Scientific Papers. Series D. Animal Science. Vol. LXIV, No. 2, 2021
ISSN 2285-5750; ISSN CD-ROM 2285-5769; ISSN Online 2393-2260; ISSN-L 2285-5750

RESEARCHES REGARDING THORACIC PERIMETER AVERAGE PERFORMANCES IN ROMANIAN HUCUL HORSE BREED - HROBY BLOODLINE

Teodor COCOR[1], Mihai PRUNA[1], Marius MAFTEI[1], Livia VIDU[1], Iulian VLAD[1], Dana POPA[1], Razvan POPA[1], Daniela IANITCHI[1], Marius DOLIS[2], Gheorghe Emil MARGINEAN[1]

[1]University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, Bucharest, Romania
[2]"Ion Ionescu de la Brad " University of Agricultural Sciences and Veterinary Medicine of Iasi, 3 Mihail Sadoveanu Alley, Iasi, Romania

Corresponding author email: agrozoovet@gmail.com

Abstract

Study of average performances in a population is very important. Regarding to a population, the average of phenotypic value is equal with average of genotypic value. That minds that the studies of the average value of characters offer us an idea about the population genetic level. The biological material is represented by 177 Hucul horse from HROBY bloodline divided in 6 stallion families analyzed at 18, 30 and 42 months old, owned by Lucina Hucul stood farm. The average performances for thoracic perimeter was 149.58 cm. at 18 months, 160.21 cm. at 30 months old and 166.97 cm. at 42 months old. We can observe a good growth rate from one age to another and significant differences between sexes. The average performances of the character are between characteristic limits of the breed.

Key words*: bloodline, horse, Hroby, Hucul, Lucina.*

INTRODUCTION

The individual can no longer be a reliable source of information on genetic determinism or in mechanisms of phenotypic manifestation for the quantitative character considered, which makes the unit of study for these characters extend to the population level. Also, in order to study the nature of the quantitative differences regarding the manifestation of the same character in different individuals in different populations, measurements are required which generally do not express the character itself but its value.

The character's average performances, in a population, have a great value because it can offer an overview of the genotypic value. All this is possible because, regarding to a population, the average phenotypic values are equal with the average of genotypic values (Maftei, 2015). More than that, the study of average values of characters, in a population, can offer an idea about populational genetic level (Maftei, 2019).

Tracking of body growth can be done by periodic determination of body weight and body dimensions. As a rule, there is a direct relationship between the weight of an animal and its volume, which means that the dynamics of the weight will, indicate also the dynamics of the dimensions. Determining only the body weight can not always indicate the clearest picture of the evolution of the growth process, as it may happen when the weight remains the same between two determinations (Popescu-Vifor, 1978, 1985).

The growth process can be followed by: growth energy, growth rate, growth intensity, and growth coefficient.

Perhaps more than in other species of economic interest, in horses, phenotypic characters occupy an important place in the breeding programs, as they play an essential role in the expression of production characters.

In this group of characters, the characters expressing the growth process (height, cannon bone perimeter, thoracic perimeter) and those expressing the body conformation specific to the production specificities (running, sports,

jumping, recreation, traction) are predominantly included. These characters belong to the group of morphological characters and are determined by somatometry. Somatometry is the most objective method of assessing the exterior of the horses. In principle, it consists in direct measurement, on the live animal, of the dimensions of the different body regions, or even the characteristic size of the species. In this study we use the cannon bone perimeter values.

MATERIALS AND METHODS

The purpose of using somatometry in assessing the exterior of the horses is to determine, first of all, body development, but also to establish the overall harmony of the specimen (Marginean et al., 2005).

In this study we analyze the thoracic perimeter, measured with the ribbon and representing the thoracic circumference.

Body size judgments (valid for both young and adult animals) are usually based on the scales set for the standard of each breed, or according to the scales set by the breeding program.

The characteristic limits for each character are different from a breed to another and also between the two sexes. To reach the maximum limit, note 10 is given. For the minimum limit and below this limit, note 4 is given. The exceeding of the maximum values is penalized by subtraction of the note.

For realising purposed objectives, the biologic material became from Lucina stood farm. It is a sample of 177 horses from Hucul breed - Hroby bloodline (figure 1), divided in 6 stallions families: Hroby XVI, Hroby XVII, Hroby XVIII, Hroby XIX, Hroby XX, Hroby XXI, presented in Table 1. It was 84 males and 93 females analyzed at three different ages: first grading at 18 months old, second grading at 30 months old and third grading at 42 months old. After the third grading the individual will be tested for energetic capacity. The sample of 177 horses was extracted from population in according with registered performances, for all three ages, in order to have one balanced experimental plan (Popa, 2009).

The individuals were studied at three different ages: 18, 30 and 42 months old.

We had calculate statistics like average, variant, average error, standard deviation, and coefficient of variability. We applied significance tests like Student. The Fisher test was applied to the case of several samples, preceded by a variance analysis. The calculated F value was obtained by reporting the average squares value between the samples at the average squares from sample. The Tukey test involves calculating a statistic, noted

$$w = q_{(p;GL_e;\alpha)} \times s_{\bar{X}}$$

where q represents the standardized amplitude read from the table at the desired significance level (α), p being the number of groups, and GLe - degrees of freedom from the intragroup component of the variance analysis table. The value is obtained by the fact that MPe is the intragroup squares average value, and n is the average size of the groups. Applying Fisher or Tukey tests had the advantage to highlight, to allows us to see between which families we recorded significant differences.

Figure 1. Ranking of sire stallions in Lucina studfarm

Table 1. Analyzed biological material

HROBY Families	Individuals	Males	Females
Hroby XVI	10	3	7
Hroby XVII	13	6	7
Hroby XVIII	3	1	2
Hroby XIX	31	15	16
Hroby XX	54	29	25
Hroby XXI	66	30	36
TOTAL	**177**	**84**	**93**

RESULTS AND DISCUSSIONS

The average performances for thoracic perimeter, in Hroby bloodline, is presented in Table 2, and the dynamics of the same character can be observed in Figure 1.

Analyzing Table 2 and Figure 1, we can observe an important growth from one grading to another, in both sexes. Also we distinguish insignificant difference between sexes for mentioned character, with a small plus for females. Anyway, the differences between sexes of 0.3 cm, at this age, is insignificant to put in discussion some differences in energetic capacity between sexes (Popa R. et al., 2004).

Analyzing the data presented, there is a more pronounced variability of the thoracic perimeter, in the Hroby bloodline at the first ranking (18 months old), in males. This is most likely due to the environment, or possibly intangible factors. From the analysis of the datas can notice the existence of differences with a high degree of significance between individuals belonging to the two sexes.

For statistical testing of significance of differences between tested families of halfsibs from Hroby bloodline it was applied Fisher test.

The calculated Fisher test scores reveal distinctly significant differences between halfsibs (males and females) families, in the Hroby blooline for the thoracic perimeter cannon bone perimeter, but only at the second ranking, at age of age of 30 months old (F = 2.94).

Tukey's test calculated values show that at the age of 30 months old there are significant differences between the performance of the Hroby XIX and Hroby XX.

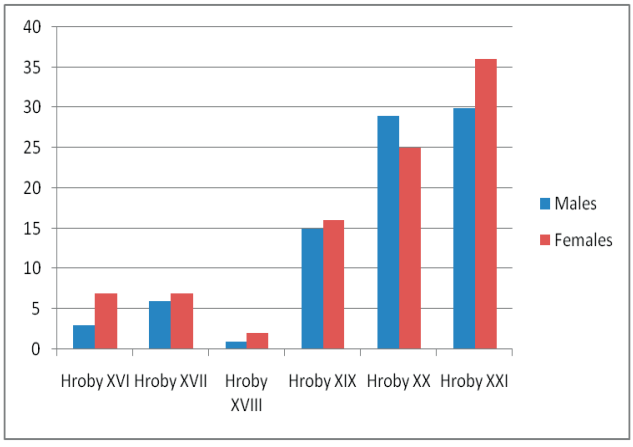

Figure 2. Distribution of individuals by families in Hroby bloodline

Table 2. Average performances for cannon bone perimeter in Hroby bloodline

Family	Sex	Age (years)											
		1.5				2.5				3.5			
		n	$\bar{X} \pm S_{\bar{X}}$	s	v%	n	$\bar{X} \pm S_{\bar{X}}$	s	v%	n	$\bar{X} \pm S_{\bar{X}}$	s	v%
H XVI	M	3	154.67 ± 2.9	5.03	3.25	3	166 ± 2	3.46	2.08	3	174.67 ± 2.19	3.79	2.17
H XVII		6	149.83 ± 2.3	5.64	3.76	6	162.5 ± 2.47	6.06	3.73	6	166.67 ± 1.94	4.76	2.86
H XVIII		1	157	-	-	1	171	-	-	1	166	-	-
H XIX		15	148.73 ± 1.55	6.02	4.05	15	158.67 ± 1.59	6.16	3.88	15	163.53 ± 0.88	3.4	2.08
H XX		29	151 ± 1.22	6.59	4.36	29	162.69 ± 0.75	4.04	2.48	29	167.48 ± 1.01	5.43	3.24
H XXI		30	145.5 ± 1.9	10.39	7.14	30	157.1 ± 1.25	6.83	4.35	30	166.9 ± 0.84	4.58	2.74
Total M		**84**	**148.75 ± 0.9**	**8.29**	**5.57**	**84**	**160.18 ± 0.69**	**6.31**	**3.94**	**84**	**166.75 ± 0.56**	**5.10**	**3.06**
H XVI	F	7	148 ± 1.72	4.55	3.07	7	159.57 ± 0.97	2.57	1.61	7	164.57 ± 1.53	4.04	2.45
H XVII		7	149 ± 1.65	4.36	2.93	7	161 ± 2.12	5.60	3.48	7	166.29 ± 1.7	4.50	2.71
H XVIII		2	153.5 ± 2.5	3.53	2.3	2	164 ± 3	4.24	2.59	2	165.5 ± 2.5	3.54	2,14
H XIX		16	148.69 ± 1.5	5.99	4.03	16	156.81 ± 1.65	6.59	4.2	16	166 ± 1.17	4.69	2,83
H XX		25	152.6 ± 1.26	6.30	4.13	25	160.28 ± 1.09	5.47	3.41	25	169.24 ± 0.87	4.37	2,58
H XXI		36	150.03 ± 0.92	5.51	3.67	36	161.53 ± 0.85	5.11	3.16	36	167 ± 1.02	6.13	3,67
Total F		**93**	**150.33 ± 0.6**	**5.76**	**3.83**	**93**	**160.25 ± 0.57**	**5.53**	**3.45**	**93**	**167.16 ± 0.54**	**5.24**	**3.13**
Total bloodline		**177**	**149.58 ± 0.53**	**7.10**	**4.75**	**177**	**160.21 ± 0.44**	**5.89**	**3.68**	**177**	**166.97 ± 0.39**	**5.16**	**3.09**
Significance of the observed differences between sexes (Student)		1.58 NS				0.08 NS				0.56 NS			

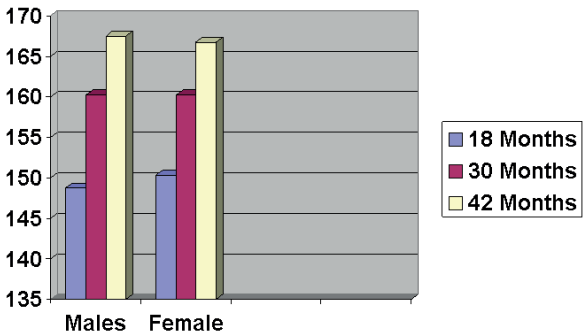

Figure 3. Dynamics of cannon bone perimeter

CONCLUSIONS

The data presented above show as values of this character, thoracic perimeter, that are between the characteristic limits of Hucul horse breed. It is easy to observe a small degree of variability, with an increasing tendencies from one successive age to another, for both sexes that was analyzed.

The evolution of growth process, for this character (thoracc perimeter) is normal, without significant differences between males and females.

We reveal an important growth of character, from one age to another, especially in stallion case (11.43 cm between first and second grade of stallions). Significant differences were recorded between the individuals from both sexes, but only at the second grading.

The calculated values for Fisher test reveal the existence of some distinctly significant differences between half sibs families from

Hroby bloodline, for thoracic perimeter, but only at 30 months old (F = 2.94). Values of Tukey test shows that at 30 month old are significant differences between performances of families Hroby XIX and Hroby XX.

From the data presented in for the thoracic perimeter, it is observed that, at these three ages, the average values of the character are approximately equal, at all the genealogical lines, for both sexes.

Regarding the absolute speed growth of thoracyc perimeter, in Hroby bloodline, this study reveal that this indicator had different levels, levels that was influenced by age, and showing decreasing values in relation to it.

After analyzing the presented data, in connection with absolute growth rate of thoracic perimeter, the following ideas can be deduced:

- ✓ The growth rate of the thoracic perimeter decreases in relation to age;
- ✓ The absolute growth rate has a small variability from one stallion family to another.

In the first growth period analyzed (from birth to the first ranking - 18 months), the individuals from Hroby bloodline recorded the highest absolute rate of growth of the thoracic perimeter, comparative with other Hucul horse bloodline.

The relative growth rate of character (%) - from the analysis of the presented data it is observed that the relative speed of thoracic perimeter is, like the absolute speed, influenced by the age of recording values of character (thoracic perimeter) a function of the age of character determination.

Regarding the relative growth rate of the thoracic perimeter, we can conclude:

- ✓ In the first period of growth, the relative growth rate had the highest value, in entire

Hucul breed also for individuals belonging to the Hroby line;

- ✓ The analyzed individuals, belonging to Hroby bloodline, had the largest thoracic perimeter at the end of the period, the initial value of the character being considered the same for all analyzed individuals.

Regarding the growth intensity, from the analysis of the presented data it is observed that, after birth, the young horses of the Hroby bloodline register a normal growth, the highest growth intensity manifesting itself until the age of 18 months (1.5 years).

It is very clear that in the post uterine period, the parameters of the growth process for the thoracic perimeter vary in close dependence with age. Their highest values are found in the first part of life, they show a decreasing trend in relation to the age factor. As a result, any deficiencies in the technology of breeding young horses during the period of maximum intensity of this process, has extremely serious repercussions on the productive life of the animal, especially on the energy capacity, which is the main production of horses.

ACKNOWLEDGEMENTS

This research work was carried out with the support of R.N.P. ROMSILVA, and the team of specialists from Horse Breeding Department.

REFERENCES

Maftei, M., Dronca, D., Marginean, G., & Nistor L. (2015). Study of the main body dimensions that are used in the selection process in the reproductive nucleus of Nonius horse from Izvin studfarm. *Scientific papers Animal Sciences and Biotechnologies, 48* (1), 288-290.

Maftei, M., Pogurschi, E., Purdoiu, S., & Suler, A. (2015). Study about thoracic perimeter average performances in Romanian Hucul horse breed – Prislop bloodline. *Scientific Papers Animal Science and Biotechnologies, 48* (2), 134-136.

Maftei, M., Marginean, G., Vlad, I., Nicolae, C., Popa, D., Pogurschi, E., Nistor, L., Ianitchi, D., & Purdoiu, S. (2019). Researches regarding cannon bone perimeter average performances in Romanian hucul horse breed – Pietrosu bloodline. *Scientific papers. Series D. Animal Science, LXII* (2), 160-164.

Mărginean, G., Georgescu, G., & Maftei, M. (2005). *Practical works for the exploitation of horses*. Bucharest, RO: AgroTehnica Publishing House.

Popa, R, Săndulescu, Dana, & Maftei, M. (2004). A part of results concerning the genetic analysis of Lucina Hutul horse breed. *Proceedings of Animal Science Second Joint Meeting of the Balkan Countries Balnimalcom,* Bucharest, Faculty of Animal Science.

Popa, R. (2009). *Breeding programs*. Bucharest, RO: Printech, 120–172.

Popescu-Vifor, Ş. (1987). *Animal genetics*. Bucharest, RO: Ceres Publishing House.

Popescu-Vifor, Ş. (1985). *Genetics of the developmental process in animals*. Bucharest, RO: Ceres Publishing House.