

# Some phenotypic traits of mules raised in Sirnak province of Turkey

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## **Abstract**

The purpose of this research study is to determine mules raised in province of Sirnak morphologically. This study was conducted to define body dimensions by analyzing sex and age by comparing with province of Ordu, region of East Anatolian, mean of Turkish, and UK mules. Data were analyzed for ANOVA and Student's T-Test using the Minitab 16 statistical programme. In this study a total of 38 mules, 18 males and 20 females, were used in three age groups (3-5, 6-8 and 9-18 years). Descriptive statistics of morphologic traits were for withers height  $132.7 \pm 0.67$ , height at rump  $133.7 \pm 0.73$ , body length  $135.1 \pm 0.84$ , heart girth circumference  $147.7 \pm 0.76$ , chest depth  $60.6 \pm 0.34$ , cannon circumference  $16.9 \pm 0.16$ , and head length  $56.8 \pm 0.26$  cm. In this study the distributions of coat colour were for bay colour 47.7%, black 7.9%, mouse gray 5.3%, white 31.6% and chestnut 10.5%. It was observed that growth is nearly complete at 3 years of age and then there was a small difference in body size. The present data showed that mules raised in province of Sirnak were slightly larger in body sizes than UK, East Anatolian, Turkish and Ordu mules.

**Key words:** Genetic resource, morphologic trait, body measurement, coat colour, Mule.

## Introduction

A mule is not a genus, species or breed but a hybrid offspring of male donkey and female horse. An offspring of female donkey and male horse is also called as hinny. Mules and/or hinnies are more patient, sure-footed, long-lived and hardier than horses. Hinnies are quite smaller than mules regarding body size and lighter in weight. (Yarkin 1962, [www.britishmulesociety.org.uk](http://www.britishmulesociety.org.uk) 2011<sup>a</sup>). The diploid chromosome number for horse is 64, that for donkey are 62 and that for the mule are 63 (Trujillo 1991). Though both male and female mules have all genitals, they are sterile and cannot give birth. There were only few evidence that mule reproduced (Anderson 1939, Jones 1985).

In the last century mules were used to be raised in mountainous areas of Black Sea, Marmara Regions, and Taurus mountain range (Yarkin 1962, Yilmaz et al 2012). Nowadays mules are mainly raised in provinces of Adiyaman, Balikesir, Hakkari, Icel, (South of) Konya, Ordu, Van, Mardin and Sirnak which have mountainous areas (Yilmaz 2011, Yilmaz et al 2012). In provinces of Hakkari, Mardin, Sirnak and Van Mules are generally used as load animal and by smugglers to carry some goods such as oil, sugar, rice between countries of Iran, Iraq and Turkey illegally. In Adiyaman, Icel, Konya and Balikesir they are used by farmers to carry wood stuff and goods. Nowadays Ordu mules are used to carry green tea leaf packs by tea producers. There are few scientific researches on Turkish mules. Yarkin (1962) reported some information on mules but did not give any measurements. On body size of mules there was only data by reported Yilmaz (2011 and 2012). Yilmaz compared mules to East Anatolian mules with UK mules whose data was sent by the Donkey Sanctuary of UK (Anonymous 2011<sup>c</sup>) (Table 1). The aim of the present study was to determine phenotypic traits including body measurements, coat colours, and age of mules reared in Province of Sirnak, Turkey (Figure 1).

Table 1. Some data on body sizes of mules from UK and Turkey.

Source	WH** ( $\bar{X}$ )	HR ( $\bar{X}$ )	BL ( $\bar{X}$ )	HGC ( $\bar{X}$ )	CD ( $\bar{X}$ )	CC ( $\bar{X}$ )	HL ( $\bar{X}$ )	EL ( $\bar{X}$ )
Anon (2011 <sup>c</sup> )*	120.4	121.8	122.6	147	-	14.8	55.2	19
Yilmaz et al (2011)	130.4	130.5	134.6	148.6	60.2	16.2	54.7	-
Yilmaz et al (2012 <sup>a</sup> )	130.6	130.7	133.9	149.6	59.7	16.5	55.6	-
Yilmaz et al (2012 <sup>b</sup> )	125.5	124.4	130.1	152.3	56.2	16.6	55.8	-

\* The data of mules belonged to Miss Liz Hazell-Smith (Senior Research Assistant, [www.thedonkeysanctuary.org.uk](http://www.thedonkeysanctuary.org.uk), UK) and data was sent via Miss Dr. Faith Burden (Head of Research, [www.thedonkeysanctuary.org.uk](http://www.thedonkeysanctuary.org.uk), UK) (Anonymous, 2011<sup>c</sup>)

\*\* WH= Withers height, HR=Height at rump, BL=Body length, Heart girth circumference, CC=Cannon circumference, HL= Head length, EL=Ear length.



Figure 1. Two mules with their master raised in village of Yemisli, county of Uludere, province of Sirnak, Turkey.

## Materials and Method

### Experimental animals

This study was carried out in December 2011. In this study a total of 38 mules, 18 males and 20 females, were studied in Province of Sirnak (37° 31'N; 47° 27'E, Anonymous 2011<sup>d</sup>). The mules were of 3 to 18 years old age. They were grouped into three age groups of 3-5, 6-8 and 9-18 years. The age of mules was determined from the information given by their owners.

### Measurements

The mules were provided to stand on their four legs properly on a flat surface. Withers height (WH), height at rump (HR), body length (BL), and chest depth (CD) were measured using a measuring stick. Heart girth circumference (HGC), cannon circumference (CC), and head length (HL) were measured with a specially graduated metal measuring tape (Sonmez 1973).

### Statistical analysis

Data was analyzed using the Minitab 16 statistical software program. Descriptive statistics for body dimensions were analyzed using ANOVA and Student's T-Test (Anonymous 2011<sup>e</sup>) that also determined the impact of sex, and age group on the response variables of WH, HR, BL, HGC, CD, CC, and HL.

## Results and Discussion

The distribution of colour is given in Table 2. About half of mules were of bay coloured. The least observed colours were black, mouse gray, and chestnut which were about one fourth. There were significant difference between male and females mules for traits of WH, HR, BL ( $P<0.01$ ), and HGC ( $P<0.05$ ) (Table 3).

The age did not have effect on morphological dimensions and there were no significant differences among traits as given in Table 3. Mules in 3-5 years old age group yielded lower and in 9-18 years old age group yielded higher values than age group of 6-8 years. Phenotypic correlation coefficient values ( $r$ ) among morphologic traits are given in Table 4. There were significant differences among almost all phenotypic traits ( $P<0.01$  and  $P<0.05$ ). There were no significant differences between HGC-HL, CD-CC and CD-HL. The highest value was found between WH and HR ( $r = 0.94$ ) ( $P<0.01$ ). Other high values were found between WH-CD ( $r = 0.83$ ), HR-BL ( $r = 0.79$ ), HR-CD ( $r = 0.79$ ), BL-HGC ( $r = 0.79$ ), HGC-CD, BL-HL ( $r = 0.75$ ), WH-HGC ( $r = 0.74$ ) those of higher than  $r = 0.70$  ( $P<0.01$ ). The lowest result was found between CD-HL ( $r = 0.23$ ), CD-CC ( $r = 0.29$ ), and HGC-HL ( $r = 0.29$ ) those of lower than  $r = 0.30$  and they were no significant differences among them. There were also no negative correlations among all other traits (Table 4).

Table 2. Distribution of body coat colour of mules

	Bay	Black	Mouse Gray	White	Chestnut	Overall
N	17	3	2	12	4	38
%	44.7	7.9	5.3	31.6	10.5	100.0

Table 3. Descriptive statistics and comparison results in different sex, and ages in mules.

Trait		WH (cm)	HR (cm)	BL (cm)	HGC (cm)	CD (cm)	CC (cm)	HL (cm)
		$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$
Overall (n=38)		132.7±1.31	133.7±1.28	135.0±1.55	147.7±1.96	60.0±1.01	16.7±0.18	56.6±0.75
Sex	Male (n=18)	136.5a±6.49	137.4a±6.00	139.2a±5.86	151.4A±5.07	61.9±4.58	16.9±1.11	58.1±5.12
	Female (n=20)	129.2b±7.95	130.4b±8.05	131.1b±10.7	144.5B±12.79	58.3±7.12	16.5±1.09	55.3±3.80
Age	3-5 years (n=12)	132.3±9.79	132.8±10.29	133.3±13.21	146.2±14.89	59.5±8.45	16.3±1.07	55.8±5.33
	6-8 years (n=13)	132.2±8.25	132.9±6.88	134.6±7.87	147.4±9.05	59.9±6.33	16.8±1.13	57.3±4.63
	9-18 years (n=13)	133.5±6.69	135.3±6.64	136.9±7.21	149.4±6.61	60.6±3.78	16.9±1.13	56.8±4.19

There were no significant differences between means showed by the same letters of alphabet in the same \* column and factor group.

a, b:  $P<0.01$ , A, B:  $P<0.05$

Table 4. Phenotypical correlation coefficient values (r) between body measurements in mules raised in Sirnak, Turkey.

Traits	WH	HR	BL	HGC	CD	CC
HR	0.94**					
BL	0.78**	0.79**				
HGC	0.74**	0.76**	0.79**			
CD	0.83**	0.79**	0.68**	0.79**		
CC	0.52**	0.46**	0.36*	0.35*	0.29	
HL	0.51**	0.51**	0.41*	0.29	0.23	0.75**

\*P&lt;0.05, \*\*P&lt;0.01

The mules reared in Turkey are not produced in Turkey and all mules except Ordu mules were imported from north of Iraq region. Those mules were produced by using large Iraqi donkeys as sire line. Hence, Iraqi mules were larger than other mules and were preferred by Turkish citizens. The mules raised in province of Ordu were produced locally by using native horse and donkey breeds as sire and dam lines.

For the traits of WH, HR and BL, Sirnak mules were the largest in body size among UK mules (Anonymous 2011<sup>c</sup>), East Anatolian (Yilmaz et al 2011), Turkish mules (Yilmaz et al 2012<sup>a</sup>), and Ordu mules (Yilmaz et al 2012<sup>b</sup>). For the traits of HGC Sirnak mules were larger in body size than UK mules (Anonymous 2011<sup>c</sup>), but smaller than East Anatolian (Yilmaz et al 2011), Turkish (Yilmaz et al 2012<sup>a</sup>) and Ordu mules (Yilmaz et al 2012<sup>b</sup>). For the trait of CD, Sirnak mules had higher value than Ordu mules (Yilmaz et al 2012<sup>b</sup>) but agreed with East Anatolian (Yilmaz et al 2011) and Turkish (Yilmaz et al 2012<sup>a</sup>). Related with CC, Sirnak mules had higher values than UK (Anonymous 2011<sup>c</sup>), and East Anatolian mules (Yilmaz et al 2011), but had nearly same values with Turkish (Yilmaz et al 2012<sup>a</sup>) and Ordu mules (Yilmaz et al 2012<sup>b</sup>). Regarding HL, Sirnak mules had the highest values among all other mules.

In this study mules which were older than 3 year-old were used. After 3 years of age there was no significant difference among all age groups (Table 3). It showed that growing nearly completed until 3 years of age and then there was a small difference in body size.

The present data demonstrated that mules raised in province of Sirnak were slightly larger in body sizes than UK, East Anatolian, Turkish and Ordu mules.

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