

## STUDY ON SEVERAL BODY DIMENSIONS OF HORSES FROM FURIOSO-NORTH STAR BREED

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### Abstract

*The research was conducted in 2022, on 89 horses; the studied breed was Furioso-North Star, from Rușețu Stud Farm, and 66 broodmares (from the 2001-2019 generations) and 23 stallions (from the 1999-2019 generations) were included in this analysis. Seven of these males have served as sires, while the other 16 were used for public breeding. The horses were assessed based on data obtained from standard measurements (height at the withers, heart girth, and cannon girth) performed during the annual ranking procedure. The results obtained regarding the height showed that it registered average values ranging between  $161.29 \pm 0.23$  cm for broodmares and  $161.43 \pm 0.39$  cm for stallions. The heart girth had average values of  $183.73 \pm 0.29$  cm for broodmares and  $185 \pm 0.40$  cm for stallions, while the cannon circumference had average values of  $20.83 \pm 0.1$  cm for females and  $21.52 \pm 0.23$  cm for males. Based on these results, it was observed that the studied group is homogeneous concerning all three analysed traits. The data obtained from the measurements are within the breed's standard and justify the promotion/maintenance of these horses within the stud farm's broodstock.*

**Key words:** broodmares, dimensions, horses, stud farm.

### INTRODUCTION

The Furioso North Star horse breed, also known as the "half-blood" was created at the Mezőhegyes Stud in Hungary, in the early 19th century by merging two families of English half-blood horses, founded by Furioso and North-Star stallions (Klein et al., 2022).

The breed exhibits intermediate characteristics for both carriage and riding. Furioso-North Star horses are distinguished by an elegant and imposing bearing. They have a harmonious conformation and a rectangular lateral body shape. They have a relatively large development (the height ranges between 164-166 cm and a body mass of 550-600 kg) and a robust constitution, with wide, broad base and joints (Doliș et al., 2023).

In 1919, an important population of Furioso-North Star horses (44 broodmares, 7 Furioso-North Star stallions, supplemented by 2 Thoroughbred stallions) was established at the Bonțida Stud in Cluj County, Romania, from the Mezőhegyes Stud (Mureșan & Daniel, 2003).

In the time period of 2000-2004, the herd of Furioso-North Star was raised at the Jegălia Stud, and starting 2004 to 2010, it was relocated

to Slatina Stud. Later, for a brief period of only one year, it was relocated at the Beclean Stud. Since 2012, the Furioso North Star population has been raised at the Rușețu Stud, in Buzău County.

Over time, specialists involved in the breeding activity have continuously sought to improve the quality of the horses, especially those comprising the reproduction herd (broodmares). Through this study, we aim to contribute as much as we can to revealing the morphological aspects influencing the performance of this breed. Considering the limited and outdated data on the evolution of the Furioso-North Star population in Romania, we consider useful to conduct this research on the current reproduction population of this breed.

### MATERIALS AND METHODS

The biological material consisted in 89 horses from the Furioso-North Star breed, specifically 66 broodmares (from the 2001-2019 generations) and 23 stallions (from the 1999-2019 generations).

Out of the 23 stallions, 7 served as sires, and along with the total of 66 broodmares, formed

the reproduction herd (broodmare population) at the Rușețu Stud (this situation persisted starting 2012 and it ended in 2022, according to the data recorded in the Stud's Genealogical Registry). The remaining 16 stallions were used for public breeding.

The traits that were the subject of the study were the body dimensions previously mentioned in the ranking activity: height at the withers, heart girth, and cannon girth. Measurements were conducted using standard tools, as the height measuring stick and measuring tape (Georgescu & Petrache, 1990; Marginean et al., 2005).

The data obtained from the measurements were statistically processed (Georgescu & Petrache, 1990).

## RESULTS AND DISCUSSIONS

The data obtained from measurements of the height at the withers have been statistically processed and centralized in Table 1.

According to these data, it can be stated that the height at the withers measurements ranged

between 155 and 171 cm, with an average value of  $161.33 \pm 0.20$  cm. Therefore, the studied population was homogeneous, with a coefficient of variation of 2.18% (CV). Data regarding the mare population are very close, with an average height at the withers of only 0.05 cm larger than the value obtained for the total population.

For mares, the height at the withers ranged between 155 and 171 cm, with an average value of  $161.33 \pm 0.20$  cm. When comparing these data with those provided by literature from the 1970s ( $157.81 \pm 0.38$  cm) (Velea et al., 1980), when Furioso-North Star was raised at the Bonțida Stud Farm, it can be stated that in broodmares, this trait has increased on average by 3.4 cm (+2.23%).

For the stallions included in the study, the height at the withers ranged between 155 and 167 cm, with an average value of  $161.43 \pm 0.39$  cm. Compared to mares, the average value of this dimension was only 0.10 cm larger in stallions (+0.06%).

Table 1. The values of height at the withers (cm)

Specification	Total number of horse population	Total number of breeding herd	Broodmares		Stallions			Public breeding stallions
			*	Total	Sires			
					Total	*		
N	89	73	66	52	23	7	7	16
MEAN±SEM	161.33 ±0.20	161.38 ±0.22	161.29±0.23	157.81±0.23	161.43±0.39	162.29 ±0.61	159.50±1.16	161.06±0.49
SD	3.51	3.45	3.53	-	3.51	2.63	-	3.86
CV%	2.18	2.14	2.19	-	2.18	1.62	-	2.39
MIN.	155.00	155.00	155.00	-	155.00	160.00	-	155.00
MAX.	171.00	171.00	171.00	-	167.00	167.00	-	167.00

\*Velea C. et al., 1980.

The sires had an average value of the height at the withers of  $162.29 \pm 0.61$  cm, which is 1.23 cm larger (+0.76%) than the average value for public breeding stallions, and 1 cm larger (+0.62%) than that of broodmares. Compared to the values recorded in the 1970s at the Bonțida Stud ( $159.5 \pm 1.16$  cm), the sires' height at the withers has increased on average by 2.79 cm (+1.75%).

The heart girth (Table 2) recorded absolute values, across the entire studied population, ranging between 171 and 197 cm, with an average value of  $184.06 \pm 0.24$  cm. It can be

stated that the population is homogeneous regarding this characteristic (the coefficient of variation is 2.86%).

For the broodmare population, the chest circumference was on average only 0.14 cm smaller (-0.08%).

In females, the heart girth had an average value of  $183.73 \pm 0.29$  cm. Compared to the data obtained at the Bonțida Stud in the 1970s ( $188.80 \pm 0.70$  cm) (Velea et al., 1980), it is observed that the chest circumference has decreased on average by 5.7 cm (-2.76%).

Table 2. The values of heart girth (cm)

Specification	Total number of horse population	Total number of breeding herd	Broodmares		Stallions			
			*	Total	Sires		Public breeding stallions	
N	89	73	66	52	23	7	7	16
MEAN±SEM	184.06±0.24	183.92±0.25	183.73±0.29	188.80±0.70	185.00±0.40	185.71±0.20	190.00±1.76	184.69±0.20
SD	5.26	5.57	5.72	-	3.61	3.68	-	3.65
CV%	2.86	3.03	3.11	-	1.95	1.98	-	1.97
MIN.	171.00	171.00	171.00	-	177.00	180.00	-	177.00
MAX.	197.00	197.00	197.00	-	192.00	191.00	-	192.00

\*Velea C. et al., 1980.

The heart girth for the entire population of stallions had an average value of 185±1.95 cm, which is 0.94 cm (+0.69%) more than for broodmares. In sires, this characteristic had an average value higher by 1.02 cm (+0.55%) compared to public breeding stallions and by 1.98 cm (+1.08%) compared to mares. It can also be observed that over approximately five decades, the chest circumference of sires has decreased on average by 4.29 cm (-2.31%).

The cannon girth had values that fall within the breed standard, ranging between 19.5 and 25 cm, with an average of 21.01 ± 0.1 cm (Table 3). Also, in terms of this characteristic, the coefficient of variation is low (4.10%), thus, the

studied population is considered homogeneous. The average value of the characteristic for mares was 20.84 ± 0.09 cm. In broodmares, the average value of the characteristic was slightly lower by only 0.1 cm (-0.48%) compared to sires.

The public breeding stallions recorded cannon girth values between 20 and 25 cm, with an average value higher by 0.85 cm (+4.06%) compared to sires and by 0.95 cm (+4.86%) compared to mares. Compared to the data obtained at the Bonțida Stud Farm in the 1970s (Velea et al., 1980), an average increase of 0.96 cm (+4.83%) is observed in mares, and a decrease of 0.14 cm (-0.67%) in sires.

Table 3. The values of cannon girth (cm)

Specification	Total number of horse population	Total number of breeding herd	Broodmares		Stallions			
			*	Total	Sires		Public breeding stallions	
N	89	73	66	52	23	7	7	16
MEAN±SEM	21.01±0.10	20.84±0.09	20.83±0.10	19.87±0.09	21.52±0.23	20.93±0.09	21.07±0.25	21.78±0.12
SD	0.86	0.65	0.64	-	1.17	0.73	-	1.25
CV%	4.10	3.10	3.08	-	5.45	3.50	-	5.74
MIN.	19.50	19.50	19.50	-	19.50	19.50	-	20.00
MAX.	25.00	22.00	22.00	-	25.00	22.00	-	25.00

\*Velea C. et al., 1980.

The data obtained from body measurements were also used to calculate various body indices, as: the digital-thoracic index, the bone index, and the massiveness index (Tables 4-6).

In the studied population, the digital-thoracic index (the percentage ratio between the cannon girth and the chest circumference) had values ranging from 10.37% to 13.44%, with an

average of 11.34 ± 0.08% in females and 11.63 ± 0.16% in males (Table 4). Compared to the values calculated based on the average values recorded for the cannon girth and the heart girth in the 1970s (Velea et al., 1980), a slight increase is observed in the current population, by 0.82 percentage points on average in mares and 0.18 percentage points in sires.

Table 4. The values of digital-thoracic index (%)

Specification	Total number of horse population	Total number of breeding herd	Broodmares		Stallions			
				*	Total	Sires	Public breeding stallions	
N	89	73	66	52	23	7	7	16
MEAN±SEM	11.42±0.07	11.34±0.07	11.34±0.08	10.52	11.63±0.16	11.27±0.07	11.09	11.79±0.08
SD	0.49	0.43	0.43	-	0.59	0.43	-	0.59
CV%	4.28	3.77	3.79	-	5.04	3.80	-	4.97
MIN.	10.37	10.37	10.64	-	10.37	10.37	-	10.99
MAX.	13.44	12.64	12.64	-	13.44	11.67	-	13.44

\*values calculated based on data from Velea C. et al., 1980.

The bone index (the percentage ratio between the cannon girth and the height at the withers) had approximately similar values, ranging across the entire studied population between 11.98% and 16.13%, with an average of  $12.91 \pm 0.08\%$  in females and  $13.35 \pm 0.20\%$  in

males (Table 5). Compared to the values calculated for the mare population at the Bonțida Stud Farm in the 1970s (Velea et al., 1980), the index recorded a slight increase of only 0.32 percentage points in mares and 0.31 percentage points in sires.

Table 5. The values of bone index (%)

Specification	Total number of horse population	Total number of breeding herd	Broodmares		Stallions			
				*	Total	Sires	Public breeding stallions	
N	89	73	66	52	23	7	7	16
MEAN±SEM	13.03±0.08	12.91±0.07	12.91±0.08	12.59	13.35±0.20	12.90±0.08	13.21	13.54±0.11
SD	0.60	0.40	0.39	-	0.93	0.53	-	1.02
CV%	4.64	3.09	3.01	-	6.99	4.11	-	7.50
MIN.	11.98	12.04	12.26	-	11.98	12.04	-	11.98
MAX.	16.13	14.19	14.19	-	16.13	13.75	-	16.13

\*values calculated based on data from Velea C. et al., 1980.

Regarding the massiveness index (the percentage ratio between the chest circumference and height at the withers), had an average value of  $113.93 \pm 0.22\%$  in mares and  $114.65 \pm 0.38\%$  in sires, with limits within the studied population ranging from 106.79% to 121.66% (Table 6).

In comparison, for this index, the value calculated for the population in the 1970s (Velea et al., 1980) was higher by 5.71 percentage points in the case of mares and by 4.66 percentage points for sires.

## CONCLUSIONS

Following the study conducted on the breeding population of Furioso-North Star horses from the Rușețu Stud, the following conclusions were drawn:

- The studied population was homogeneous in terms of all analysed characteristics, with coefficients of variation having maximum values of 7.5%.
- The data obtained in this study fall within the limits specified by the literature and the conformation assessment criteria for the Furioso-North Star breed.
- The studied horses exhibited appropriate development, allowing them to be promoted and maintained in the breeding herd of the stud farm, both as broodmares and sires, as well as public breeding stallions. Based on the differences in values obtained for the studied dimensions and body indices in the current population compared to those from the 1970s, a trend of increasing height at the withers (towards hypermetric development) and a reduction in heart girth can be

observed over time. This suggests the shaping of a more refined and robust constitution, with a harmonious and supple conformation. These aspects recommend the Furioso-North Star horses as excellent for sport. Regarding this aspect it can be stated that the present analysis reveals the fact that the breeding perspective was fulfilled in Rușețu Stud to increase the height at the withers and to reduce the hearth girth for the Furioso-North Star horse breed. Furthermore, the information found in the literature are outdated.

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