

Phenotypic Correlation Between Body Measurements in Saudi Sheep in Qassim Region

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Abstract

Identify the genetic resources of the sheep and characterize these breeds accurately are very important to enhance the good performances of sheep and expand the knowledge of the differences among those breeds. Body measurements therefore, are perfect indicators to make definition for each breed. The present study is part of a wide one to definite of phenotypic characteristics in local breeds of sheep in Qassim region, Kingdom of Saudi Arabia. The data were collected from three breeds in Qassim region, Noemi, Najdi and Hari. Najdi is the biggest breed of the sheep breeds in Saudi Arabia and it is the main breed in Najd region. Noemi is taking the second size breed of the sheep breeds in Saudi Arabia. Hari is the smallest breed of sheep breeds in Saudi Arabia, it is the main breed in Hejaz and Assir regions, which belong to the sheep with coarse hair, and thick tail strain. Eight body measurements traits were studied, Wither heights (WH), Rum heights (RH), Body length (BL), Head length (HL), Heart girth (HG), Muzzle diameter (MD), Cannon circumference (CC) and Cannon length (CL).

The correlations coefficients among all studied traits were moderate to high and highly significant. The highest correlation coefficient was found between RH and WH traits (0.872), and the lowest one was found between CC and HG traits (0.214). The correlations coefficients between relative traits can help us to understand the similarity among studied traits and can be used in the future in selection program.

Keywords: Wither heights, Rum heights, Body length, Head length, Heart girth, Muzzle diameter, Cannon circumference and Cannon length

1. Introduction

Many researchers give an attention to the body measurements of sheep as good indicators of growths. Body measurements are necessary data sources in terms of reflecting the breed standards, Riva et al., (2004) and are important in giving information about the morphological structure and development ability of the animals. Body measurements differ according to the factors such as breed, gender, yield type and age, Shirzeyli et al., (2013). Highly significant correlations were reported in most studies between linear body measurements and live body weight (Otoikhian et al., 2008, Moneim et al., 2009). Body measurements have also been used to differentiate and identify the Saudi local breed as a phenotypic characterization (Suparyanto et al., 1999, Mansjoer et al, 2007). The phenotypic characterization in sheep can be measured through body size, which can be used for visual identification and to determine the idea growth of the animal (Ghahri et al., 2019, Widi, et al., 2016).

Serval body measurements such as height at withers (WH), body length (BL), heart girth (HG), are corelated and can be used to predict body weight and describe the performance of sheep (Hardjosubroto, 1994, Iqbal et al., 2019). Body measurements were easy to measure compare with body weight, which need weighting, scale while surveying farms. Classify genetic resources of sheep and characterize these breeds accurately, maintain and increase the numbers of good performances animals, knowing the different production patterns in the Kingdom and the distribution of species in the regions and cities and different economic production systems This will enable

us to increase this important agricultural production sector in the Kingdom. To date, there is no specific scientific description known to our local breeds as is known to all other breeds around the world.

2. Material and Method

This study was carried out in Animal Production and breeding department, College of Agriculture and Veterinary Medicine, Qassim University, Qassim region, Saudi Arabia.

A total of 1992 records from 294 animal of three different local breeds: 96 Noemi, 108 Najdi and 90 Hari for male and female was used in the current study, data were collected from College of Agriculture and Veterinary Medicine experimental station and some private farms in Qassim region.

Body measurements had taken in a standing position of the sheep. Eight characters of body measurements were taken by using a metric tape and cattle height hip measuring stick. Eight body measurements traits were used in the studied traits, Wither heights (WH), Rum heights (RH), Body length (BL), Head length (HL), Heart girth (HG), Muzzle diameter (MD), Cannon circumference (CC) and Cannon length (CL).

Table 1: Summarize of collected data.

Breed	Sex	Age			Total	
		8 months	18 months	48 months		
Noemi	Male	20	4	9	33	96
	Female	16	21	26	63	
Najdi	Male	16	23	6	45	108
	Female	23	22	18	63	
Hari	Male	17	9	7	33	90
	Female	18	19	20	57	
Overall		110	98	86	294	

2.1 Statistical Analysis

SAS software Ver.9.0 (SAS, 2002) was used for analysis of variance of quantitative traits. Estimation the least square mean for different measurements traits and analysis of variance for three-fixed effect of sex, age and breed. The modal used as:

$$Y_{ijk} = \mu + S_i + A_j + B_m + S*A_{ij} + S*B_{im} + A*B_{jm} + S*A*B_{ijm} + e_{ijk} \text{ Where:}$$

μ : is the overall mean;

S: is the fixed effect of the sex where $i= 2$;

A: is the fixed effect of the age where $j= 3$;

B: is the fixed effect of the breed where $m= 3$;

S*A: is the interaction between sex and age where $ij= 6$;

S*B_{im}: is the interaction between sex and breed where $im = 6$;

A*B_{jm}: is the interaction between age and breed where $jm = 9$;

S*A*B_{um}: is the 3 terms of interaction among age, breed and sex where $um = 18$ and e_{ijk} = random error

Phenotypic correlation is the Pearson correlation coefficient between two body measurements the same animal and estimated by formula:

$$\text{Correlation} = \frac{\text{Cov}_{(X,Y)}}{\sigma_X * \sigma_Y}$$

$\text{Cov}_{(x,y)}$ = covariance of the variables x and y

σ_x = sample standard deviation of variable x

σ_y = sample standard deviation of variable y

3. Results and Discussion

Table 2, showed the correlation coefficients between the eight studied traits. As shown in table, the highest value of the correlation coefficient was found between wither heights and rum heights (0.872, $p \leq 0.001$). By the other way, the lowest value of the correlation coefficient was found between heart girth and cannon circumference (0.214, $p \leq 0.001$). In general, the positive moderate to high correlations coefficients between relative traits are so important in selection program meaning that improve one trait improve the others.

In this respect, the highest value of correlations items sorted by ascending were 0.872, 0.861, 0.799, 0.794, 0.755, 0.773, 0.723, 0.677, 0.692, 0.661, 0.640, 0.639 and 0.629, between (RH, WH), (MD, HL), (CL, HL), (CC, HL), (CL, MD), (BL, WH), (BL, RH), (CC, MD), (MD, BL), (HG, WH), (HL, BL), (HG, RH) and (HG, BL), respectively. The phenotypic correlation between (WH, BL), (WH, HG), (WH, CL), (RH, BL), (RH, HG), (RH, CL), (BL, HG), (BL, CL), (HG, CL) were 0.77, 0.69, 0.43, 0.72, 0.64, 0.46, 0.63, 0.56 and 0.41, respectively.

These results are similar to that found by other researcher, for example Jafari et al., (2014) reported moderate correlation coefficient.

Also, Taye et al., (2016) in their work found that the phenotypic correlation between studied traits was high to moderate the coefficients values were, 0.85, 0.68, 0.66, 0.57, 0.56 and 0.56 between (WH&RH), (WH&HG), (RH&HG), (BL&WH), (BL&RH), (BL&HG), respectively.

In addition, Feyissa et al., (2018) figured out that the correlation coefficients between (WH, BL), (WH, HG), (WH, CC) (BL, WH), (BL, HG), (BL, CC), (HG, WH), (HG, BL), (HG, CC), (CC, WH), (CC, BL), (CC, HG), were 0.39, 0.63, 0.32, 0.45, 0.39, 0.22, 0.40, 0.41, 0.42, 0.43, 0.24 and 0.51, respectively.

The moderate to high favorable coefficients of correlation between studied traits led us to say that the genetic improvements are at the same time can be made simply to improve one trait and we can gain the improvements in the other traits.

Table 2. Correlations coefficients between studied traits

	WH	RH	BL	HL	HG	MD	CC	CL
WH		.872***	.773***	.535***	.692***	.587***	.222***	.437***
RH			.723***	.542***	.639***	.538***	.226***	.464***
BL				.640***	.629***	.661***	.281***	.561***
HL					.538***	.861***	.794***	.799***
HG						.587**	.214***	.415***
MD							.677***	.755***
CC								.638***

***Correlation is significant at the 0.001 level.

Wither heights (WH), Rum heights (RH), Body length (BL), Head length (HL), Heart girth (HG), Muzzle diameter (MD), Cannon circumference (CC) and Cannon length (CL).

4. Conclusion

Positive moderate to high correlations coefficients between the eight studied traits. This gives us the opportunity to save time and make selection more accurate.

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