Review Article

RELATIONSHIP OF THE BODY WEIGHT AND LINEAR MEASUREMENTS OF THE WEST AFRICAN DWARF (WAD) SHEEP UNDER THE HUMID ENVIRONMENT OF NIGERIA

MMEREOLE F.U.C.[1], OBINNE J.I.[2]

Department of Animal Science, Delta State University, Asaba, Delta State of Nigeria
Department of Agricultural Education, Federal College of Education (Technical) Asaba, Delta State of Nigeria

Abstract

Studies on the relationship of body weight with the linear body measurements of the West African Dwarf (WAD) sheep were carried out at the National Animal Animal Production Research Institute (NAPRI) outstation located in Ubiaja, Edo state of Nigeria. The studies involved 38 WAD sheep comprising 25 females and 13 males. The following measurements were taken: weekly live body weight (BWT), body length (BLT), head of shoulder (HDS), hearth girth (HGT) and height at withers (HTW). Correlations between body weight and linear body measurements and among linear measurements were derived. There were positive and significant ($P < 0.05$) correlation coefficients (r) between BWT and most of the linear body measurements even at the early age of the animals .The correlation coefficient (r) between BWT and the BLT remained significant from the beginning of the experiment (age: 2 weeks, $r = 0.87$) to the end of the experiment ($r = 0.93$). Similarly the correlation coefficient, r, between BWT and HGT remained high throughout the experiment ($r = 0.96$ at week 2 and 0.98 at week 14). The correlation coefficients between the BWT and other linear measurements (HDS, HTW) were not consistent 0.28 (HDS). The correlation coefficients between the BWT and HGT and between BWT and BLT were observed to be the highest and consequently could be used to calibrate an assessment for the body weight of WAD sheep especially in areas where weighing facilities are not available.

Key words: WAD sheep, caliberate, assessment of body weight, linear body measurements

INTRODUCTION

Body weight and body weight gains are good indicators of growth performance throughout the lifetime of small ruminants. Live weight is an important variable that determines the market values of an animal (Buvanendran et al., 1983). Out of 22.09 million sheep widely distributed in Nigeria, about 95% are reared under traditional management system (FDLPCS, 1992). In most of these rural communities weighing facilities are not usually available even in rare cases where they may be available they are cumbasome to be carried about in the field or in the market places. Consequently, the weights of animals reared in the rural areas are traditionally assessed visually and by attempting to lift the animal and feel its weight (Abanikanda, 2002). The rural farmers who rear the small ruminants (predominantly WAD sheep), are faced with the difficulty of estimating the correct body weights of their animals in order to properly determine the market values. The dearth of documented information on the quick assessment of body weights based on the relationship between the body weight and linear body measurements of the WAD sheep has posed a serious problem to the marketing of these animals. The development of an objective assessment of the body weight of the WAD sheep based on the relationship of the BWT with the linear body conformations, which can be measured simply with ordinary tailors tape, will overcome most of the problems associated with the visual estimates (Shrestha et al., 1984). Recently, however, several studies regarding the evaluation of the relationship between the body weight and linear body measurements of WAD sheep and other farm animals have been carried out in Nigeria and in other regions of the world. Osinowo et al. (1992) as well as Ozoije and Herbert (1997) observed that measurement of the chest girth was effectively used to estimate live body weight of Yankasa sheep and Red Sokoto goats under field conditions. Abdullahi et al. (2003) confirmed that there were high correlation coefficients between body weight and the linear body measurements of rabbits. Ige et al. (2007)

worked with mature indigenous chickens in the derived Savana zone of Nigeria and concluded that linear body measurements can be used to estimate the body weights of the chickens. Yakubu et al. (2007) made a comparison of the linear and non-linear models in the estimation of body weights from body measurements in West African Dwarf (WAD) goats in North Central Nigeria and confirmed that linear body measurements can be used to assess the live body weights of WAD goats. In some other regions of the world similar studies have been carried out (Islam et al., 1991; Slippers et al., 2000; Singh and Mishra, 2004; Hamayun et al., 2006). The present study was designed to study the relationship between the body weight and the linear body measurements of the WAD sheep with the view to identifying the basis for estimating the body weight based on the linear body measurements.

MATERIALS AND METHODS

The experiment which involved 38 WAD sheep (25 females and 13 males) was conducted at the National Animal Production Research Institute (NAPRI) out-station located at Ubiaja in Edo State of Nigeria. Ubiaja is situated within the humid rainforest belt area of Nigeria between latitude 6°4' North and longitude 6°08' East. The 35 WAD sheep were selected from a large flock. The basis for selection was age of the animals. Only the lambs that were just 14 days old at the commencement of the experiment were selected. The management of the animals was by semi-intensive system. The lambs which were identified with ear tags were allowed to run with their dames throughout the experimental period which lasted for 14 weeks. The lambs and their dames were allowed to graze on range for 6–8 hours daily but the dames were given 200 g of protein concentrate supplement daily. The dames and lambs were vaccinated against rinderpest and PPR (peste des petits ruminants). The following measurements were taken at the commencement of the experiment and subsequently taken weekly: (1) body weight (BWT) using heavy hanging scale, while the linear body measurements (2) body length (BLT), head on shoulder (HDS), height at withers (HTW), and hearth girth (HGT) were measured using the simple tailors tape. The data were subjected to correlation analysis using window SPSS package.

RESULTS

Correlation coefficients were determined between BWT and linear body measurements at week 2, week 4, week 6 week 8, week 10, week 12 and week 14. The results of these determinations are presented on Table 1. From Table 1, it can be observed that in week 2, the BWT was significantly ($P < 0.01$) and positively correlated to all the linear measurements where the correlation coefficients, r, are 0.87, 0.67, 0.96 and 0.85 for BLT, HDS, HGT and HTW respectively. The table also presents the correlation coefficients r between BWT and linear body measurements in the WAD sheep at 4 weeks. From the results, it can be observed that BWT was positively and significantly ($P < 0.01$) correlated with BLT ($r = 0.90$), HGT ($r = 0.98$), and HTW ($r = 0.91$). BWT was, however, positively but not significantly ($P > 0.05$) correlated with HDS ($r = 0.35$). The correlation coefficients between BWT and linear body measurements at week 6 are presented on Table 1. The results show that BWT was positively and significantly ($P < 0.05$) correlated with BLT ($r = 0.68$), HGT ($r = 0.98$), and HTW ($r = 0.67$) respectively but the correlation between BWT and HDS ($r = 0.18$) though, positive but was not significant ($P > 0.05$). In week 8, the results show that BWT positively and significantly ($P < 0.05$) correlated with BLT ($r = 0.92$), HGT ($r = 0.97$) and HTW ($r = 0.57$) respectively but the correlation with HDS ($r = 0.31$) was not significant ($P > 0.05$). At week 10, the results show that only BLT ($r = 0.85$) and HGT ($r = 0.94$) were positively and significantly ($P < 0.01$) correlated with BWT while the correlation coefficients between BWT and HDS ($r = 0.43$) and between BWT and HTW ($r = 0.47$) were

Tab.1: Correlation coefficients between BWT and the linear body measurements from age 2–14 weeks

Age (wks)	BLT	±SEM	HDS	±SEM	HGT	±SEM	HTW	±SEM
2	0.87**	0.15	0.67*	0.13	0.96**	0.11	0.85**	0.11
4	0.90**	0.26	0.35^{NS}	0.10	0.93**	0.08	0.85**	0.08
6	0.68*	0.09	0.18^{NS}	0.06	0.98**	0.10	0.67*	0.08
8	0.92**	0.10	0.31^{NS}	0.02	0.97**	0.09	0.54*	0.04
10	0.85**	0.13	0.43^{NS}	0.02	0.94**	0.10	0.47^{NS}	0.02
12	0.87**	0.10	0.58*	0.13	0.96**	0.09	0.70**	0.16
14	0.93**	0.20	0.64*	0.05	0.98**	0.25	0.76**	0.23

not significant (P > 0.05). At weeks 12 and 14, the correlation coefficients between BWT and BLT, HDS, HGT and HTW were all positive and significant (P < 0.05).

DISCUSSION

Investigating the dynamics of linear body measurements and the body weights of WAD sheep at ages 2–14 weeks, it was possible to assess the body weights of the animals on the basis of the linear body measurements even at the early part of their lives. The high positive and significant correlations observed between the BWT and most of the linear body measurements are consistent with those observed by Osinowo et al. (1992) and Ige et al. (2006) who confirmed that in sheep and chicken respectively, the significant and positive correlations are useful tools in estimating the body weights of the animals studied. Hristakieva et al. (2006) also made similar observations and concluded that at an early age, while the correlations of body weight with linear body parts were positive and significant, the correlations among the various linear measurements were positive but not significant. The present study shows that at a later age (14 weeks) HGT and BLT became the two linear measurements with the highest correlation coefficients with the body weight. This development is expected considering the high response of HGT to environmental factors. HGT and BWT increase in response to environmental factors such as feeds and management (Mgbere et al., 2005; Hamayun et al., 2006, Yakubu et al., 2007). Consequently, this observation could be used to assess the environmental impact on the animals.

In conclusion, this study has shown that the live body weight positively and significantly correlated with most of the linear body measurements studied particularly at the early age and later part of life of the WAD sheep. The HGT and BLT showed the highest correlation with the BWT in all the ages studied thus indicating that the two measurements are the most accurate linear measurements for estimation of the live body weights of WAD sheep especially in the rural areas within the humid environment of Nigeria. Having established this fact, what is now required is a calibrated table which will indicate the various linear measurements and body weights they represent. When this is done, the rural farmers will overcome their present difficulties of knowing the weights of sheep they are rearing or they want to sale.

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Corresponding author:

Dr. F.U.C. Mmereole
Department of Animal Science
Delta State University, Asaba Campus
Asaba, Delta State of Nigeria
e-mail: fucmmereole @yahoo.com