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The Determination of Situation and Breed Characteristics of Turkish Rahvan Horse in Turkey

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Abstract: This study was conducted to determine body characteristics and speeds of Rahvan horses racing at Pace Horse Races in Turkey. A total of 1258 Rahvan horses racing at 20 pace races between 1999 and 2000 years in Turkey were inspected. The speeds of 125 winner horses and body measurements of 120 Rahvan horses were determined. The speeds of winner horses racing at different native categories were calculated as 21.66-34.20 km h^{-1} for Tozkoparan, 25.11-37.04 km h^{-1} for Deste, 28.97-39.07 km h^{-1} for Kucuk orta, 30.20-36.63 km h^{-1} for Buyuk orta, 27.05-43.06 km h^{-1} for Bas alti, 32.26-40.52 km h^{-1} for Bas, respectively. The averages of head length, neck length, height at withers, body length, height at rump, heart girth circumference, chest depth, chest width and cannon bone circumference as body measurements were found as 56.49, 69.80, 139.21, 141.60, 138.28, 155.30, 58.38, 34.24 and 17.69 cm, respectively. There is no significantly difference for inspected body measurements among age or sex groups, except for cannon bone circumference. The averages of cannon bone circumference of 3 years old horses and mares were found as lower than the others ($p<0.05$). And the ratio of height at rump to height at withers in mares was higher than stallions ($p<0.05$). The Pacing speed of Turkish Rahvan Horses was found as lower than the other breeds that can pace in the World. It was concluded that Turkish Rahvan Horses should be improved with respect to increase height at withers and to lengthen and to thin neck.

Key words: Pace horse, speed, body measurements, determination, Rahvan horses, Turkey

INTRODUCTION

Only the sounds of two steps are heard in Pacing of the Rahvan horse. The front and back feet on the right of the body move forward together, then the front and back feet on the left move forward together. Although, it is named as Pacing, the steps are fast and rhythmic therefore, they enable the horse go fast. Since, the right and left feet move in return, the rider do not move up and down but shake left to right.

Every horse can not pace. In order to pace, the horse should have the feature of Pacing. Special study or even force is required to have the horses pace if they are not Rahvan born. It has been stated that some horses can not pace or some, if they can could do it very slowly.

Rahvan is called Yorga or Corga in middle Asia. Rahvan horse is very important in middle Asia even today. Kidirmayev (1994), mentions about Rahvan horse and states that It is a national game to raise Yorga Horse and Kirghiz people have been raising them since old times. The reason for this is that the Yorga horses are more enduring and carry the passenger more easily compared to galloping horses.

During Ottoman period Pacing horses are seen as the horses raised and trained by the Turks (Esin and Emine, 1995; Anonymous, 2009a). For this reason the Rahvan horses in the country should be accepted as a race horses and the features of the race should be defined by conducting studies on the issue. Rahvan horses that were owned only by Turks for many years were taken abroad. As the result of the studies, it is estimated that there are around 50,000 Rahvan horses in Turkey. It has been stated that today, mostly in Aegean and Marmara regions, 3000 Rahvan horses participate to the 300 horse races organized by either local authorities or private people (Gulec, 1996).

Hendricks (1995) informs us about Rahvan horse as follows; though they have small body and consume little

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feed they can carry heavier loads using less energy, when compared to bigger horses. They provide easy and smooth ride. They keep their head and tail erect, while Pacing. All colors can be seen. Height at withers is 10.3-15.1 (13.1) hand span. The head is very beautiful neck is thick and muscular, back is short the chest is wide and deep, the feet have hard nails and they are strong.

In Turkey, there are different types of horses under the concept of local horse like Anatolian horse, Canik horse, Cirit horse, Malakan horse, Uzunyayla horse, Cukurova horse. Besides these locally raised breeds, there are other Turkish horse races raised out of Turkey such as Girit horse, Turkmen Horse, Yakutian horse, Kirghiz horse (Arpacik, 1996).

There are not enough studies on the features and speed of the local horse races raised in Turkey. It was impossible to find information especially on Rahvan horses.

Information about Rahvan speed was encountered for the first time in 1871. According to this data, it was stated that one mile is covered at 2 min 25 sec with Pacing. This is equal to 40 km h^{-1}.

Besides, it was stated that steady star called standardbred race paced one mile in 1 min 50 sec (51 km h^{-1}) (Anonymous, 2009b). According to the data on the Pacing of Iceland's Rahvan horse, it was stated that they reached at a speed of 30 mph (approximately 48.28 km h^{-1}) (Anonymous, 2009c) or even more than that (Anonymous, 2009d). Gulec (1996) reported that the speed record of Rahvan with a rider is 1000 m in 1 min 13 sec (nearly 49.3 km h^{-1}), the speed record with coach is reported as 1600 m in 1 min 55 sec (nearly 50 km h^{-1}). Gulec also states that in the history of Pacing the longest destination covered with Pacing was 500 km, he states that today the world record is 312 km a day. Kidirmayev (1994) reported that Rahvan horse races in Kirgizhistan are performed at different distances up to 10 km.

Only body measurements were studied in some researches carried out on local horses in Turkey. These researches include the following studies, Batu (1939) studied on Karacabey Arabian mares; Ariturk (1956) on Uzunyayla and Malakan Horses; Yarkin (1953) on Canik horses; Said (1940) on Anatolian local horses and Kirmizibayrak *et al*. (2004) studied on Kars region Turkish local horses.

The purpose of this research is to define the existing situation of the Rahvan horses, one of the most important gene sources and national values and to define the body measurements and speeds of the Rahvan horses participating Pacing horse races.

MATERIALS AND METHODS

The animal population of this research is consisted of 1258 Rahvan horses that participated 20 Pacing horse races in 1999 and 2000 (Table 1). However, it is estimated that the real number was around 900-1000 since some of the horses participated more than one race during the stated years and counted several times in races.

It is almost impossible to define the horses that participated the Pacing horse races due to a number of factors. The factors can be listed as follows, there was no

Table 1: The number of horses participated in Pacing horse races that have been studied

Race	Date	Tozkoparan 2 years old colts	3 years old colts	4 years old colts	Deste	Kucuk orta (A)	Kucuk orta (B)	Buyuk orta	Bas alti	Bas	Total
Alanya	24.10.1999	1	3	2	3	6	-	3	4	9	31
Babadag	12.11.2000	-	4	4	-	23	-	12	6	9	58
Cayli	10.10.1999	-	10	-	11	10	41	12	10	12	106
Cayli	08.10.2000	7	7	9	-	36	5	10	8	7	89
Ciftlik	17.09.2000	-	7	-	7	38	-	6	9	9	76
Degirmendere	18.07.1999	5	1	6	27	10	-	7	9	3	68
Golcuk	17.09.2000	1	4	6	25	12	-	6	7	4	65
Hacikebir	28.05.2000	-	3	-	3	4	15	5	4	7	41
Karapurcek	13.06.1999	-	5	10	34	10	-	10	5	13	87
Karapurcek	04.06.2000	-	10	21	43	23	-	12	8	14	131
Kayapa	25.06.2000	4	5	-	14	15	-	7	6	8	59
Konya	03.10.1999	-	8	-	-	9	5		5	6	33
Konya	15.10.2000	-	8	-	-	7	-	10	7	7	39
Kusadasi	21.11.1999	3	5	-	-	8	9	3	4	9	41
Mahmudiye	12.09.1999	6	-	8	8	19	-	14	18	17	90
Mahmudiye	27.08.2000	-	4	7	-	26	-	9	6	11	63
Odemis	30.04.2000	2	-	6	2	27	-	8	3	5	53
Soke	07.05.2000	-	-	5	2	12	-	4	4	4	31
Yatagan	07.08.1999	2	-	5	3	11	-	8	5	3	37
Yumrutas	24.09.2000	2	6	7	-	22	-	11	4	8	60
Total		219	-	-	182	403	-	157	132	165	1258

record keeping about the horses that participated the races, the horses that participated were called with their owner's name rather that the horse's own name and the owner and the place, where the horse came were given priority, the fact that when the horses were sold their names were changed as well, the names of the horse that would participate to the race were not known beforehand as they were registered just before the race and finally the fact that the horses that participate in races did not have pedigree or passport.

In addition to these factors, the tracks where the races were held do not have standard structure. Due to lack of assistance of the race organizations, it was impossible to define the speeds of the horses in Cayli Pacing Rahvan races that took place on 8th October, 2000. The track in Cayli is wide and flat so the referee team that follows the race had to follow the horses with vehicles. In the first race (in 1999), the researcher followed the speeds when he was accepted to the vehicle. However, in the second race in 2000 he was not taken to the vehicle. Therefore, he could not detect the speed values.

To define the race performances of the Rahvan horses in races, the race speeds were calculated considering the distances, the Pacing time of the winner horses were recorded with chronometer for every group according to the categories (Tozkoparan: 2 years old colts, Deste: 3 years old colts, Ayak: 4 years old colts, Kucuk orta: 5 years old colts, Buyuk orta: 5 years old or older horses that won the kucuk orta at least three times Bas alti: 5 years old or older horses that won the buyuk orta at least 3 times and Bas: 5 years old or older horses that won the bas alti at least 3 times).

Information and measurements were taken only about 120 horses among those participated to the races. Besides the owner of the horse, information about the race, sex, age, color and markings of he horses have been registered. As body measurements, Head Length (HL), Neck Length (NL), Body Length (BL), Height at Withers (HW), Height at Rump (HR), Chest Depth (CD), Chest Width (CW), Heart Girth Circumference (HGC) and fore leg Cannon Bone Circumference (CBC) were taken using measuring compass, tape and measurement stick. It was impossible to measure some parts of the horses at times (especially head circumference and neck) due to the horses bad temper. Therefore, the measurements obtained from the examined horses were used for evaluation.

The owners of Rahvan horses that will participate to the races are jealous of their animals so they do not let anyone approach their horses. They prefer to come to the track just before the race and take part in the races after warming their animals rather than bring them early and wait there for the race. The owners do not let us measure the body measurements of the horses, when they started for warming up exercise to avoid cooling sweat. For this reason interview with the owners on body measurements of the horses were done just before the race, for a short time, we did not have much chance to take body measurements.

The data obtained for body measurements was grouped according to age and sex factors and statistical values of the factors were calculated. Analysis of variance was applied to age and sex groups and differences among groups were determined with t-test (Perrie and Watson, 1999). Statistical analysis was done using SPSS.15.0 packet program (SPSS, 2006).

RESULTS AND DISCUSSION

Pacing speed: The speed values belonging to 125 winner horses in the races in 1999-2000 were given in Table 2. When the Table 2 is examined, it will be observed that the speed varied in different types. The speed of horses according to categories were found as follows, Tozkoparan and colts 21.66-34.20 km h^{-1}, Deste 25.11-37.04 km h^{-1}, Kucuk orta 28.97-39.07 km h^{-1}, Buyuk orta 30.20-36.63 km h^{-1}, Bas alti 27.05-43.06 km h^{-1} and Bas 32.26-40.52 km h^{-1}.

No information was found on Rahvan horses in the studies conducted about Turkish horses. Therefore, since there was no value on the speed of local horse races, the evaluation was done according to the Pacing values obtained from the horse races in the world. When the speeds given at Table 2 were examined, the speed average according to the categories would be seen as follows. In colts 28.79 km h^{-1}, deste 31.92 km h^{-1}, kucuk orta 33.26 km h^{-1}, buyuk orta 33.68 km h^{-1}, bas alti 34.26 and bas 36.35 km h^{-1}. The order meets an expectation. When they are examined individually the highest speed was recorded in Konya in 1999 in bas alti category as 43.06 km h^{-1}. However, when compared to the Pacing speed of other races in the world, it shows similarity to the 40 km h^{-1} speed recorded in 1871 (Anonymous, 2009b).

With selection and cross breeding studies so far, this speed value has been over passed and reached 51 km h^{-1} in Standardbred breed (Anonymous, 2009b). When compared with this rate, the fastest Pacing horse in Turkey turns out to be slow. Even the 48.28 km h^{-1} speed (Anonymous, 2009c) of Pacing of Iceland breed, which is among the Pacing races, seems much faster than the fastest Rahvan in Turkey. When general information on Pacing speed is compared it reveals that there is no need to compare the speed with world records.

Table 2: The Pacing speed of winner horses according to the categories (km h^{-1})

Race	Tozkoparan 2 years old colts	3 years old colts	4 years old colts	Deste	Kucuk orta (A)	Kucuk orta (B)	Buyuk orta	Bas alti	Bas
Alanya	21.66	23.57	26.83	29.79	35.98	-	30.99	33.75	36.16
Babadag	31.97	-	34.20	-	37.87	-	36.63	36.55	36.64
Cayli	-	24.23	-	25.11	32.12	-	32.83	34.83	37.08
Ciftlik	26.83	27.52	-	31.14	34.91	-	37.16	33.49	36.50
Degirmendere	26.40	24.12	25.70	29.33	33.33	-	31.43	32.64	34.53
Golcuk	-	28.27	27.14	30.86	29.83	-	31.58	32.00	33.00
Hacikebir	-	-	-	29.33	29.13	28.97	30.99	-	36.86
Karapurcek (1999)	28.61	-	33.49	32.98	34.15	-	34.15	33.49	36.92
Karapurcek (2000)	29.76	-	33.66	33.89	33.76	-	35.71	36.23	37.36
Kayapa	-	-	-	30.66	31.30	-	32.92	32.77	35.62
Konya (1999)	29.67	-	-	-	31.49	-	30.20	43.06	38.30
Konya (2000)	-	-	32.24	35.23	35.71	-	-	35.47	36.72
Kusadasi	-	26.24	-	27.82	31.23	33.29	33.79	34.65	34.85
Mahmudiye (1999)	31.25	31.74	31.68	37.04	33.96	-	33.95	34.30	35.75
Mahmudiye (2000)	30.72	-	32.67	-	33.72	-	33.99	34.95	40.52
Odemis	25.22	-	32.37	34.82	39.07	-	36.58	37.58	39.15
Soke	23.12	27.43	-	35.05	32.96	33.18	35.89	30.45	32.26
Yatagan	29.62	-	30.79	35.82	32.73	-	33.91	27.05	-
Yumrutas	28.65	29.51	31.94	-	32.95	-	33.56	33.43	36.01
Total	-	28.79±0.57	-	-	31.92±0.87	33.26±0.54	33.68±0.50	34.26±0.76	36.35±0.46

Body measurements: The statistical values related to the body measurements of the Rahvan horses that participated Pacing races were given in Table 3 according to their age groups. In Table 4, their sex groups, body measurements and especially their rate to height at withers were given. When the statistical values in Table 3 were examined, no significantly difference was determined among age groups in terms of body measurement-except cannon bone circumference. Related to the canon bone circumference, it can be said that it is the lowest at the age of three and there were no difference at the age of four and later ages however, it gradually increased at later ages.

When the differences among sexes were examined (Table 4) it can be said that the canon bone circumference is thicker in males ($p<0.05$). In addition, the rate of height at rump to the height at withers shows significant difference ($p<0.05$). While there were no differences between the height at rump and withers the fact that there was difference when rated can be explained due to the fact that the height at withers is more in males though the height at rump is nearly the same for both sexes. From a different viewpoint, the fact that the average height at rump is 1.15 cm longer than height at withers in females and in males just the opposite, the average of the height at withers is 1.13 cm longer than the average of height at rump therefore, the rate of withers of that of rump resulted from this fact.

The body measurements of 120 horses that participated in Pacing horse races were taken and evaluated. The average measurements were compared to those of the former studies: Batu (1939) studied 79 Karacabey Arabian mares, Ariturk (1956) studied on 91 Uzunyayla and 63 Malakan Horses, Yarkin (1953) studied on 27 Canik horses, Said (1940) Anatolian local horses, Cukurova type, Local type and Local type under the influence of Arab and Kirmizibayrak *et al*. (2004) studied on 117 Kars region Turkish local horses.

Head length: The average of head length was found as 56.49±0.26 cm. This value showed similarity in Uzunyayla (56.846 cm), Malakan (56.826 cm) and Karacabey Arab horses (56.22 cm) to the reported head length however, it was found higher in Anatolian local (52.75 cm), Canik (52.63 cm) and Local horses in Kars region (54.78 cm).

Besides, the rate of head length in this study, 40.59±0.20%, to the height at withers was found higher in Karacabey Arab horses (36.78%), Anatolian local (38.9%), Canik (39.1%) and for Uzunyayla horses (39.45%) and lower for the Malakan horses (41.809%). The rate of head length calculated as 81.21±0.61% to the length of neck was found higher than that of the following breeds Uzunyayla (70.98%) and Malakan (71.03%), similar to that of Canik (80.87%) and lower than that of Anatolian local horses (89.15%).

Neck length: The rate of head length to the neck length shows itself here too. The neck length calculated as 69.80±0.39 for the Rahvan horses it was found higher in Canik (65.077 cm) and Anatolian local (57.23 cm) and lower for Uzunyayla (80.087 cm) and Malakan horses (80.00 cm). The rate of the neck length to the height at withers, 50.13±0.27 in Rahvan horses was found lower for Uzunyayla (54.90%) and Malakan (58.09%), whereas it was higher for Canik (48.50%) and Anatolian local (41.8%). When the local breeds were examined, it was seen that Rahvan breeds showed average values in neck length.

Table 3: Body measurements according to age groups (Mean±SE)

	≤3 years old		4 years old		5 years old		6 years old	
Measurements	n	Mean±SE	n	Mean±SE	n	Mean±SE	n	Mean±SE
HL (cm)	15	56.60±0.74	13	56.00±0.51	26	56.42±0.65	15	56.40±0.62
HL/NL (%)	15	84.05±2.12	13	80.39±1.89	25	81.36±1.37	15	79.11±1.22
HL/HW (%)	15	41.20±0.63	13	39.88±0.34	26	40.59±0.51	15	40.68±0.41
NL (cm)	15	67.67±1.06	13	70.08±1.60	25	69.60±0.82	15	71.47±1.12
NL/HW (%)	15	49.23±0.72	13	49.91±1.13	25	50.00±0.45	15	51.56±0.81
HW (cm)	15	137.47±0.91	13	140.46±1.15	26	139.10±0.71	15	138.67±1.05
BL (cm)	15	138.60±1.28	13	142.85±1.22	26	141.46±0.76	15	141.20±1.19
BL/HW (%)	15	100.83±0.66	13	101.73±0.79	26	101.74±0.58	15	101.84±0.62
HR (cm)	15	136.93±1.16	13	139.38±1.26	26	137.87±0.68	15	137.80±0.97
HR/HW (%)	15	99.62±0.61	13	99.23±.41	26	99.13±0.33	15	99.38±0.23
HGC (cm)	15	152.60±1.13	13	156.00±1.74	26	156.63±1.45	15	155.47±1.31
HGC/HW (%)	15	111.03±0.68	13	111.06±0.83	26	112.65±1.08	15	112.17±1.05
CD (cm)	15	57.47±1.55	13	58.04±0.81	25	59.68±0.94	14	57.71±0.97
CD/HW (%)	15	41.80±1.11	13	41.33±0.54	25	42.98±0.72	14	41.67±0.70
CW (cm)	15	34.27±0.88	13	35.19±1.31	25	33.76±0.54	14	34.86±0.78
CW/HW (%)	15	24.94±0.67	13	25.05±0.88	25	24.31±0.40	14	25.16±0.56
CBC (cm)	15	17.13^{c}±0.13	13	17.69^{abc}±0.17	26	17.71^{abc}±0.14	15	17.47^{bc}±0.22

	7 years old		8 years old		9 years old		10-12 years old	
Measurements	n	Mean±SE	n	Mean±SE	n	Mean±SE	n	Mean±SE
HL, cm	14	55.57±0.59	13	56.62± 1.01	10	56.50± 0.87	13	57.92± 0.77
HL/NL (%)	14	77.45± 0.90	14	75.17± 5.94	9	83.37± 3.36	13	83.71± 1.49
HL/HW (%)	14	39.71± 0.57	14	37.72± 2.97	10	40.65± 0.57	13	41.37± 0.54
NL (cm)	14	71.79± 0.54	14	69.79± 0.82	9	68.33± 2.15	13	69.31± 0.79
NL/HW (%)	14	51.29± 0.54	14	50.15± 0.65	9	49.03± 1.59	13	49.51± 0.66
HW (cm)	14	140.07± 1.09	14	139.21± 1.00	10	139.00± 1.10	13	140.08± 1.15
BL (cm)	14	142.96± 1.22	14	142.18± 1.73	10	141.00± 1.53	13	142.92± 0.97
BL/HW (%)	14	102.09± 0.76	14	102.11± 0.84	10	101.47± 1.10	13	102.10± 0.94
HR (cm)	14	140.25± 1.15	14	137.86± 1.13	10	137.30± 1.05	13	139.15± 1.04
HR/HW (%)	14	100.13± 0.23	14	99.02± 0.28	10	98.79± 0.45	13	99.37± 0.52
HGC (cm)	14	156.14± 1.41	14	153.43± 1.23	10	154.20± 1.91	13	156.85± 1.40
HGC/HW (%)	14	111.49± 0.73	14	110.23± 0.71	10	110.96± 1.29	13	112.04± 1.23
CD (cm)	14	56.86± 0.82	14	58.32± 1.06	9	57.89± 1.27	13	60.00± 0.82
CD/HW (%)	14	40.60± 0.52	14	41.90± 0.72	9	41.55± 0.61	13	42.88± 0.76
CW (cm)	14	33.39± 0.58	14	34.54± 0.97	8	33.25± 1.03	13	34.69± 0.95
CW/HW (%)	14	23.88± 0.53	14	24.84± 0.75	8	23.80± 0.73	13	24.76± 0.62
CBC (cm)	14	18.07^{ab}± 0.22	13	17.77^{abc}± 0.36	10	17.50^{bc}± 0.27	12	18.21a± 0.29

$^{a-c}$The differences between values with different superscript letters in the same line are significant ($p<0.05$). HL: Head Length, NL: Neck Length, HW: Height at Withers, BL: Body Length, HR: Height at Rump, HGC: Heart Girth Circumference, CD: Chest Depth, CW: Chest Width, CBC: Cannon Bone Circumference

Table 4: Body measurements according to sex groups (Mean±SE)

	Mares		Stallions		Total		
Measurements	n	Mean±SE	n	Mean±SE	n	Mean±SE	P
HL (cm)	10	56.50±0.86	109	56.49±0.27	119	56.49±0.26	-
HL/NL (%)	10	82.86±2.03	107	81.06±0.64	117	81.21±0.61	
HL/HW (%)	10	41.21±0.65	109	40.54±0.21	119	40.59±0.20	-
NL (cm)	10	68.40±1.28	108	69.93±0.41	118	69.80±0.39	-
NL/HW (%)	10	49.90±1.05	108	50.16±0.28	118	50.13±0.27	-
HW (cm)	10	137.20±1.48	110	139.40±0.35	120	139.21±0.35	-
BL (cm)	10	141.20±1.51	110	141.64±0.45	120	141.60±0.43	-
BL/HW (%)	10	102.99±1.28	110	101.62±0.26	120	101.74±0.26	-
HR (cm)	10	138.35±1.22	110	138.27±0.38	120	138.28±0.36	-
HR/HW (%)	10	100.86±0.36	110	99.20±0.14	120	99.33±0.13	*
HGC (cm)	10	155.20±1.84	110	155.31±0.56	120	155.30±0.53	-
HGC/HW (%)	10	113.18±1.39	110	111.45±0.37	120	111.59±0.36	-
CD (cm)	10	58.70±1.20	107	58.35±0.40	117	58.38±0.38	-
CD/HW (%)	10	42.83±1.01	107	41.87±0.29	117	41.95±0.28	-
CW (cm)	10	33.80±0.99	106	34.28±0.31	116	34.24±0.30	-
CW/HW (%)	10	24.65±0.72	106	24.60±0.23	116	24.60±0.22	-
CBC (cm)	10	17.05±0.26	108	17.75±0.08	118	17.69±0.08	*

*: $p<0.05$; $p>0.05$. HL: Head Length, NL: Neck Length, HW: Height at Withers, BL: Body Length, HR: Height at Rump, HGC: Heart Girth Circumference, CD: Chest Depth, CW: Chest Width, CBC: Cannon Bone Circumference

While Rahvan breeds show similarity to Uzunyayla and Malakan horses in terms of head length, they are shorter than the same breeds in terms of neck length. Rahvan horses are placed at upper places in the list among local breeds in terms of head length. When the obtained results were evaluated generally, it can be said that the neck length was shorter when compared to head length or head length was longer to that of neck.

Height at withers: The average height at withers for Rahvan horses is calculated as 139.21±0.35 cm. Uzunyayla horses (145.869 cm) are highly longer than Rahvan horses in terms of the height at withers. However, the averages of the height at withers for Malakan (137.715 cm), Kars Region local horses (137.26 cm), Anatolian local horses (136.43 cm), Local type (134 cm) Cukorova type (136.8 cm), Local type under the influence of Arab (134.30) and Canik (134.778) were lower than the average rate defined for the Rahvan horses. Generally, the height at withers for Rahvan horses can be regarded higher than other local horses. However, when they are compared to the height at withers of Karacabey Arap mares (152.84 cm), they are very short.

Body length: There is no similarity among local horses on body length. According to the data obtained about body length, Uzunyayla (150.143 cm), Karacabey Arab horses (147.8 cm) and Malakan (146.826 cm) have quite long bodies. However, Canik, Kars region local horses and in other local horse types, it was reported that body length changed between 130-137.60 cm. In this study, the average of body length that is calculated as 141.60±0.43 cm can be accepted as general average of the local types. In addition, when the rate of body length calculated as 101.74±0.26% to the height at withers is considered, it can be seen that it is similar to that of Uzunyayla (102.982%), lower than that of Malakan (106.112%) and higher than that of Karacabey Arab horses (96.81%). It can be said that Rahvan horses have a square looking body because of the closeness of the body length and the height at withers.

Height at rump: In this study, the height at rump was found as 138.28±0.36 cm. This value is lower than that of Karacabey Arab horses (151.87 cm) and Uzunyayla (145.33 cm), similar to the value of Malakan horses (138.778 cm) and higher than those of Kars region local horses (137.66 cm), Canik (135.185 cm) and Anatolian local horses (136.68 cm). As in the body length, Rahvan horses have the value that can be accepted as the general average of the local horses.

The rate of rump height to wither height was calculated as 99.33±0.13% for Rahvan horses. It can be said that this rate is the lowest rate among the values obtained (99.977-101.213%) from local breeds. This resulted from the fact that the height of rump is 1 cm shorter than that of wither. Generally evaluated, it attracts the attention that the averages of the height at rump for the local horses are higher than that of the height at withers. Besides, the rate of rump and wither height for female horses (100.86%), though it shows similarity to the general rate, it is seen that this rate (99.20%) is lower in male horses. In other words, while the height of rump is 1.13 cm shorter than that of wither in males; the situation is just reverse in females with 1.15 lengths. Although, there is not a statistical difference between male and female horses in terms of rump and wither height, significant differences have appeared on the rate of rump/wither height ($p<0.05$).

Heart girth circumference: In this study, the average heart girth circumference for Rahvan horses is calculated as 155.30±0.53 cm. This value is lower than the values of Karacabey Arab horses (173.68 cm), Uzunyayla (161.187 cm) and Malakan (158.841 cm), yet higher than the values of Canik (154.37 cm), Kars region local horses (151.17 cm), Anatolian local (147.29), Local under the influence of Arab (144.7 cm), Cukurova (147.2 cm) and local type (147 cm). When a general evaluation was made, the calculated average hearth girth circumference seemed to be the general average of the Anatolian local horse types. The value of 111.59±0.36% as the rate of hearth girth circumference to the height at withers was found higher in Anatolian horses (107.96%), similar to that of Uzunyayla (110.5%) and lower than those of Karacabey Arab horses (113.6%), Malakan (115.134%) and Canik (114.53%). This explains the fact that hearth girth circumference is lower than those of other breeds when compared to the height at withers.

Chest depth: The study shows that Rahvan horses with 58.38±0.38 cm chest depth have the lowest chest depth average among the local breed horses raised in Turkey. The same fact is valid for the rate of chest depth, calculated as 41.95±0.28% to the height at withers. Since both the chest depth was lower and the height at withers was higher than the other breeds, the rate of chest depth to the height at withers was found quite low.

Chest width: In this study, the average chest width for Rahvan horses is calculated as 34.24±0.30 cm. It attracts the attention that while this value shows similarity to the values of Uzunyayla (34.285 cm) and Malakan (34.016 cm), it was lower than the values of Karacabey Arab horses (42.38 cm), Kars region local horses (38.71 cm) and higher than those of Canik (31.76 cm) and Anatolian horses (31.07 cm). When the fact that normal length heart girth circumference and low chest depth is considered, the fact that the chest width is high explains an expected result.

Cannon bone circumference: The average of17.69±0.08 cm cannon bone circumference in Rahvan horses was found quite lower than the values of Uzunyayla (18.747 cm), Malakan (18.366 cm) and Karacabey Arab horses (18.86 cm), similar to the values of Kars region local horses (17.23 cm) and Canik horses (17.148 cm) and higher than that of Anatolian local horses (16.91 cm). This situation explains the fact that Rahvan horses have fine bone structure. In general, when a general appearance evaluation is made about the Rahvan horses that took part in Pacing races, it can be observed that the head is bigger when compared to the body, the neck is thick and short or the fore part of the body (head, neck, wither and shoulders) is thicker than the rest of the body. In fact, it can not be clearly said that head length is longer. However, when the rates of head length to the height at withers or to the neck length rate are examined, it is seen that these values are strikingly high. Therefore, the front part of Rahvan horses has highly thick appearance. Ariturk (1956) stated that muscular but short neck is not appropriate for speed. For this reason, improving these horses to raise their neck length will lead to forming an appropriate body shape to increase the speed. However, Gulec (1996) states that Pacing is unique to the horses with short structure and poor body balance. Besides, he states that the animals with heavy front part and high heaviness centre in the front (Camel, giraffe) generally pace, if you add a 2 kg load to the back feet of a horse the heaviness centre will be lowered and front heaviness centre will be up therefore, the animal would intend to Pacing. In the light of obtained data, it can be thought that chest depth is less when compared to other local breeds therefore, the fact that leg length (height at withers-chest depth) is longer than that of other local breeds leads to both increasing level of front heaviness centre and decrease in heaviness of the front part.

CONCLUSION

The speeds of the Rahvan horses that took part in Pacing races in Turkey is quite low. However, there is need for improvement studies as soon as possible. With the breeding and selection applications in Rahvan horses, the height at withers can be increased neck can be lengthened and extended, so the front heaviness centre will be up and Pacing will be much easier and speedy.

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