The study of linear body measurements of West African Dwarf (WAD) lambs and kids under traditional management system

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Abstract

Linear dimensions of WAD lambs and kids were compared under traditional management system from birth to weaning age of 3 months. At birth, male and female lambs were comparable to their kid counter parts in body length (BL) and Height-at-withers (HW) but inferior to kids in Heart Girth (HG), Mean HG for lambs at birth was 23.09cm while that of kid was 26.62cm. At 3 months, mean HG for lambs was 49.40cm while that of kids was 46.24cm. Birth type had significant effects (P<0.05) on linear dimensions at birth and weaning. For both species, linear dimensions increased with increase in birth and weaning weights. The superiority of WAD lambs is body dimensions compared to WAD kids is indicative of better frame size in lambs at post weaning age.

Keywords: - Linear dimensions, lambs and kids, traditional management.

Introduction

The importance of linear body measurements in livestock production has been stressed in several studies, conducted in research stations. Tegbe and Olorunju (1988) used body measurements to predict liveweight of pigs while Orheruata and Olutogun (1994) and Young (1972) reported the relationship between body measurement and liveweight of cattle in the tropics. The linear measurements of West African Dwarf (WAD) goats and Red Sokoto goats of different ages were also reported by Ozoje and Herbert (1997).

Linear body measurements have been used to evaluate breed performance and to characterize breed of animals. In addition, it has been used as a means of selecting replacement animals and evaluating breed in a controlled environment (Shrestha et al., 1984).

Studies reporting relationship between body measurements of indigenous sheep and goats at village level in Nigeria are very scanty. The aim of this study therefore was to compare the linear body measurements of WAD sheep and goats in a village setting with a view to identifying the productive advantages of the two species of animals.

Materials and Methods

A total of 31 lambs and 29 kids of WAD breeds produced in Odeda Local Government area of Ogun State, Nigeria were used for the study. The Local Government is bounded on the Southwest by Abeokuta North, Abeokuta South and Obafemi Owode Local Government areas of Ogun States and on the Northeast by Iddo and Ibarapa Local Government areas of Oyo State. Odeda Local Government has a prevailing tropical climate in which the vegetation represents an interphase between the rainforest and the derived savannah.

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Management of Animals

The experimental animals were individually tagged and allowed to roam freely with their dams from 0 to 3 months of age. The mothers and their offsprings were fed daily on maize chaff and chopped cassava tubers at home while they scavenged on crop residue and natural pasture within the vicinity. Prior to the time of study, all small ruminants in the local government were vaccinated against PPR and dewormed with Baminth II wormer by the State Agricultural Development Project and Veterinary Department.

Linear body measurements of the lambs and kids were recorded weekly from birth up to the age of 3 months with the aid of a measuring tape and a ruler as described by Searle et al.(1989). Body length (BL) was measured from the tip of scapular to the pin bone, height-at-withers (HW) was measured from the dorsal part of the animal to the ground surface while heart girth (HG) was the circumference of the chest. Birth weights and body weights at 3 months of age were classified into 3 categories respectively. The birth weights categories were 1.00kg – 1.5kg; 1.60kg – 2.00kg and above 2.00kg. Body weight categories at 3 months of age were 7.00kg – 8.9kg; 9.00kg – 11kg and above 11.00kg.

Statistical Analysis

Harvey (1990) mixed model least squares and maximum likelihood programme was used to estimate the fixed effects (species, sex, birth type and body weight categories). The model used is stated below:

$$Y_{ijklmn} = \mu + S_i + X_j + B_k + A_l + W_m + e_{ijklmn}$$

Where Y_{ijklmn} = dependent variable

μ = population mean

S_i = effect of the ith species (I =sheep, goat)

X_j = effect of the jth sex (j = male , female)

B_k = effect of the kth birth type (k =singles, twins, triplets)

A_l = effect of the lth birth weight category

W_m = effect of the mth weaning weight category

e_{ijklmn} = residual random error

Preliminary analysis revealed that all the first order interaction had no significant effect on the measurements studied. They were therefore eliminated from the final model used.

Results and Discussion

Average values of linear body measurements from WAD lambs and kids at birth are presented in Table 1.

Linear body measurement of WAD lambs and kids

Table 1 *Least square means for Linear body measurements of WAD lambs and kids at birth*

Variable	Lambs					Kids				
	No of Observations	Body weight(kg)	Body length(cm)	Height at withers(cm)	Heart girth(cm)	No of Observations	Body weight(kg)	Body length(cm)	Height at withers(cm)	Heart girth(cm)
Overall	31	1.98±0.08	30.33±0.29	23.32±0.31	23.09±0.25	29	1.54±0.54	29.90±0.42	23.03±0.45	26.62±0.41
Sex										
Male	18	2.03±0.05^a	30.71±0.39^a	23.61±0.39	23.12±0.34	17	1.83±0.24^a	30.12±0.64^a	23.24±0.55	26.65±0.51
Female	13	1.83±0.24^a	29.81±0.41^b	22.94±0.50	22.96±0.41	12	1.40±0.26^b	29.58±0.48^b	22.78±0.76	25.53±0.61
Birth Type										
Single	7	2.13±0.07^a	32.914±0.34^a	24.64±0.24^a	24.64±0.39^a	5	2.07±0.05^a	33.00±0.32^a	25.20±0.58^a	26.65±0.55^a
Twins	20	2.07±0.04^b	30.16±0.17^b	23.50±0.30^a	22.96±0.22^b	19	1.49±0.03^b	30.00±0.26^b	23.32±0.47^b	26.65±0.44^a
Triplet	4	1.39±0.07^c	28.00±0.35^c	20.18±0.11^b	21.00±0.01^c	5	1.14±0.09^c	26.40±0.60^c	19.80±0.37	26.65±0.51
Birth weight Category (kg)										
1.00-1.50	5	1.36±0.07^a	27.90±0.29^a	20.94±0.77^a	21.50±0.30^a	16	1.37±0.05^a	28.75±0.49^a	22.38±0.61^a	25.75±0.62^a
1.60-2.00	1	1.90±0.03^b	30.59±0.33^b	23.35±0.38^b	22.67±0.31^a	12	1.71±0.50^b	31.17±0.52^b	23.67±0.62^a	27.67±0.36^b
Above 2.00	30	2.29±0.05^c	31.08±0.38^b	24.21±0.30^b	24.09±0.28^b	1	2.20±0.00^c	33.00±0.00^c	26.00±0.00^b	28.00±0.00^b

a,b,c means in the same column with different superscript differ significantly (P<0.05)

Males of both species were superior to females in all measurements studied. However, male and female lambs were comparable to their kid counterparts in BL and HW but inferior to the kids in HG at birth. The significance of BL in evaluating breed performance has been demonstrated. Ozoje (1997) indicated that BL at birth was more highly correlated with average growth rate of WAD goats than with HG.

The average value recorded for HG at birth for male and female kids were 26.65cm and 26.53cm respectively while values recorded for male and female lambs were 23.12cm and 22.96cm respectively. Hall (1991) in a related study reported bigger HG of 62.20cm for adult male WAD goats and 61.70cm for adult male WAD sheep. In a study of 5 body measurements of sheep and goats, Ibiwoye et al. (1993) observed that HG was superior to other measurements in estimating live weight.

In the present study, offspring of single birth in both species were superior in linear body measurements to those of multiple births. This could be attributed to the bigger size of offspring from single births. The significance of linear births on linear dimensions was reported by Wiener and Hayter (1974). The authors observed that birth type had its most marked effect in the first 6 months of the lamb's life. However, this study revealed that kids from single births were superior to lambs from single births in linear dimensions as indicated in Table 1.

The values of 33.00cm BL, 25.20cm HW and 28.00cm HG were recorded for the former while lower values of 32.14cm BL, 24.64cm HW and 24.64cm HG were recorded for the latter. Orheruata and Olutogun (1994) indicated that animals selected with high HW would have better frame size at post weaning age.

In the birth categories, linear body measurements in both species increased with increase in birth weight. Kids were however superior to lambs in BL, HW, and HG in the 3 birth weight categories considered. Wilson (1987) concluded that sex, type of birth, system of feeding and season of birth significantly affected goat and lambs' birth weights.

Mean values of linear dimensions for WAD lambs and kids at 3 months of age are shown in Table 2. Males of both species were superior to females in BL, HW, and HG at the age of 3 months. A similar trend was observed at birth for both species as indicated in Table 1. In a related study, Wiener and Hayter (1974) observed that males measured from birth to weaning were heavier and larger than females both at birth and at weaning. Gilbert et al. (1993) compared linear measurements in cattle and reported similarly that dimensions of bulls for BL, HW, and HG exceeded those of heifers at weaning.

Table 2 *Least square means for Linear body measurements of WAD lambs and kids at 3 months*

Variable	Lambs					Kids				
	No of Observations	Body weight(kg)	Body length(cm)	Height at withers(cm)	Heart girth(cm)	No of Observations	Body weight(kg)	Body length(cm)	Height at withers(cm)	Heart girth(cm)
Overall	31	10.19±0.16	66.70±0.39	48.44±0.42	49.40±0.50	29	7.66±0.21	56.44±1.16	23.03±0.45	46.24±0.77
Sex										
Male	18	10.40±0.31a	66.69±0.33	48.87±0.33	49.81±0.68	17	7.84±0.31a	57.53±1.61	23.24±0.55	46.82±1.13
Female	13	9.90±0.42a	66.72±0.45	47.85±0.41	48.96±0.73	12	7.40±0.26b	54.92±1.62b	22.78±0.76	45.52±0.99
Birth Type										
Single	7	11.15±0.17a	68.29±0.74	50.28±0.58a	52.00±0.75a	5	8.92±0.97a	66.40±0.51a	25.20±0.58a	52.10±0.86a
Twins	20	10.13±0.16b	66.08±0.54	50.11±0.61a	49.45±0.47b	19	7.73±0.13b	55.77±0.94b	23.32±0.47b	45.95±0.69b
Triplet	4	9.00±0.00c	67.00±0.00	45.00±0.00b	45.00±0.00c	5	6.14±0.09c	49.00±0.55c	19.80±0.37c	41.40±0.81c
Birth weight Category (kg)										
7.00-8.90	-					16	6.56±0.36a	51.56±1.99a	35.00±0.41a	43.13±1.19a
9.00-11.00	1	8.80±0.00a	66.00±0.09	44.70±0.91a	45.00±0.09a	12	7.97±0.09b	57.37±1.14b	36.68±0.53ab	46.74±0.78b
Above 11.00	30	10.24±0.16b	66.72±0.40	48.56±0.74b	49.60±0.49b	1	9.05±0.05c	67.00±1.00c	39.50±0.50c	54.00±1.00b

a,b,c means in the same column with different superscript differ significantly (P<0.05)

Birth had significant effects (P<0.05) on linear body measurements in both species. The birth type effects earlier noticed at birth persisted to the age of 3 months. Offspring of single birth type in both species had highest values of linear body measurements while those of triplets recorded the lowest linear body measurements. Wiener and Hayter (1974) concluded that all linear dimensions in sheep were significantly affected by birth type up to twelve weeks old and that when twins were reared as twins they did not come to within 5% of the weight of singles until almost 18 months old. Ozoje and Herbert (1997) reported that sex and type of birth did not significantly influence body measurement at any age in WAD and WAD X Red Sokoto goats. In the weaning weight categories, linear measurements were higher with higher weaning weight in both species.

Although, the present study could not be extended beyond pre-weaning stage because of the urgent need to return the experimental animals to the farmers, the overall results indicate that WAD lambs are superior to WAD kids in pre-weaning linear body measurements under traditional management system except in Hg at birth. The Superiority of WAD lambs is attributed to the larger body weight of lambs compared to the smaller body weight of kids. In effect, WAD lambs are excepted to produce better frame size at post weaning age than kids. However, further study on linear dimensions of growing sheep and goats up to maturity stage at village level is necessary.

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