: the height at withers (155.17 ± 1.76 cm), the thoracic perimeter (182.83 ± 1.91 cm) and the cannon perimeter (20.33 ± 0.64 cm), based on which there were calculated: the dactylo-thoracic index ($11.12 \pm 0.05\%$), the skeleton index ($13.10 \pm 0.07\%$), and the massiveness index ($117.83 \pm 0.09\%$); the data obtained attest the fact that the analysed horses are within the breed standard.

Key words: horses, mares, stallions, indexes, measurements

INTRODUCTION

The Lipizzaner is one of the oldest modern horse breeds in Europe, with a history of about five Centuries; the ancestors of Lipizzaner can be traced through history to the year 800 A.C. and it is a fact well known that the breed was formed in the Lipizza Stud Farm; the main population consisted of 24 broodmares and 9 stallions, from Berber, Andalusian, and Arab horses, brought from Spain, which were crossed with local horses from the Karst plateau.

The Lipizzaner are particularly gentle, intelligent, docile, very sensitive, and willing to learn new things, being quick learners. They excel in dressage discipline, and they have born skills for this discipline.

Lipizzaner horses have a generally rectangular lateral body format, with a height of around 160 cm and a weight of approx. 500-550 kg [2, 9, 11, 14, 16, 17, 18].

In Romania there is a valuable nucleus of horses at the National Stud farm from Sâmbăta de Jos (Braşov County), and also the National Stud farm from Beclean (Bistriţa Năsăud County). There are also many breeders in the country who are passionate about this breed. Annually, within the Stud farms, but not only, the National herd is evaluated and ranked during the periodic activities of appreciation, thus are kept for reproduction only the most representative individuals [19]. Through these procedures, as normal, special attention is paid to the examination of external aspects. In this regard, we consider it opportune to have a humble contribution to the study of some external aspects of this breed, referring to several body dimensions of the studied horses.

MATERIAL AND METHOD

The studied biological material was represented by six Lipizzaner horses (five mares and a stallion), owned by a breeder from Cătămărăşti Deal, Botoşani County (table 1).

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Table 1 The data of studied Lipizzaner horses

| The name of the horse | Year of birth | Sex | Sire | Dam |
|-----------------------------|---------------|-----|---------------------------|-----------------------------|
| MAESTOSO XXXIX-39-1 | 2004 | F | MAESTOSO XXXIX-39F | PLUTO XIX-47F |
| FAVORY XXXV-31 F | 2001 | F | FAVORI XXXV | TULIPAN XIV-11F |
| SIGLAVY CAPRIOLA XVII -29 F | 2000 | F | SIGLAVY CAPRIOLA XVII-F | FAVORY XXXI-20F |
| SIGLAVY CAPRIOLA XIV -56-4L | 2004 | F | SIGLAVY CAPRIOLA XIV -56F | INCITATO II-12 BN |
| INCITATO II-24-3L | 2008 | M | INCITATO II-24 BN | SIGLAVY CAPRIOLA XVII -29 F |
| MAESTOSO XXXIX-40-4-L | 2009 | F | MAESTOSO XXXIX-40 F | FAVORY XXXV-31 F |

The studied characters were: height at the withers, height at the back, height at the croup, chest depth, sternum-floor distance, trunk length, head length, neck length, croup length, chest width, croup width at coxo-femoral joints, thoracic perimeter, and cannon perimeter. Based on these data, three body indexes were calculated: the index of the lateral body format [(oblique length of the trunk / height at the withers) x 100], the index of compactness [(thoracic perimeter / length of the trunk) x 100], croup format index [(croup width at the hips / croup length) x 100], skeleton index [(cannon perimeter / height at the withers) x 100], dactylo-thoracic index [(cannon perimeter / thoracic perimeter) x 100], speed index [(legs length / trunk length) x 100], and massiveness index [(thoracic perimeter / height at the withers) x 100] [2,3,4,5,6,7,8,10,13].

The data obtained were statistically processed [1].

RESULTS AND DISCUSSION

The data obtained were statistically processed and centralized in table 2 and table 3, and represented for each group of characters separately (fig. 1)

Thus, the data obtained after performing the main height measurements (fig. 1) indicated that the height at withers has an average value of 155.17 cm, which means that the group is homogeneous regarding the character (the coefficient of variability was 0.88%). Regarding the current ranking criteria, the studied horses can obtain marks of over 8.

Regarding the height at the back, which had an average value of 145.67 cm, the group is homogeneous (V% = 1.01).

Table 2 The values of studied body dimensions (cm)

| Crt. no. | Height at withers | Height at back | Height at croup | Chest depth | Sternum-floor distance | Trunk length | Neck length |
|----------------|-------------------|----------------|-----------------|-------------|------------------------|--------------|-------------|
| 1 | 154 | 145 | 154 | 72 | 82 | 160 | 64 |
| 2 | 155 | 145 | 154 | 73 | 82 | 161 | 65 |
| 3 | 154 | 144 | 154 | 71 | 83 | 160 | 63 |
| 4 | 155 | 146 | 155 | 72 | 83 | 160 | 66 |
| 5 | 157 | 147 | 156 | 75 | 82 | 163 | 68 |
| 6 | 156 | 147 | 156 | 73 | 83 | 166 | 67 |
| \bar{X} | 155.17 | 145.67 | 154.83 | 72.67 | 82.50 | 161.67 | 65.50 |
| $\pm s\bar{x}$ | 1.76 | 1.71 | 1.76 | 1.21 | 1.28 | 1.80 | 1.14 |
| V% | 0.88 | 1.01 | 0.62 | 2.57 | 0.36 | 3.63 | 5.34 |
| MIN | 154.00 | 144.00 | 154.00 | 71.00 | 82.00 | 160.00 | 63.00 |
| MAX | 157.00 | 147.00 | 156.00 | 75.00 | 83.00 | 166.00 | 68.00 |
| % | 100.00 | 93.88 | 99.79 | 46.83 | 53.17 | 104.19 | 42.21 |

Table 3 The values of body dimensions (cm)

| Crt. no. | Head length | Croup length | Chest width | Croup width at hips | Croup width at femoral joints | Chest perimeter | Cannon perimeter |
|----------------|-------------|--------------|-------------|---------------------|-------------------------------|-----------------|------------------|
| 1 | 60 | 54 | 43 | 52 | 50 | 182 | 19.5 |
| 2 | 61 | 54 | 43 | 53 | 50 | 183 | 20.5 |
| 3 | 60 | 56 | 44 | 54 | 52 | 181 | 20.5 |
| 4 | 63 | 56 | 44 | 54 | 51 | 182 | 20 |
| 5 | 64 | 56 | 46 | 55 | 52 | 185 | 21 |
| 6 | 63 | 54 | 45 | 53 | 50 | 184 | 20.5 |
| \bar{X} | 61.83 | 55.00 | 44.17 | 53.50 | 50.83 | 182.83 | 20.33 |
| $\pm s\bar{x}$ | 1.11 | 1.05 | 0.94 | 1.03 | 1.01 | 1.91 | 0.64 |
| V% | 4.80 | 2.18 | 3.09 | 2.06 | 1.90 | 1.19 | 1.31 |
| MIN | 60.00 | 54.00 | 43.00 | 52.00 | 50.00 | 181.00 | 19.50 |
| MAX | 64.00 | 56.00 | 46.00 | 55.00 | 52.00 | 185.00 | 21.00 |
| % | 39.85 | 35.45 | 28.46 | 34.48 | 32.76 | 117.83 | 13.10 |

This paper is a morphological study, performed on a number of 6 adult horses, owned by a breeder from Botoșani County. The study included several body dimensions, also from the ranking sheet, respectively the height at the withers (155.17 ± 1.76 cm), the thoracic perimeter (182.83 ± 1.91 cm), and the

cannon perimeter (20.33 ± 0.64 cm), based on which there were calculated: the dactylo-thoracic index ($11.12 \pm 0.05\%$), the skeleton index ($13.10 \pm 0.07\%$), and the massiveness index ($117.83 \pm 0.09\%$); the results obtained attest the fact that the analysed horses are within the breed standard.

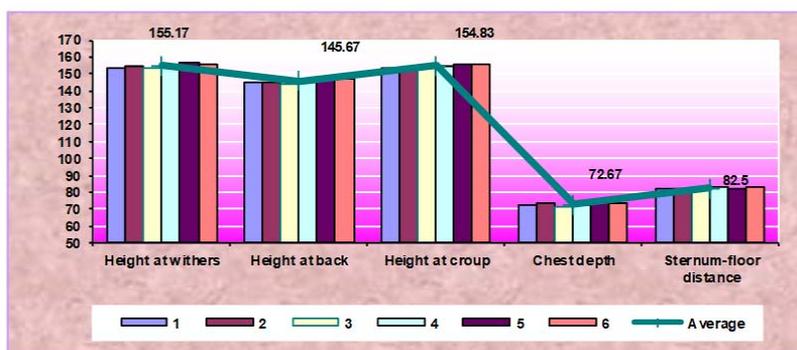


Fig. 1 Values of main height measurements (cm)

The height at the croup represents, on average, 99.79% of the height at withers (154.83 cm). And for this character the group is homogeneous ($V=0.62\%$ which means the variability of the character is reduced).

The chest depth, with an average value of 72.67 cm, represents 46.83% of the height at

withers, which means that the sternum-floor distance represents 53.17% (it has a value of 82.50 cm on average). Both characters have low values of the coefficient of variability within the studied group.

These data, obtained within the group of Lipizzaner horses studied, are comparable to those presented in the literature.

The data obtained from performing the main length measurements were also represented graphically in Figure 2.

The length of the trunk ranged between 160 and 166 cm, exceeding, on average, by 4.19% the height at withers.

The length of the neck had an average value of 65.5 cm, which represents 42.21% of the height at withers.

The head, which represents about 39.85% of the height at withers, had an average length of 61.83 cm.

The length of the croup had an average value of 55 cm, with limits between 54 and 56 cm.

Regarding all these length dimensions, the studied group was homogeneous, the coefficients of variability registering small values, between 2.18 and 5.34%.

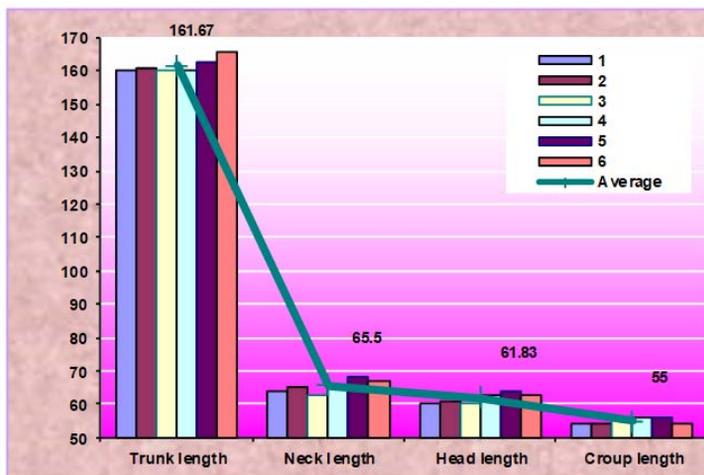


Fig. 2 Values of main length measurements (cm)

The data obtained from performing the main width measurements were plotted in Figure 3.

The chest width had an average value of 44.17 cm (the limits ranged between 43 and 46 cm).



Fig. 3 Values of main width measurements (cm)

The width of the croup at hips had an average value of 53.5 cm, and it was 9.33 cm larger than the width of the chest.

The width of the croup at coxo-femoral joints had an average value of 50.83 cm, and it was 2.67 cm smaller than the width of the croup at the hips and 6.66 cm larger than the chest width.

Regarding these width dimensions, the studied group was homogeneous, the coefficients of variability registering small values, between 1.90 and 3.09%.

The data obtained after performing the main perimeter measurements were represented graphically in figure 4.

The thoracic perimeter had values that ranged between 181 and 185 cm, with an average of 182.83 cm. Regarding this character, the studied group was homogeneous ($V=1.19\%$).

The cannon perimeter had an average value of 20.33 cm, which represents 13.10% of the height at withers, ranging between 19.5 and 21 cm.

To be more relevant, the absolute values obtained from the measurements were transformed into relative values (fig. 5).

Also, based on the data obtained from body measurements, a series of body indices were calculated, and their values were centralized in table 4.

The lateral body format of the studied horses is rectangular, and the average value of this index is 104.19% (fig. 6).

By comparing the values obtained for the thoracic perimeter to the length of the trunk, it was possible to calculate the compactness index, whose average value was 113.1%, the studied horses having a finely robust constitution (fig.7).

By relating the cannon perimeter with the height at withers, respectively to the chest perimeter, the bone and dactylo-thoracic indexes were obtained, whose values were 13.1%, and also 11.12% (fig. 8).

The speed index, obtained by ratio between the length of the limbs at the height at withers, had an average value of 51.04 (fig. 9).

The studied horses have a correctly conformed croup, indicated by the average value of the croup format index which was 97.28% (fig. 10).

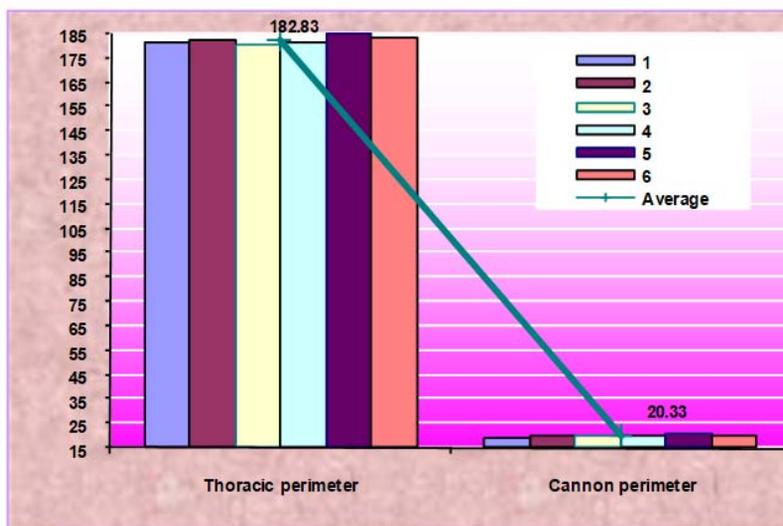


Fig. 4 Values of main perimeter measurements (cm)

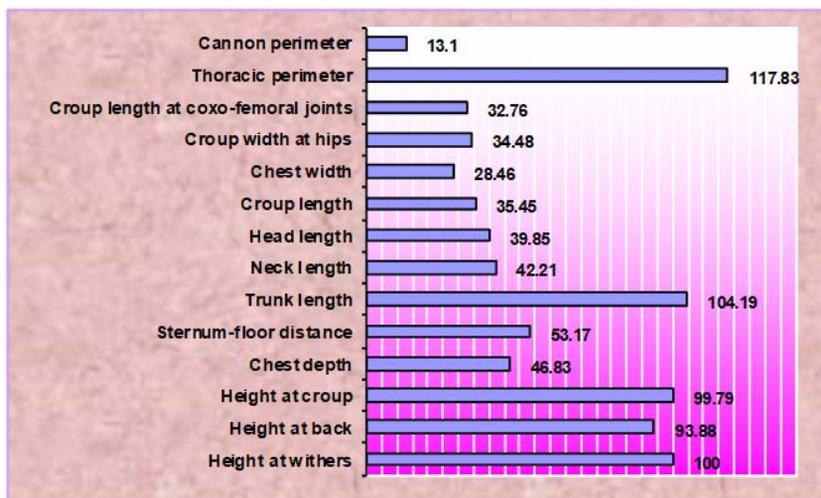


Fig. 5 Relative values of main body dimensions (%)

Table 4 Main body indexes values (%)

| Crt. no. | Lateral body format index | Thoracic depth index | Compactness index | Dactylo-thoracic index | Bone index | Massiveness index | Croup format index | Speed index |
|----------------|---------------------------|----------------------|-------------------|------------------------|------------|-------------------|--------------------|-------------|
| 1 | 103.90 | 46.75 | 113.75 | 10.71 | 12.66 | 118.18 | 96.30 | 51.25 |
| 2 | 103.87 | 47.10 | 113.66 | 11.20 | 13.23 | 118.06 | 98.15 | 50.93 |
| 3 | 103.90 | 46.10 | 113.13 | 11.33 | 13.31 | 117.53 | 96.43 | 51.88 |
| 4 | 103.23 | 46.45 | 113.75 | 10.99 | 12.90 | 117.42 | 96.43 | 51.88 |
| 5 | 103.82 | 47.77 | 113.50 | 11.35 | 13.38 | 117.83 | 98.21 | 50.31 |
| 6 | 106.41 | 46.79 | 110.84 | 11.14 | 13.14 | 117.95 | 98.15 | 50.00 |
| \bar{X} | 104.19 | 46.83 | 113.10 | 11.12 | 13.10 | 117.83 | 97.28 | 51.04 |
| s^2 | 1.253871 | 0.32672 | 1.282833 | 0.056983 | 0.073718 | 0.090008 | 0.959549 | 0.613908 |
| s | 1.12 | 0.57 | 1.13 | 0.24 | 0.27 | 0.30 | 0.98 | 0.78 |
| $\pm s\bar{X}$ | 1.44 | 0.97 | 1.50 | 0.47 | 0.51 | 1.54 | 1.39 | 1.01 |
| V% | 1.20 | 0.70 | 1.13 | 0.51 | 0.56 | 0.08 | 0.99 | 1.20 |
| MIN | 103.23 | 46.10 | 110.84 | 10.71 | 12.66 | 117.42 | 96.30 | 50.00 |
| MAX | 106.41 | 47.77 | 113.75 | 11.35 | 13.38 | 118.18 | 98.21 | 51.88 |

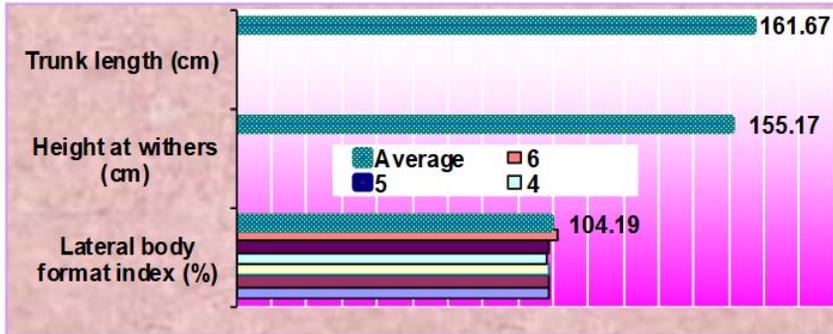


Fig. 6 Values of index of lateral body format

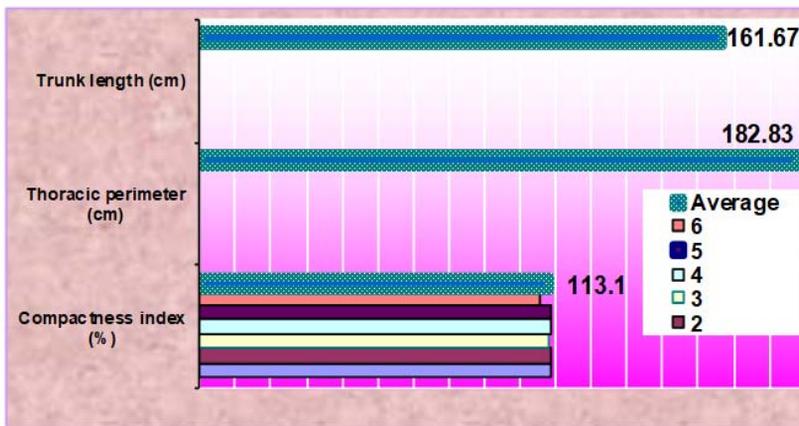


Fig. 7 Values of compactness index

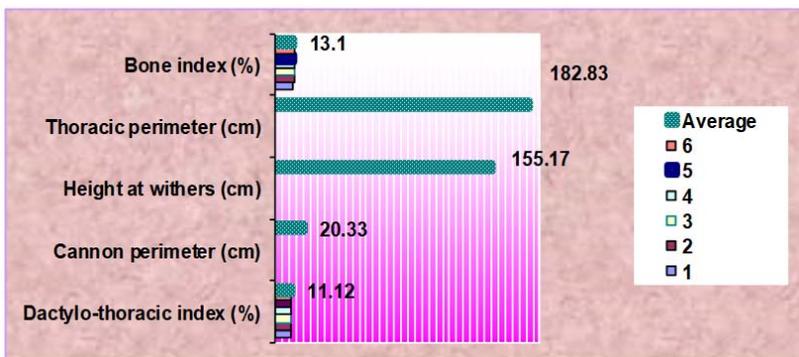


Fig. 8 Dactylo-thoracic and bone index values

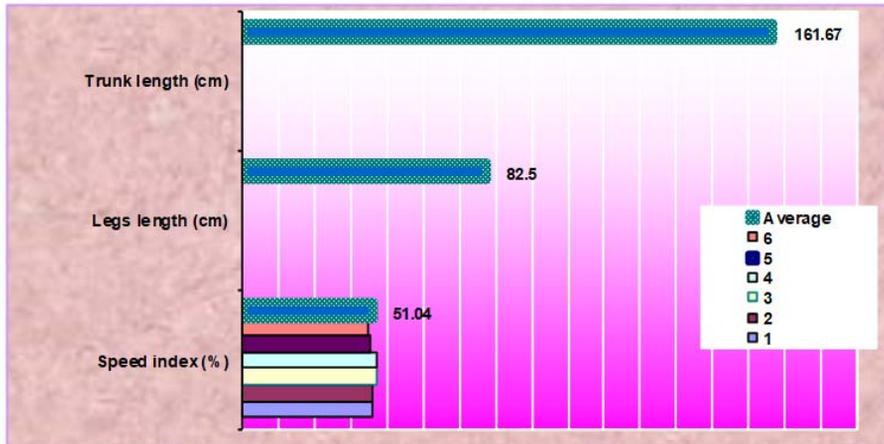


Fig. 9 Speed index values

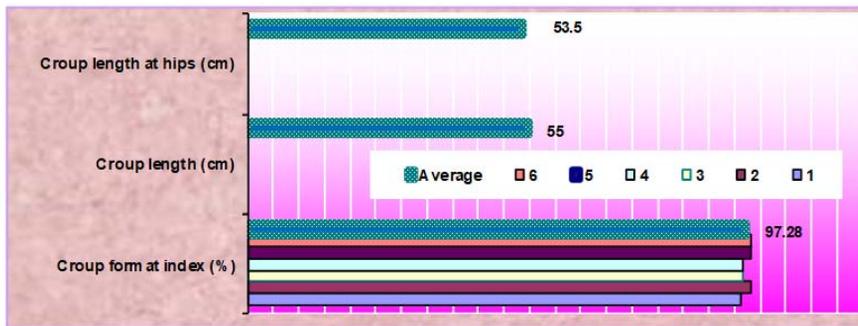


Fig. 10 Croup format index values

CONCLUSIONS

Following the study on breeding horses of the studied Lipizzaner horses, the following conclusions can be drawn:

-For the main height measurements the following average values were obtained: 155.17 cm for the height, 145.67 cm for the height at the back, 154.83 cm for the height at the croup, 72.67 cm for the chest depth, and 82.50 cm for the sternum-floor distance.

-At the main length measurements, the following average values were obtained: 161.67 cm for the length of the trunk, 65.50 cm for the length of the neck, 61.83 cm for the length of the head, and 55 cm for the length of the croup.

-At the main width measurements, the following average values were obtained: 44.17 cm for the chest width, 53.5 cm for the width of the croup at the hips, and 50.83 cm for the width of the croup at the coxo-femoral joints.

-The following average values were obtained for the main perimeter measurements: 182.83 cm for the chest perimeter, and 20.33 cm for the cannon perimeter.

-For the main calculated indexes, the following average values were obtained: lateral body format index - 104.19%, chest depth index - 46.83%, compactness index - 113.10%, dactylo-thoracic index - 11.12%, bone index - 13.10%, massiveness index - 117.83%, croup format index - 97.28%, and speed index - 51.04%.

-The data obtained in this paper are comparable to those in the literature.

-Based on the values obtained at the measurements, according to the current rating norms, the studied horses can be included in the elite class, regarding the body development.

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