
LOCATION AND SEX EFFECT ON MORPHOMETRIC TRAITS OF WEST AFRICAN DWARF GOATS IN AKWA IBOM STATE

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ABSTRACT

Interaction between environment and genes causes variation in phenotype. There's dearth of information on the influence of agroecological zones in Akwa Ibom State on morphometric traits of West African Dwarf goat in Akwa Ibom State. This study seeks to address this. The study was conducted to determine the influence of location and sex on the morphometric traits of West African Dwarf goat raised in Akwa Ibom State. A total of 384 goats comprising of 259 does and 125 bucks were sampled from the three senatorial districts (Eket, Ikot Ekpene and Uyo) of Akwa Ibom State. One hundred and twenty-eight goats were sampled from each of the senatorial districts. Morphometric traits studied were body length (BL), heart girth (HG), rump height (RH), body depth (BD), ear length (EL), tail length (TL), neck circumference (NC) as well as body weight (BW). Data obtained from this on sex were analysed using independent T test while morphometric traits were subjected to analysis of variance using SPSS. Results obtained showed that all the traits studied were significantly ($P < 0.05$) affected by location except RH. Goats in Ikot Ekpene senatorial district were superior in body weight than goats in Eket and Uyo senatorial districts. However, goats in Uyo senatorial district were significantly higher in BL, HW, HG, RH, BD, TL, EL and NC than goats in Ikot Ekpene and Eket senatorial districts. There were significant ($P < 0.05$) effect of sex on the studied traits except on HW, RH, EL and TL. It was concluded that body weight and morphometric traits are important in West African Dwarf goats and these traits are sex influenced and favours females than males. These traits were also significantly affected by locations within Akwa Ibom State. It is therefore recommended that morphometric traits and location should be considered during selection to improve West African Dwarf in Akwa Ibom State.

Keywords: Location, sex and morphometric traits.

INTRODUCTION

Over the years, goat production had proven to be one of the excellent tools in achieving food security in Nigeria (Sam, *et al* 2017; Udo *et al.*, 2022). However, researchers have reported that weather conditions in the tropics affect both reproductive, morphological and physiological traits of West African Dwarf goats. (Sam *et al.*, 2017; Eyoh *et al.*, 2019). For this reason Sam *et al.* (2023) noted that potentials of small ruminants in the tropic are not fully utilized. Among the breed of goats in Nigeria, West African Dwarf goat is predominant in Akwa Ibom State. They have varying coat colours which include black, black-brown, brown, white, white-brown and white-black (Okon *et al.*, 2023). Chiejina and Behnke (2011) found that the abundance of this West African Dwarf goat in the tropical humid environment shows a better adaptation of this breed to the environment. Salako (2004) asserted that goats are important genetic resources because they can adapt to the stressful tropical environment. Ceriotti *et al.* (2003) found that the interaction between environment and genes results in phenotypic variation leading to the differences in the morphological, physiological and production traits. Variations in the other hand become raw material for breed improvement and adaptation to changing environmental condition. However, there's dearth of information on the influence of agroecological zones in Akwa Ibom State on morphometric traits of West African Dwarf goat raised in Akwa Ibom State. The present study seeks to address this.

MATERIALS AND METHODS

Study Area:

The study was conducted in the three senatorial districts of Akwa Ibom State, namely Eket, Ikot Ekpene and Uyo. Eket is located between longitude 7° 52' East and latitude 4° 45' North. The mean yearly temperature is 25°C and 28°C through the year. The average annual rainfall amounts to

3731mm. The area is dominated with varieties of vegetation such as tall tree which yield timber and pulps. Ikot Ekpene senatorial district is located between longitude 7° 33' East and latitude 5° 35' North. The location falls within humid tropic characterized by bimodal rainfall. The average is about 366.47mm. Average annual temperature is 30.46°C. Vegetation is of heavy rainforest type. Uyo senatorial district is located between latitude 04° 56' N and longitude 07° 56' E. The climate is tropical and it belongs to swamp forest agro-ecological zone of Nigeria. The annual rainfall is about 339.79mm average temperature is 28.24°C (AKSG, 2022).

Animals and management:

A total of three hundred and eighty four (384) goats were sampled between April 2023 and July 2023 from the three senatorial districts. One hundred and twenty eight (128) goats were sampled from each of the senatorial districts.

Brownses/grasses/legumes mixture commonly fed to goat in each of the senatorial districts were *Panicum maximum*, *Pennisetum purpureum*, *Andropogon gayanus*, *Microdesmis puberula*, *Diallumguinensis*, *Fiscus capensis*, *Pueraria phasioloides* for Ikot Ekpene. Some major fodders cut for goats in Uyo Senatorial District were mostly *Pueraria phasioloides*, *Panicum maximum*, *Gmelina aborea*. Fodders identified in Eket senatorial district were *Alcornea cordifolia*, *Gmelina aborea*, *Panicum maximum*. These browse/grasses/ legumes mixture were cut and fed to them in the stall. Sometimes supplementary feed in form of cassava peel, yam peel and kitchen wastes were also given to them.

Measurement of Morphometric Traits

Animals selected for measurement were brought out with acceptance from the owner and restrained before measurement. The following measurements were taken using tailors' tape in centimeter (cm) except body weight in kilogram (kg) on each of the animals using the methods as described by Sam *et al.* (2023).

Body weight (BWT): This was measured using a hanging scale in kilograms.

Body length (BL): Body length was measured using tailor's tape as the distance from the occipital protuberance to the base of the tail.

Height at withers (HW): The height was measured as the distance from the ground to the withers using tailor's tape.

Heart girth (HG): The heart girth was measured by taking the measurement of the circumference of the chest using tailor's tape.

Rump height (RH): The rump height was measured as the distance from the ground to the rump using tailor's tape.

Body depth (BD): This was measured using tailor's tape as the circumference of the region immediately after the hind leg towards the abdomen.

Ear length (EL): ear length was measured from the base of the ear to the pinna of the ear

Tail length (TL): tail length was measured from the base of the tail to the pinpoint of the tail.

Neck circumference (NC): this was measured as the distance around the neck.

Data analysis:

The data collected were analyzed using the General Linear Model procedure of SPSS (2000).

$$Y_{ij} = \mu + L_i + S_j + E_{ij}$$

Where Y_{ij} = observations on morphometric traits

μ = overall means L_i = fixed effect of i^{th} locations (Eket, Ikot Ekpene and Uyo)

S_j = fixed effect of j^{th} sex (male and female) and E_{ij} = random error associated with measuring each animal. T test was used to analyze the effect of sex on morphometric traits.

RESULTS AND DISCUSSION

The effect of location on body weight and morphometric traits of West African Dwarf goat is presented in Table 1. All the studied traits were significantly ($P < 0.05$) affected by location except for height at wither. Goats in Ikot Ekpene were significantly ($P < 0.05$) heavier than goats in Eket but statistically similar ($P > 0.05$) to goats in Uyo. However, goats in Uyo were significantly ($P < 0.05$) superior in HG (61.86±0.49cm), RH (45.72±0.55cm), BD (68.82± 0.58), TL (11.10±0.29cm), EL (10.40±0.16cm) and NC (32.54±0.98) than their counterparts in Eket and Ikot Ekpene.

The significant effect of location on morphometric traits obtained in this study was similar to the report of Aluko *et al.* (2013), who observed significant variations in linear body measurements of

WAD goats in four local government areas of Ogun State. The values for BL and HG in Yewa South reported by the Aluko *et al.* (2013) are similar to the value of BL in Uyo and HG in Ikot Ekpene. However, body weight obtained in Eket, Ikot Ekpene and Uyo is heavier than the body weight reported by Aluko *et al.* (2013) in Yewa North Yewa South and Abeokuta North local government areas of Ogun State. The average body length (BL), height at wither (HW), heart girth (HG) are similar to the mean BL, HW and HG reported by Dudusola *et al.* (2018) for West African Dwarf goats in Osun State but lower than the values reported by Adamu *et al.* (2020) in Red Sokoto goats. The value of BL, HG, and HW reported by Getew (2014) for short eared Somalian goats is lower than the value reported in this study.

The mean morphometric traits and body weight in Ikot Ekpene were higher than that reported by Sam *et al.* (2016) for West African Dwarf goat raised in Obio Akpa. This is probably because the previous study by Sam *et al.* (2016) had one sample area and the age limit was 3 years while the present study extended both the sample area and the age to above 5 years. These variations of morphometric traits in the study areas could be as a result of environmental effect such as climatic condition of the environment, and the type of forage they consumed. Researchers have reported that climatic actors such as ambient temperature, relative humidity, solar radiation affect the availability of feed, water, feed quality, growth rate, reproductive physiology, metabolism and the immune system (Batima *et al.*, 2006; Hacer and Hilal, 2021)

Table 1 Effect of location on morphometric traits of West African Dwarf goats

PARAMETERS	LOCATION		
	EKET (±SE)	IKOT EKPENE (±SE)	UYO (±SE)
BW (kg)	18.26±0.46 ^b	20.71±0.63 ^a	19.45±0.46 ^{ab}
BL (cm)	48.54±0.62 ^{ab}	50.74±0.68 ^a	47.08±1.25 ^b
HW (cm)	42.58±0.37	42.52±0.42	42.48±0.47
HG (cm)	57.88±0.51 ^b	59.08±0.67 ^b	61.86±0.49 ^a
RH (cm)	43.92±0.40 ^b	44.64±0.60 ^{ab}	45.72±0.55 ^a
BD (cm)	65.34±0.60 ^b	64.86±0.94 ^b	68.82±0.58 ^a
TL (cm)	10.42±0.23 ^b	9.50±0.16 ^c	11.10±0.29 ^a
EL (cm)	9.24±0.15 ^b	9.50±0.18 ^b	10.40±0.16 ^a
NC (cm)	28.64±0.48 ^b	28.44±0.52 ^b	32.54±0.98 ^a

^{abc} means on the row bearing different superscripts are significantly different (P<0.05)

BL=body length; HW= height at wither; HG= heart girth; RH= rump height; BD= body depth; BW= body weight; TL= tail length; EL=ear length; NC=neck circumference; SEM= standard error of mean

Effect of sex on morphometric traits of West African Dwarf goat in Akwa Ibom State is presented in Table 2. Sexual dimorphism were observed between the two sexes in most of the traits studied. Body weight (BW), body length (BL), heart girth (HG), body depth (BD) and neck circumference (NC) differed significantly (P<0.05) between bucks and does while height at wither (HW), rump height (RH), tail length (TL) and ear length (EL) did not significantly (P>0.05) differ in both sexes. However, does expressed superiority in all the studied traits except in neck circumference. The differences in morphometric traits and body weight may be due to differences in sex hormones (estrogen and androgen) and late release of androgen in male goats. The observations are in agreement with the reports of Sam *et al.* (2023) and Aluko (2013). Fajemilehin and Salako (2008) had reported superior body weight and morphometric traits in does than buck because female goat grows faster than the bucks at early stage. However, this study is not in agreement with the findings of Ogah *et al.* (2013) who found that bucks were superior in morphometric traits and body weight than does except for rear length.

CONCLUSION AND RECOMMENDATION

The study showed that body weight and morphometric traits are sex influenced and favoured females than males. They were influenced by locations within Akwa Ibom State. It is therefore recommended that morphometric traits and location should be considered during selection to improve West African Dwarf in Akwa Ibom State.

Table 2: Effect of sex on morphometric traits of West African Dwarf goat raised in Akwa Ibom State

Parameters	Bucks ($\pm$ SE)	Does ($\pm$ SE)	LOS
Body weight (kg)	17.80 $\pm$ 0.52	20.81 $\pm$ 0.35	**
Body length (cm)	45.76 $\pm$ 1.10	49.39 $\pm$ 0.58	**
Height at wither (cm)	41.48 $\pm$ 0.43	42.74 $\pm$ 0.27	NS
Heart girth (cm)	57.36 $\pm$ 0.88	60.06 $\pm$ 0.37	**
Rump height (cm)	43.00 $\pm$ 0.63	45.11 $\pm$ 0.34	NS
Body depth (cm)	63.48 $\pm$ 1.13	66.91 $\pm$ 0.46	**
Tail length (cm)	10.28 $\pm$ 0.29	10.35 $\pm$ 0.16	NS
Ear length (cm)	9.24 $\pm$ 0.22	9.81 $\pm$ 0.14	NS
Neck circumference (cm)	31.76 $\pm$ 0.97	29.49 $\pm$ 0.47	**

LOS=level of significant **=P<0.05, NS= Not Significant

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