

MORPHOLOGICAL INDICES OF THREE INDIGENOUS BREEDS OF GOATS IN CALABAR SOUTH LGA, CROSS RIVER STATE

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ABSTRACT

A study on morphological indices was carried out on three indigenous breeds of goat. A total of 60 goats comprising twenty each of west African dwarf goats (WAD), Red Maradi and Sahel goats. The ages of the goats used in the experimental study was between one and half to two years. Identification was done using their dentition. Healthy animals [males and females] were used for the experiment. The morphological and phenotypic traits measured in this study were body weight (BW), body length (BL), height at wither (HW), rump length (RL), rump width (RW), head length (HDL), head width (HDW), cannon circumference (CC), hind legs (HL), fronts legs (FL) and heart girth (HG). Morphological indices were calculated for length index (LI), pelvic index (PI), body index (BI), proportionality (IPr), thoracic development (TD), baron crevet (BC), compact index (CII), area index (AI), and relative cannon thickness index (RCTI). The data obtained were analysed using SPSS statistical package, significant means were compared using Duncan's multiple range test. The result revealed that Sahel and Red Maradi had longer area index than West African dwarf. West African Dwarf goats showed higher values for LI (0.98), TD (1.18), BC (2.35), CII (4.59) and RCTI (15.25) while Sahel had highest value for proportionality (IPr). The genetic potentials of these goat breeds can be exploited for milk and meat purpose which they are basically used for by goat farmers.

Keywords: Morphological indices, Goats, Breeds, Indigenous

INTRODUCTION

Goats play very significant role in the social and economic livelihoods of rural dwellers. This animal contributes significantly as sources of milk, meat, skin and income generation (Adebambo *et al.*, 2011). Salako (2006) stated that indices estimated from various combinations of conventional and non-conventional body parameters do not only provide superior guide to weight, but also serve as indicators of type and function in domestic animals. Introduction of indices from body measurements and objective assessment of body conformation from the stand point of type may be relatively easier. Ethnological indices give general information about the livestock breed characteristics in terms of describing structure and proportions which are morphological characteristics of an animal while functional indices provide information about the type, aptitude and production performance of the animal. The calculation and analysis of the different indices give room for morphological classification of livestock breed particularly the ruminants (Esquivelzeta *et al.*, 2011). This study was aimed at evaluating the morphological indices of three breeds of goats in Calabar South LGA, Cross River State, Calabar.

MATERIALS AND METHODS

This experiment was conducted at three different farms located in Calabar, Cross River state. Eleven (11) morphological traits were taken on sixty goats comprising of three breeds (20 each of West African Dwarf – WAD, Sahel and Red Maradi). All measurements were obtained using a flexible tape rule calibrated in centimetres (cm). Measurements were taken after restraining and holding the animals while standing on a flat surface with head held up in an unforced position. Caution was taken to avoid animal movement and variation in hair cover was considered to avoid taking inaccurate readings. Using these parameters (height at withers, body length, heart girth, body weight, rump length, rump width, head

length, head width, cannon circumference, hind legs and front legs) morphological indices were calculated based on the following formulars according to Alderson (1999).

Length index (LI) = Body length / Height at wither

Pelvic index (PI) = [Rump width / Rump length] * 100

Body index (BI) = [Body length / Heart girth] * 100 When this measures greater than 0.90, the animal is longiline; between 0.86 to 0.88 is medigline; and less than 0.85, it is breviline

Proportionality (Ipr) = [Height at withers / Body length] * 100

Thoracic development (TD) = Heart girth / Height at withers. This indicates thoracic development of animal, with values above 1.2 indicating animal with good TD

Baron and Crevat (BC) = [Heart girth] / Height at withers the result should be closer to 2.1. The bigger the index, the closer the animal is to the traction type; the smaller this index, the weaker the animal will be.

Compact index (CII) = [Weight / Height at withers] / 100. Compact index indicates how the animal is. Meat type animals have values above 3.15. value close to 2.75 indicates that the animals are more suitable for milk purpose.

Area index (AI) = Height at withers times Body length

Relative cannon thickness index (RCTI) = [Cannon circumference / Height at withers] x 100

Data collected were subjected to one-way analysis of variance using general linear model procedure of SAS, 9.0 (2004).

RESULTS AND DISCUSSION

Values obtained for morphological indices are presented in Table 1. For all parameters assessed in this study, there was no significant ($P > 0.05$) difference between the goat breeds. Length index (LI) values were 0.98, 0.74 and 0.71 for West African Dwarf, Red Maradi and Sahel goats, respectively. The higher value for WAD suggests that the carcass yield of this goat breed is higher than the other two breeds. Pelvic index values were 95.88 (WAD), 98.44 (Red Maradi) and 89.65 (Sahel). In the present study, PI values indicated that goats had convex curve with a predominance of rump length over the width. Body index values were similar for WAD (83.25) and Red Maradi (83.28). These goat breeds have long linear profile (body index < 90) using the scale by Chacon *et al.* (2011). Proportionality index (PrI) was highest ($P < 0.05$) for the Sahel goat (142.39) and least for WAD (104.80). The proportionality showed higher values, this means that these goats tend to be square in shape and is a predominant feature in dairy production animal (Bravo and Sepulveda, 2010). Overall values for PrI were greater than 100, classifying them as dairy type goat populations.

The WAD (1.18) had a higher ($P < 0.05$) thoracic development among the goat populations studied, while Red Maradi and Sahel recorded similar values of 0.89 and 0.87, respectively. The higher thoracic development index for the WAD suggest that this goat breed possess good respiratory system and fitness, thus is able to survive in high altitudes. Thoracic development (TD) may also be a good indicator of animal physical vigour and allowing for good resistance to long journeys as wide, deep and muscular thorax is a factor for determine physical vigor (Zamorlini, 2001). The West African Dwarf goat recorded a value of 2.35 for baron crevet (BC) higher than 1.79 recorded for Red Maradi and 1.74 for Sahel. This result indicates that the WAD goat is closer to being a traction animal while the other two breeds are not. Compact index values were 2.35 (WAD), 1.79 (Red Maradi) and 1.74 (Sahel) for the goat breeds studied. The value obtained in this study suggests that these breeds are used for milk purpose. Red Maradi (4195.18) and Sahel (4191.33) had higher values for area index compared to West African Dwarf goat (2944.52) which recorded a lower value. This result interprets as these breeds possessing larger body surface area relative to their body mass. The Red Maradi and Sahel possess the ability from this result to withstand heat stress effectively and dissipating heat through heat dissipation mechanisms. Relative canon thickness index shows the relationship between the canon bone perimeter and the height of the animal. It therefore provides an indication towards breed type. In the present study WAD had the value of 15.25 indicating good muscling than the other two breeds.

CONCLUSION AND RECOMMENDATION

West African Dwarf goats showed higher values for LI, BI, TD, BC, CII and RCTI while Sahel had highest value for PrI. The implications of the results of this study is that the genetic potentials of these goat breeds can be exploited with adequate record keeping to utilize them as milk types in addition to the meat purpose for which they are basically used for by goat farmers.

Table 1. Morphological indices, mean and standard deviation of indigenous goat breeds.

Indices	WAD		Red Maradi		Sahel	
	Mean	SD	Mean	SD	Mean	SD
LI	0.98	0.17	0.74	0.07	0.71	0.07
PI	95.88	19.86	98.44	13.93	89.65	10.04
BI	83.25	9.16	83.28	3.61	81.47	6.80
Ipr	104.80	17.23	135.38	12.53	142.39	13.11
TD	1.18	0.15	0.89	0.08	0.87	0.08
BC	2.35	0.29	1.79	0.17	1.74	0.16
CI1	4.59	10.91	3.84	6.82	3.47	7.07
AI	2944.52	532.25	4195.18	545.56	4191.33	696.95
RCTI	15.25	2.20	11.83	1.01	11.25	0.99

SD = standard deviation, LI= Length index, PI= pelvic index, BI= body index, Ipr= proportionality, TD= thoracic development, BC= baron crevet, CI1= compact index 1, AI=area index, RCTI= relative cannon thickness index.

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