Phenotypic characterization of dactyl thoracic index of Nigerian indigenous sheep population

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Abstract

The study was conducted to evaluate phenotypic characterization of dactyl thoracic index of Nigerian indigenous sheep population. Four hundred indigenous sheep (of average age between 18- 24 months) were sampled in major small ruminant markets, with one hundred sheep from each of the four predominant breeds in Nigeria (Balami, Yankasa, Ouda, and WAD). Data were collected on body measurements of the sheep which were used to estimate the dactyl thoracic Index (DTI) of the sheep. The data were subjected to Univariate analyses using SAS (2004). Result revealed mean values which ranged between 1.05 ± 0.10 (dactyl thoracic index) and 78.23 ± 2.49cm (chest circumference). Result also revealed a relative high variability (coefficient of variation) with highest coefficient of variation obtained for rump width (29.80%) and the lowest was recorded for dactyl thoracic index (9.85%). There were significant effects ($p<0.05$) of breed on morphological traits of the sheep. However, the DTI was not significantly affected ($p>0.05$) by breeds of the sheep. Result revealed significant differences ($p<0.05$) between sex in all the variables, ram had higher values in all these variables. However, there was no significant effect of sex on DTI of these sheep population. Based on the result of the study, it is concluded that Nigerian indigenous sheep breeds are light meat type.

Keywords: Breeds, indigenous, phenotype, population, traits

Introduction

Sheep have important social, cultural and structural roles in local communities particularly in developing countries. Indigenous sheep and goat contribute over 98% of the total small ruminant population in Africa (FAOSTAT, 2011). Sheep serve as on hand assets and are closely linked to the social and cultural life of resource poor family. The highest sheep population in Nigeria was recorded in the northwest zones where Kano was the highest population of about 2.6million heads and Zamfara recording the lowest population of about 857000 heads. The southwest zone had about 1.1million heads of sheep with Edo having the highest population 668410 heads (FMARI, 2002). Gefu *et al.,* (1994) in a survey of old Anambra state found that mean flock size was 2.4 million for sheep. Nigeria sheep population comprises of large breed of flocks managed extensively under harsh environment and traditional conditions with large variation in (Greoneveld *et al.,* 2010).

There are generally considered to be four breeds or races of sheep native to Nigeria viz: Balami, Uda, Yankasa and West African Dwarf (Ngere *et al*., 1979). Balami is the most predominant in the North eastern part of Nigeria. It is predominantly white and hairy breed with a pronounced

convex heat and dull depression. Uda breeds occur throughout the Sahel Sudan vegetation zone of Nigeria. The coat colour is extremely brown or black from forehead anterior to the limber abdominal girth and white posterior. Yankasa breed is widely distributed in the Northern part of Nigeria. In size, it is the intermediate between Uda and the West African dwarf sheep. The coat colour of Yankasa is typically white with black patches around the eyes, ears, muzzle and sometimes feet. The West African dwarf is widely distributed in the south Nigeria, the is small compact hardy sheep with a wide range of coat colour which maybe white, black or brown or spotted black or brown or white coat. The breed is considered to be tolerant to trypanosomiasis (Adu and Ngere 1979).

One of the difficulties in conserving a genetic resource is the lack of its characterization and knowledge of the best production system for raising it (Edilberto *et al*., 2011). Phenotypic characterization of livestock generally refers to the process of identifying distinct breed populations and describing their external and production characteristics within a given production environment (FAO, 2012). 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 characters describing body shape (Cervantes *et al*., 2009). According to Solomon *et al*. (2007) morphological description is an essential component of breed characterization that can be used to physically identify, describe, and recognize a breed, and also to classify livestock breeds into broad categories. Thus, this study sought to evaluate the phenotypic characterization of dactyl thoracic index of Nigerian indigenous sheep population

Materials and Methods

The study was conducted in Ibadan, the capital city of Oyo State, Southwest Nigeria. For this study, four hundred indigenous sheep (of average age between 18- 24 months) were sampled in major small ruminant markets, with one hundred sheep from each of the four predominant breeds in Nigeria (Balami, Yankasa, Ouda, and WAD). Data were collected on body measurements of the sheep using flexible measuring tape following the standard procedure as described by FAO (2012). Traits measured were withers height, body length, rump height, rump width, chest circumference, chest depth, heart girth, hip width, chest width. These traits were used to estimate the dactyl thoracic Index (DTI) according to Alderson (1999). The DTI is thus estimated as: DTI = Chest circumference / Heart girth. Data were subjected to Univariate analyses using UNIVARIATE and FREQ of SAS (2004).

Results and Discussion

Result of summary statistics of morphology and dactyl thoracic index of Nigerian indigenous sheep population is presented in Table 1. Result revealed mean values which ranged between 1.05 ± 0.10 (dactyl thoracic index) and 78.23 ± 2.49cm (chest circumference). Result also revealed a relative high variability (coefficient of variation) with highest coefficient of variation obtained for rump width (29.80%) and the lowest was recorded for dactyl thoracic index (9.85%). Low values obtained for coefficient of variation for the result is an indication of good accuracy of the test low error in the results as reported by Acourene *et al*., (2001) that the smaller the coefficient of variation, the better the accuracy of the test and the smaller is the errors of the results. Low coefficient of variation had been reported in earlier studies on goat (Popoola *et al*., 2018), sheep (Popoola and Oseni, 2018).

Table 1: Descriptive statistics of morphological traits of the indigenous sheep breeds

Variables (cm)	Mean	Standard deviation	Coefficient of variation
Wither height	72.42	9.29	12.83
Chest circumference	78.23	12.49	15.97
Heart girth	74.81	9.90	13.24
Body length	62.53	8.88	14.21
Rump height	73.86	10.05	13.61
Rump width	22.13	6.59	29,80
Chest depth	20.05	5.88	29.31
Hip width	33.94	6.37	18.77
Chest width	75.37	11.98	15.89
Dactyl thoracic index	10.50	0.10	9.85

Table 2 shows the effect of breeds on the morphological traits and DTI of the sheep. There were significant effects ($p<0.05$) of breed on morphological traits of the sheep. Uda had highest values of wither height, chest circumference, heart girth, body length, rump height, chest depth; highest value of rump width was recorded in Balami. However, the DTI was not significantly affected ($p>0.05$) by breeds of the sheep. Edilberto *et al.*, (2010) reported that DTI may not be more than 10.5 in light animals, up to 11.0 in light meat animal and up to 11.5 in heavy meat type. Results of DTI for Nigerian indigenous sheep (10.40-10.60) indicated that Nigerian sheep breeds are light meat type.

Table 2: Effects of breeds on morphological traits and dactyl thoracic index of indigenous sheep population.

Variables (cm)	Balami	Uda	WAD	Yankasa	SEM (±)
Wither height	73.78^{b}	77.92^{a}	66.77^{c}	68.93^{c}	0.41
Chest circumference	79.63^{b}	84.41^{a}	73.41^{c}	73.92^{c}	0.55
Heart girth	76.00^{b}	80.04^{a}	70.71^{c}	71.19^{c}	0.44
Body length	64.18^{a}	64.91^{a}	60.31^{b}	60.38^{b}	0.39
Rump height	75.50^{b}	79.58^{a}	67.05^{d}	70.40^{c}	0.44
Rump width	22.70^{b}	25.09^{a}	19.46^{c}	20.23^{c}	0.29
Chest depth	21.08^{a}	22.11^{a}	18.38^{b}	18.34^{b}	0.26
Hip width	34.04^{b}	36.80^{a}	32.33^{c}	32.07^{c}	0.28
Chest width	76.08^{b}	81.93^{a}	70.88^{c}	71.05^{c}	0.53
Dactyl thoracic index	10.50	10.60	10.40	10.40	0.11

Table 3 shows the effects of sex on morphological traits and DTI of Nigerian indigenous sheep population. Result revealed significant differences ($p<0.05$) between sex in wither height, chest circumference, heart girth, body length, rump height, rump width, chest depth, hip width, chest width. Ram had higher values in all these variables. However, there was no significant effect of sex on DTI of these sheep population. The result of dactyl thoracic index of both sexes indicate that both ram and ewe are light meat type.

Table 3. Effect of sex on morphological traits and dactyl thoracic index of indigenous sheep population

Variables (cm)	Ewe	Ram	SEM (±)
Wither height	67.82[b]	74.17[a]	0.41
Chest circumference	74.12[b]	79.80[a]	0.55
Heart girth	71.60[b]	76.03[a]	0.44
Body length	60.03[b]	63.48[a]	039
Rump height	69.45[b]	75.53[a]	0.44
Rump width	20.64[b]	22.69[a]	0.29
Chest depth	18.44[b]	20.66[a]	0.26
Hip width	31.61[b]	34.83[a]	0.28
Chest width	69.93[b]	77.44[a]	0.53
Dactyl thoracic index	10.40	10.50	0.10

Conclusion

Based on the result of the study, it is concluded that there were significant effects of breeds on morphological traits of Nigerian indigenous sheep. The DTI of the sheep was not affected by breeds of the animals and Nigerian indigenous sheep breeds are light meat type.

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