

## Comparison of Some Body Measurements of South Anatolian Red and Native Southern Yellow Cattle\*

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**ABSTRACT:** This study was conducted with the aim of determining differences between some body measurements of South Anatolian Red (SAR) and Native Southern Yellow (NSY) cows because of they were generally evaluated in the same cattle breed name in Turkey. In the present study, 92 heads of SAR cows and 100 heads of NSY cows were used as animal material. These cattle types were in *in-situ* conservation program of domestic animal genetic resource held in 2005. In this context, the herds for SAR and NSY cattle were established in Hatay and Adana provinces, respectively. In the study, four body measurements (Body Length: BL, Withers Height: WH, Rump Height: RH and Chest Depth: CD) of the cattle types were investigated and were compared according to these body measurements. Statistical analysis showed that the overall means ( $\pm$ SE) of BL, WH, RH and CD for SAR cows were 141.37 $\pm$ 1.26 cm, 123.22 $\pm$ 1.06 cm, 128.38 $\pm$ 1.13 cm and 64.06 $\pm$ 0.53 cm respectively. The overall means of body measurements indicated above for NSY cows were 119.29 $\pm$ 0.84 cm, 103.29 $\pm$ 0.68 cm, 105.70 $\pm$ 0.79 cm and 55.63 $\pm$ 0.39 cm respectively. Independent two-sample t-test showed that the mean differences all of body measurements between two cattle types were statistically significant ( $P < 0.01$ ). The results supported that these cattle types were different cattle breeds, although they were generally evaluated in the same cattle breed name (as Native Yellow Red cattle: NYR).

**Key Words:** South Anatolian Red (SAR), Native Southern Yellow (NSY), Body Measurements, Genetic Resource, Conservation

### Güney Anadolu Kırmızısı ve Yerli Güney Sarısı Sığırların Bazı Vücut Özelliklerinin Karşılaştırması

**ÖZET:** Bu çalışma, ülkemizde genellikle aynı isim altında değerlendirilen Güney Anadolu Kırmızısı (GAK) ve Yerli Güney Sarısı (YGS) sığırların bazı vücut ölçüleri arasındaki farklılıkların belirlenmesi amacıyla yürütülmüştür. Çalışmada, hayvan materyali olarak yerli hayvan genetik kaynakların yerinde (çiftçi şartlarında) korunması amacıyla 2005 yılında GAK sığırlar için Hatay ilinde oluşturulmuş sürüdeki 92 baş inek ile YGS sığırlar için Adana ilinde oluşturulmuş sürüdeki 100 baş inek kullanılmıştır. Çalışmada, bu sığırlara ait dört farklı vücut ölçüsü (Vücut Uzunluğu: VU, Cidago Yüksekliği: CY, Sağrı Yüksekliği: SY ve Göğüs Derinliği: GD) kullanılmış ve bu özellikler yönünden sığırlar karşılaştırmalı olarak incelenmiştir. İstatistik analizler sonunda, GAK ineklerde vücut uzunluğu, cidago yüksekliği, sağrı yüksekliği ve göğüs derinliği genel ortalamaları ( $\pm$ SH) sırasıyla 141.37 $\pm$ 1.26 cm, 123.22 $\pm$ 1.06 cm, 128.38 $\pm$ 1.13 cm ve 64.06 $\pm$ 0.53 cm olarak bulunurken, YGS ineklerde bu özellikler için genel ortalamalar sırasıyla 119.29 $\pm$ 0.84 cm, 103.29 $\pm$ 0.68 cm, 105.70 $\pm$ 0.79 cm ve 55.63 $\pm$ 0.39 cm olarak bulunmuştur. Bağımsız iki örneklem t-testi, incelenen bu özellikler bakımından bu sığır tipleri arasında istatistiksel olarak önemli fark olduğunu göstermiştir ( $P < 0.01$ ). Çalışmadan elde edilen bu sonuçlar, genellikle aynı ırk adı altında (Güney Sarı Kırmızı: GSK) değerlendirilen bu sığırların iki farklı ırk olduğunu destekler nitelikte bulunmuştur.

**Anahtar Kelimeler:** Güney Anadolu Kırmızısı (GAK), Yerli Güney Sarısı (YGS), Vücut Ölçüleri, Genetik Kaynak, Koruma

### INTRODUCTION

Today, it is informed that there are totally 897 cattle breeds on worldwide, Turkey has also 23 native cattle breeds (called as groups or types), but 15 breeds of them were nonexistence in the last 50 years, 6 breeds of them have already been under the risk, only 2 breeds (East Anatolian Red and Native Black) are widely reared in Turkey (Soysal, 2010).

It is well known that dairy cattle farmers prefer high yielded exotic cattle breeds (i.e. Holstein) in Turkey (Unalan, 2009). However, some problems (management, nutrition and production etc.) related to

keeping of this breed in non-intensive farming systems, especially in high and mountainous regions may be occurred. Therefore, the other cattle breeds, especially native breeds are preferred by the farmers in the different region of Turkey (Ünalán and Çankaya, 2010). In this case, conservation of native livestock breeds (cattle, sheep, goat etc.) is becoming increasingly important day to day.

In general, Turkey has large animal genetic resources in terms of natural life and has also livestock genetic resources. However, our native animal genetic resources are now faced to nonexistence risk because of

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uncontrolled and unconscious cross-breeding with the exotic breeds (Ünalán, 2007a).

South Anatolian Red (SAR) and Native Southern Yellow (NSY) cattle are widely reared in the southern region of Turkey and these native cattle types are now just becoming as an important genetic resource for that region. Of course, it is firstly needed to determine these genetic resources correctly and to describe the breed's characteristics of these cattle types. Many studies have been conducted on these cattle types up today. But, in general, these cattle types were combined or evaluated in the same breed's name as "Native Yellow Red" or "Kilis type" cattle in many previous studies (Özcan et al., 1976a; Özcan et al., 1976b; Karakaş, 1980; Şekerden and Pekel, 1982; Şekerden and Özkütük, 1990; Cebeci et al., 1993; Pekel et al., 1993). Especially, there was not enough number of studies on South Anatolian Red (SAR) cattle and Native Southern Yellow (NSY) cattle are the same or different breeds until 2005. But, it was reported that these two cattle types were different cattle breeds in a PhD Thesis made in 2005 (Altınalan, 2005).

The first and most comprehensive study in order to determine cattle breed's characteristics reared in South Anatolian region of Turkey was conducted in 1956 (Eker, 1956). In this study, it was reported two cattle types called as "Native South Anatolian Red (SAR)" cattle usually reared in lowlands and had quite high milk yielded and had large bodies, and called as "Native

Southern Yellow (NSY)" cattle abundantly reared higher and rough regions and had small body size. Consequently, it was also reported that these cattle types (SAR and NSY) would might be different cattle breeds by this researcher. Unfortunately, this study was the first and only research conducted on NSY cattle. Although many researches were carried out to determine some features of SAR cattle (Cankaya et al., 2005; Ünalán and Işık, 2007; Öztapak et al., 2010), there was no study for NSY cattle type. This situation was shown that in the searching literature on these cattle types as being registration of different cattle breeds (as SAR and NSY Turkish native cattle breeds) in 2004 (in the terms of Notification of Native Animal Breeds and Lines Registration on 12 December, 2004 dated and 25668 numbered of the Turkish Official Gazette) (Resmi Gazete, 2004).

Literature about some body measurements of both cattle types were summarized in Table 1.

Consequently, although SAR and NSY cattle types were registered as two different Turkish native cattle breed in 2004, only one research results (Eker, 1956) were used for the registration of NSY cattle not to be the same breed with SAR cattle. For this reason, this study was conducted to investigate comparatively some body measurements of these cattle types commonly reared by the cattle breeders in southern regions of Turkey, and to contribute mainly literature about NSY cattle.

Table 1. Literature for some body measurements of SAR and NSY cattle

Cattle Breeds	Measurements				
<b>SAR</b>	n	BL	WH	RH	CD
Bilgemre (1952)	21	144.4	139	-	68.1
Batu (1956)	22	-	137	-	-
Eker (1956)	217	139.2	128.9	134.3	62.1
Pekel et al. (1993)	29	148.3	137.6	140.3	67.5
<b>NSY</b>					
Eker (1956)	146	111.6	107.0	112.6	54.6

SAR: South Anatolian Red, NSY: Native Southern Yellow

BL: Body Length, WH: Withers Height, RH: Rump Height, CD: Chest Depth

## MATERIAL and METHODS

In this study, 92 heads of South Anatolian Red (SAR) cows and 100 heads of Native Southern Yellow (NSY) cows were used as animal material. The 26, 22, 19, 14 and 11 heads of SAR cows and 28, 24, 20, 15 and 13 heads of NSY cows were 3, 4, 5, 6 and 7 years of age respectively. The means age of SAR and NSY cows were 4.59 and 4.61 years respectively. SAR cows were selected among 127 animals belonged to 23 cattle breeders in the conservation herd in Güzelce village of Kırıkhan distinct of Hatay. NSY cows were selected among 147 animals belonged to 61 cattle breeders in the conservation herd in Süphandere and Bağdatlı villages of Feke distinct of Adana in terms of *in-situ* conservation of domestic animals genetic resources (Resmi Gazete, 2005; Ünalán, 2007b) by held in

General Directorate of Agricultural Researches of the Ministry of Agriculture and Rural Affairs, and directed by Adana Çukurova Agricultural Research Institute in 2005. In the present study, four body measurements (Body Length: BL, Withers Height: WH, Rump Height: RH and Chest Depth: CD) of these cattle types were used and were compared according to these body measurements.

Because control difficulty of the native cattle breeds, especially NSY cattle being primitive and their regional and geographical hardships, to obtain the body measurements of cows; firstly, all cows were marked by dimension of 10x10 cm reference tag and then photos of cows were taken (Figure 1 and Figure 2) and finally the body measurements of cows were computed from the

photos by processing in Image Pro-Plus 4.5 Software (Figure 3).

Body measurements of two cattle types were analyzed by independent two-sample t-test for each age group and the overall means according to statistical model given below in SPSS 12.0 Program.



Figure 1. A photo of South Anatolian Red (SAR) cow



Figure 2. A photo of Native Southern Yellow (NSY) cow

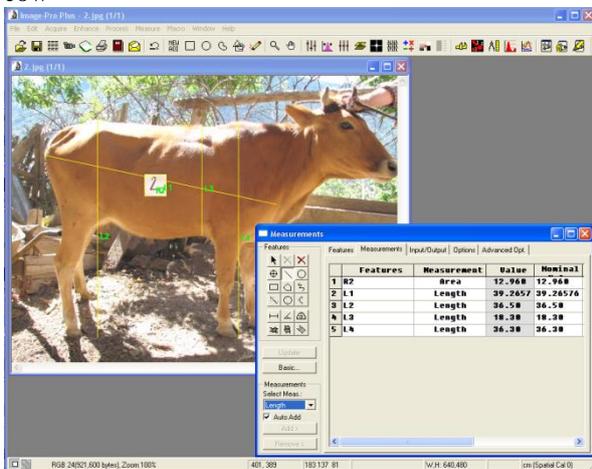


Figure 3. A screenshot computing of cows' body measurements by Image Pro-Plus 4.5 Software

Cattle types were assumed as fixed effect in the analysis. Besides, phenotypic correlations among the body measurements for each cattle type were also estimated.

$$Y_{ij} = \mu_t + c_{it} + e_{ij}$$

In the equation:

$Y_{ij}$ :  $t^{\text{th}}$  measurement value of  $j^{\text{th}}$  cow in  $i^{\text{th}}$  cattle type ( $t = 1$ : body length, 2: withers height, 3: rump height ve 4: chest depth),  $\mu_t$ : general mean of  $t^{\text{th}}$  measurement,  $c_{it}$ :  $i^{\text{th}}$  cattle type effect for  $t^{\text{th}}$  measurement ( $i = 1, 2$ ),  $e_{ij}$ : random error for  $t^{\text{th}}$  measurement.

## RESULTS

The least square means ( $\pm$ SE) of body measurements of the cattle types and independent two-sample t-test results for each age group and overall means were given in Table 2.

As seen in Table 2, the mean differences of body measurements between two cattle types both each age group and the overall means were statistically significant ( $P < 0.01$ ). For all investigated body measurements SAR cows had higher overall means than NSY cows. SAR cows had higher means about 22 cm (%18.5), 20 cm (%19.4), 23 cm (%21.5) and 8 cm (%15.2) for body length, withers height, rump height and chest depth, respectively than the overall means of NSY cows.

One of the breed's characteristics of SAR cows is tail binding point and depending on this feature, rump is higher than withers (Ünalın, 2007a). In the present study, rump height of SAR cows was found higher about 5 cm than withers. This result was in accordance with the previously reported results.

In general, all results obtained from this study were nearly similar to the previously reported results, especially with the results of by Eker (1956).

Correlations among the body measurements of two cattle types were given in Table 3.

As seen in Table 3, the phenotypic correlations among the body measurements for each cattle type were highly positive and statistically significant ( $P < 0.01$ ). However, phenotypic correlations among the body measurements of SAR cows were also higher (39.3%, 30.0%, 16.6%, 2.5%, 15.1% and 16.7% for BL and WH, BL and RH, BL and CD, WH and RH, WH and CD, and RH and CD, respectively) than the correlations of NSY cows. In addition, the highest phenotypic correlations were found to be between WH and RH as 0.900 and 0.878 for SAR and NSY cows respectively, the lowest phenotypic correlations were found to be between BL and RH as 0.787 and 0.605 for SAR and NSY cows respectively.

Table 2. The least square means ( $\pm$ SE) of the body measurements of cows and t-test results

Breeds/Ages	n	Body Measurements			
		BL	WH	RH	CD
<b>3 years of age</b>					
SAR	26	127.55 $\pm$ 1.57 <sup>a</sup>	112.70 $\pm$ 1.43 <sup>a</sup>	117.61 $\pm$ 1.41 <sup>a</sup>	58.51 $\pm$ 0.66 <sup>a</sup>
NSY	28	110.42 $\pm$ 0.47 <sup>b</sup>	98.60 $\pm$ 1.22 <sup>b</sup>	100.47 $\pm$ 1.30 <sup>b</sup>	52.48 $\pm$ 0.47 <sup>b</sup>
<b>4 years of age</b>					
SAR	22	138.39 $\pm$ 0.68 <sup>a</sup>	121.81 $\pm$ 0.91 <sup>a</sup>	126.82 $\pm$ 1.47 <sup>a</sup>	62.61 $\pm$ 0.43 <sup>a</sup>
NSY	24	115.74 $\pm$ 0.47 <sup>b</sup>	101.85 $\pm$ 1.18 <sup>b</sup>	103.88 $\pm$ 1.37 <sup>b</sup>	54.83 $\pm$ 0.50 <sup>b</sup>
<b>5 years of age</b>					
SAR	19	145.73 $\pm$ 0.76 <sup>a</sup>	126.45 $\pm$ 1.41 <sup>a</sup>	130.80 $\pm$ 1.42 <sup>a</sup>	66.32 $\pm$ 0.70 <sup>a</sup>
NSY	20	121.59 $\pm$ 0.57 <sup>b</sup>	105.00 $\pm$ 1.00 <sup>b</sup>	106.52 $\pm$ 0.86 <sup>b</sup>	56.18 $\pm$ 0.72 <sup>b</sup>
<b>6 years of age</b>					
SAR	14	152.03 $\pm$ 0.69 <sup>a</sup>	130.56 $\pm$ 1.28 <sup>a</sup>	136.13 $\pm$ 1.60 <sup>a</sup>	68.23 $\pm$ 0.65 <sup>a</sup>
NSY	15	125.80 $\pm$ 0.42 <sup>b</sup>	105.53 $\pm$ 1.48 <sup>b</sup>	109.67 $\pm$ 1.90 <sup>b</sup>	57.93 $\pm$ 0.61 <sup>b</sup>
<b>7 years of age</b>					
SAR	11	159.66 $\pm$ 1.58 <sup>a</sup>	138.04 $\pm$ 1.75 <sup>a</sup>	142.93 $\pm$ 2.84 <sup>a</sup>	70.93 $\pm$ 0.75 <sup>a</sup>
NSY	13	133.88 $\pm$ 1.72 <sup>b</sup>	110.82 $\pm$ 1.51 <sup>b</sup>	114.53 $\pm$ 2.15 <sup>b</sup>	60.43 $\pm$ 1.18 <sup>b</sup>
<b>Overall</b>					
SAR	<b>92</b>	<b>141.37<math>\pm</math>1.26<sup>a</sup></b>	<b>123.22<math>\pm</math>1.06<sup>a</sup></b>	<b>128.38<math>\pm</math>1.13<sup>a</sup></b>	<b>64.06<math>\pm</math> 0.53<sup>a</sup></b>
NSY	<b>100</b>	<b>119.29<math>\pm</math>0.84<sup>b</sup></b>	<b>103.29<math>\pm</math>0.68<sup>b</sup></b>	<b>105.70<math>\pm</math>0.79<sup>b</sup></b>	<b>55.63<math>\pm</math>0.39<sup>b</sup></b>

SAR: South Anatolian Red, NSY: Native Southern Yellow

BL: Body Length, WH: Withers Height, RH: Rump Height, CD: Chest Depth

<sup>a,b</sup>Different letters in the same column indicate statistically significant differences (t-test, P<0.01)

Table 3. Phenotypic correlations among the body measurements of the cattle types

Measurements	BL	WH	RH	CD
BL		0.861**	0.787**	0.892**
WH	0.618**		0.900**	0.875**
RH	0.605**	0.878**		0.788**
CD	0.765**	0.760**	0.675**	

BL: Body Length, WH: Withers Height, RH: Rump Height, CD: Chest Depth

Phenotypic correlation coefficients: above diagonal for SAR cattle, below diagonal for NSY cattle, \*\*P<0.01.

## DISCUSSION

Both statistically significant mean differences of the body measurements between SAR and NSY cows and different phenotypic correlations among the body measurements in each cattle type supported that these cattle types were not the same cattle breed. Phenotypic correlations among the body measurements of SAR cows were higher (ranged from 2.5% to 39.3%) than the correlations of NSY cows. In addition, it is well known that NSY cows have smaller body size than SAR cows. Although NSY cows have low milk yield, this cattle breed is commonly reared in high mountainous, rough and insufficient food source region of Turkey because of their smaller body size and weight. Consequently, determination of morphological differences of these cattle breeds and conservation of both NSY and SAR cattle breeds are very important to maintain indigenous animal genetic diversity and sustainable cattle breeding in Turkey.

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