PHENOTYPIC CORRELATION OF BODYWEIGHT AND MORPHOMETRIC TRAITS FROM SELECTED NIGERIAN BREEDS OF SHEEP IN KANO STATE

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ABSTRACT

Morphometrics and sheep body weight have shown enormous changes in estimating productivity and breed assessment for some sheep breeds. Thus, this study was aimed to identify the morphometric parameters that have correlation among and between body weight (BW) of sheep breeds. Two hundred and sixteen (216) sheep from three breeds; 72 Balami, 72 Uda and 72 Yankasa, three locations; (Bayero University Kano (BUK) new campus, Kano main abattoir and Danbare quarters), two sexes (ram and ewe) and four age groups (≤2, ≤3, ≤4 and ≥5 years) were used for this study. Body weight was measured in kg using weighing belt and sixteen linear body measurements were measured in cm using measuring tape from adult sheep. The results of pearson correlation analysis for the variables measured showed that relationship between BW and all the morphometric measurements, except hip height (HH) and scrotal length (SL) were positive and significant; indicating that selection for BW might yield a correspondent positive result in other morphometric traits. The morphometric measurements with positive and non-significant correlations were BW/HH (0.06) and BW/SL (0.11), respectively.

Keywords: Morphometrics, Breed, Correlations, Parameters

INTRODUCTION

In developing countries like Nigeria, small ruminants especially sheep play major role in sustainable livestock production. Sheep is one of the important livestock species in Nigeria with a population of over 42 million and ranked fifth in the world (Muhammad, 2019).

There are 4 sheep breeds commonly found in Nigeria namely: West Africa Dwarf (WAD) sheep, Uda, Balami and Yankasa. The sources of animal protein are mainly ruminant animals such as cattle, sheep and goat in arid and semi-arid zones of Nigeria and they are reared mainly by pastoralists (Muhammad, 2019).

Moreover, sheep is an important livestock species in the socio-economic lives of the people around the world including Nigeria (Yakubu and Ibrahim, 2011). Increased loss of genetic diversity has been observed for all livestock species and it was estimated that more than half of the livestock breeds are now endangered (FAO, 2011). Presently, 740 breeds were recorded as extinct with 1,335 (32% of the estimated total) being classified at high risk of loss or under threat of extinction. If the erosion of animal genetic diversity continues without adequate action, more than 2,000 domestic animal breeds could be lost within the next two decades (FAO, 2011).

Sheep biodiversity has been described using morphological measurements while the phenotypic variation in a population arises due to genotypic and environmental effects and the magnitude of phenotypic variability differs under different environmental conditions. Morphometric characters are continuous and they are used to describe aspects of body shape and variation between populations which can provide basis for understanding flock structure, and it can be used to study short-term, environmentally induced variation which is more applicable to livestock management (Agaviezor *et al*., 2012).

According to Gizaw *et al*., 2011, morphological description is an essential component of breed characterization that can be used to physically identify, describe, recognize and classify livestock breeds into broad categories. Morphological measurements such as heart girth, height at withers and body length can be used for rapid selection of large size individuals in the field to enable the establishment of elite flocks (Dossa *et al.,* 2007).

MATERIALS AND METHODS

The study was conducted in three locations; Kano main abattoir, Fagge Local Government Area, Bayero University Kano Teaching and Research Farm, Ungogo Local Government Area and Danbare quarters, Kumbotso Local Government Area of Kano State. Kano State is located in the semi-arid area of North-Western Nigeria. According to the recent census, it has a population of 9,383,682 people (NPC, 2006). Three breeds of sheep (Balami, Uda and Yankasa) aged (≤2, ≤3, ≤4 and ≥5 years) using dentition were used for the study. Each breed of sheep comprised adult ram and ewe which served as population. Sixteen (16) morphometric characters (using measuring tape) and body weight (using weighing belt) were measured from 216 adult rams and ewes (72 Balami, 72 Uda and 72 Yankasa) sheep population according to the procedures of Edilberto *et al*., 2011 and Akpa *et al.,* 2014. The study was carried out in a completely randomized design using a 2x3x3x4 factorial arrangement. The factors were Sex (ram and ewe); Breeds (Balami, Uda and Yankasa); Location (Kano main abattoir, BUK Farm and Danbare quarters) and Age (≤2, ≤3, ≤4 and ≥5 years), respectively. The data were computed in excel and analysed using SAS 2010 General Linear Model procedure to determine the relationships among variables.

RESULTS AND DISCUSSION

Table 1 Showed the Pearson correlation analysis for all the variables measured among the sheep breeds studied. The relationship between body weight and the morphometric measurements (body length (BL), heart girth (HG), wither height (WH), hip width (HW), shoulder width (SW), neck length (NL), ear length (EL), horn length (HL), tail length (TL), cannon length (CL), chest depth (CD), head circumference (HC), face length (FL), scrotal length (SL) and scrotal circumference (SC)) were positive and significant. Their correlated coefficient (r) values were BW/BL (0.83), BW/HG (0.92), BW/WH (0.84), BW/HW (0.56), BW/SW (0.74), BW/NL (0.60), BW/EL (0.55), BW/ HL (0.18), BW/TL (0.63), BW/CL (0.63), BW/CD (0.51), BW/HC (0.71), BW/FL (0.66), BW/SL (0.11) and BW/SC (0.14), respectively. The relationship between body weight and hip height (HH) and scrotal length (SL) were positive and not significant with the correlated coefficient (r) values of BW/HH (0.06) and BW/SL (0.11).

Table 1: Pearson correlation analysis of the measured morphometric traits among 3 sheep breeds

Parameters	BW	BL	HG	WH	HH	HW	SW	NL	EL	HL	TL	CL	CD	HC	FL	SL	SC
BW	-																
BL	0.826**	-															
HG	0.917**	0.848**	-														
WH	0.840**	0.691**	0.821**	-													
HH	0.058	-0.101	0.075	0.134*	-												
HW	0.562**	0.450**	0.491**	0.482**	-0.113	-											
SW	0.735**	0.678**	0.669**	0.703**	-0.290**	0.481**	-										
NL	0.601**	0.489**	0.567**	0.596**	0.218**	0.406**	0.461**	-									
EL	0.547**	0.476**	0.462**	0.611**	0.104	0.260**	0.527**	0.585**	-								
HL	0.184**	0.105	0.110	0.145*	0.089	0.028	0.178**	0.204**	0.154*	-							
TL	0.632**	0.569**	0.607**	0.665**	0.027	0.431**	0.550**	0.524**	0.522**	0.176**	-						
CL	0.631**	0.640**	0.595**	0.586**	-0.474**	0.599**	0.736**	0.325**	0.370**	0.101	0.543**	-					
CD	0.508**	0.468**	0.513**	0.565**	0.219**	0.260**	0.359**	0.487**	0.370**	0.291**	0.457**	0.290**	-				
HC	0.712**	0.650**	0.666**	0.616**	-0.193**	0.463**	0.640**	0.428**	0.450**	0.115	0.513**	0.658**	0.228**	-			
FL	0.661**	0.657**	0.636**	0.599**	-0.417**	0.545**	0.693**	0.319**	0.431**	-0.032	0.521**	0.810**	0.190**	0.776**	-		
SL	0.114	0.062	0.066	0.094	0.024	0.081	0.166**	0.143*	0.078	0.918**	0.123	0.129	0.251**	0.105	-0.022	-	
SC	0.136*	0.080	0.075	0.110	0.001	0.110	0.182**	0.147*	0.082	0.909**	0.147*	0.156*	0.246**	0.117	0.004	0.985**	

BW - body weight; BL - body length; HG - heart girth; WH - wither height; HH - hip height; HW- hip width; SW- shoulder width; NL - neck length; EL- ear length; TL - tail length; CL - cannon length; CD - chest depth; HC - head circumference; FL - face length; HL - horn length; SL - scrotal length; SC - scrotal circumference. NS-not significant; * - significant at P<0.05; ** - highly significant at P<0.01

The pearson correlation analysis showed that body weight had a positive and significant (P< 0.01) relationship with the following morphometric characteristics (BL, HG, WH, HW, SW, NL, EL, HL, TL, CL, CD, HC, FL, SL and SC) measured thereby indicating that selection for body weight might give a correspondent positive result in other morphometric characteristics, which could be used in selection criteria for any breeding goal in sheep breeding programme by animal breeders. The result was similar to (Popoola and Oseni, 2018) who reported that phenotypic correlation coefficients among cephalic traits of the sheep presented in some traits were highly and positively correlated while few traits were negatively correlated. This implies that increase in any of the correlated traits will lead to corresponding increase in the other traits. The high positive correlations (0.92) exhibited by sheep in this study indicated that as linear body measurements increase, there is corresponding increase in body weight which could be attributed to the availability of feed resources and good management practices.

More so, this result was similar to Dauda *et al.* (2018) who reported that morphometric traits among Balami sheep correlated positively except head length which was negatively correlated.

CONCLUSION

The positive correlations observed in this study showed that they are controlled by same gene and any of these morphometric traits could be used to predict body weight in the studied sheep.

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