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BODY CONFORMATION CHARACTERISTICS OF DOMESTIC RABBITS IN HUMID TROPICAL SOUTHERN NIGERIA

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ABSTRACT

The body weight (BWT) and linear body measurements (LBM) of 21 grower and 21 breeder, crossbreed rabbits were used for the study. The LBMs were: Head length (HL), Body length (BL), Heart girth (HG***),*** Ear length (EL) and Tail length (TL). The breeders showed significantly higher mean values in BWT and all LBMs than the growers except in TL. Sex, however, did not have any significant influence on BWT and LBMs between the two groups of rabbits, though the bucks' showed slightly higher numerical values than the does. The correlation matrix showed high, positive and significant values among most of the traits studied ($p<0.01$). The highest coefficient was between BWT and HG ($r=0.848$).Results of the regression coefficients showed that HG was the best predictor of BWT, contributing 93% of total variability.

Keywords: Rabbits, Linear body measurements, Bodyweight, Body conformation

INTRODUCTION

The linear body measurements of meat animals like the rabbit give an indication of their live weight gain, skeletal size, reproductive performance and carcass characteristics. The live body weight and linear body measurements of meat animals have been found useful in quantifying body size and shape (Ibe and Ezekwe, 1994). The size and shape measurements are necessary in animal breeding programmes for estimating certain genetic parameters. Linear body measurements have been used in health and feed managements and it provides basis for production performance monitoring and marketing of animal products (Mayaka, *et al.*,1995). Besides, an evaluation of the relationship existing among the various live body measurements could be used as the basis of a genetic improvement in the animal. In our local markets where scales are lacking, animals are appraised visually and their economic values determined. Such visual assessment is subjective and might not reveal the true economic value of such animal. An objective assessment which involves the analysis of relationships existing among the various live body traits would be more appropriate. The relationship among live body traits in rabbits have been studied by various authors (Tiamiyu, *et al. ,* 2000; Chineke ,2000, 2002, and 2005; Abdullah *et al.,*2003 and Isaac, *et al .,* 2011).
This paper aims at analyzing the live body traits of the grower and breeder groups of rabbits, as well as evaluating the relationships among the traits in domestic rabbits in Calabar, Southern Nigeria.

MATERIALS AND METHOD

The study was carried out at the Rabbit Unit of the Teaching and Research Farm, University of Calabar, Nigeria. A total of fourty two (42) crossbred rabbits , comprising 21 four month

old growers and 21 breeders of 9 months and above were used for the study. There were 16 bucks and 26 does altogether. The animals were housed individually in wooden cages. They were fed *ad libitum* on a concentrate diet of 18% Crude Protein and 2590 Metabolizable Energy KCal/Kg . This diet was supplemented with fresh *Calapogonium mucunoides* leaves. Fresh clean water was supplied regularly. Medications were given when necessary and strict hygiene maintained on the farm. The body weight (BWT) was taken using a weighing scale and recorded in kilogrammes(kg). The LBMs considered include Body length (BL)-the distance from the shoulder to the junction between the hip tail. Ear length (EL)-the distance from the point of attachment of the ear to the head to the tip of the ear. Heart girth (HG)-the circumference of the body just behind the forelimbs. Head length(HL)-the distance from in-between the ears to the tip of nose. Tail length(TL)-the distance from the junction of the hip to the tip of the tail.

All measurements were taken in the morning prior to feeding. Data obtained were subjected to a one-way analysis of variance, Pearson's correlation coefficient were estimated using the general linear model. All data were analysed using Genstat statistical package 2010.
The statistical model used was:
$Y_{ijk} = \mu + A_i + S_j + e$
Where
Yijk =estimated value for the BWT or LBM
μ = population mean
Ai = fixed effect of age
Sj = fixed effect of sex
Eijk = residual error

The generalized prediction model was:
$Y_i = a + \sum b_i X_i + e_i$
Where
Yi =dependent variable (BWT)
a= intercept in the Y-axis
bi =partial regression coefficients
Xi = independent variable (the LBM)
ei = random error, which is identically, independently and normally distributed with zero mean and constant variance.

RESULTS AND DISCUSSION

The mean and standard error values for BWT and LBMs with respect to age of the rabbits are presented on Table 1. The breeders showed significantly ($p<0.05$) higher values than the growers in all traits measured except TL. This result is expected as age has been indicated as a major determinant of skeletal and body size in animals (Salako, 2004; Ebegbulem *et al.,*2011 ; and Henry *et al.,*2011). As age increases, growth continues which is a multiplication of the body cells. This growth brings about an increment in body and skeletal size. Therefore older animals present a better meat value than very young animals. The non-

significant difference ($p>0.05$) observed in TL between the two age groups could be attributed to the genetic ceiling of some body parts after a certain age in life. Table 2 shows the mean values and standard error for BWT and LBMs of rabbits based on sex. The results show that there was no significant difference ($p>0.05$) in all the traits studied between both sexes. However, the males showed slightly higher numerical values in traits than the females. This report is in agreement with the reports of Hassan and Ciroma (1992), Idowu (2002) in Red Sokoto goats and Adewunmi *et al.*(2008) in sheep. The non-significant differences in traits between both sexes is in tandem with the report of Ebegbulem *et al.* (2011) in West African Dwarf goats. The result of the correlation analysis is presented in Table 3. BWT is highly and positively correlated (ranging from 0.637-0.848) with all the LBMs measured, except TL which has moderate correlation of 0.347 with BWT ($p<0.05$). The high positive correlation between BWT and the LBMs suggest that selection for any of the traits will lead to an increased BWT in domestic rabbits. The magnitude of association of BWT especially with HG, BL, HL, and EL indicates that these traits are complementary and they represent a good body conformation. Therefore selection for any of the traits would portend an increment in overall meat productivity of the rabbit. This work corroborates the reports of Chineke(2000) who reported a correlation coefficient range of 0.765-0.948 among traits in rabbits; Tiamiyu *et al* .(2000) who reported high positive correlation coefficient range of 0.89-0.98 between BWT and EL, BL, and HG in rabbits; as well as , Atansuyi *et al* .(2011). Henry *et al.* (2011) in their work with grasscutter; Ebegbulem *et al.* (2011) in their study of goats and Orheruata & Olutogun (1994) in cattle, reported similar trends of high positive correlation between BWT and LBMs.

In the present study, moderate positive correlation was observed between BWT & TL ($r = 0.347$) , HL & TL($r = 0.318$) and HG & EL($r = 0.371$).A low but positive correlation was observed between TL and BL, HG, and EL with coefficients of 0.071, 0.179, and 0.284 respectively. This portends that selection for any of these traits will lead to a slow increment in the other over many generations. The trend of correlation between TL and other LBMs is at variance with the observation of Henry *et al.*(2011) in grasscutter. A multiple regression analysis was used to determine the body trait combinations for best predictor of BWT in Table 4. A positive and significant relationship was observed between BWT and the LBMs studied. Results show that HG contributed 93% of the total variability in BWT and therefore is the best predictor of BWT at any age in rabbits. TL, HL and EL are also good predictors of BWT in rabbits having 75% , 56%, and 55% contributions respectively. These traits would be useful in situations where scales are unavailable, for proper appraisal and valuation of the rabbit. The high percentage of prediction of BWT by HG is in agreement with earlier reports in literature about rabbits (Chineke, 2000 ; Isaac *et al.,*2011 and Atansuyi *et al.,* 2011). The positive values in the relationship among the traits suggest that the BWT is directly influenced by changes in the LBMs. Consequently, selection and breeding for any of the LBMs especially HG will lead to a corresponding increment in BWT of rabbits.

CONCLUSION

This study showed that age significantly influenced body weight and linear body measurements in rabbits, whereas sex did not influence these traits much. Body weight was strongly positively correlated with heart girth, body length, and head length which are indicators of good body conformation. Heart girth is the best predictor of body weight in rabbits.

Table 1: Means (± s.e) of body weight and linear body measurements of rabbits based on age

Age(months)	BWT	BL	EL	HG	HL	TL
4(N=21)	1.39[b]	24.50[b]	9.71[b]	20.21[b]	9.60[b]	7.36[a]
	±0.04	± 0.32	±0.11	± 0.31	±0.10	± 0.15
9[+](N=21)	2.05[a]	27.87[a]	10.45[a]	24.10[a]	10.62[a]	7.81[a]
	±0.06	± 0.48	± 0.18	± 0.34	± 0.21	± 0.21

Means on the same row with different superscripts are significantly different ($p<0.05$)

Table 2: Means (±s.e) of body weight and linear body of measurements of rabbit based on sex

SEX	**BWT**	**BL**	**EL**	**HG**	**HL**	**TL**
Male(N=16)	1.78	26.78	10.29	22.17	10.17	7.52
	±0.10	±0.63	±0.19	± 0.53	±0.22	±0.26
Female(N=26)	1.68	25.82	9.95	22.12	10.08	7.62
	±0.08	±0.48	±0.15	±0.52	±0.18	±0.14

($p<0.05$) ($p>0.05$)

Table 3: Correlation coefficient matrix of body weight and linear body measurements of rabbits

	BWT	HL	BL	HG	EL	TL
BWT						
HL	0.716**					
BL	0.752**	0.641**				
HG	0.848**	0.489**	0.540**			
EL	0.637**	0.766**	0.634**	0.371*		
TL	0.347*	0.318*	0.071	0.179	0.284	

** Correlation is significant at the 0.01 level.
*Correlation is significant at the 0.05 level.

Table 4: Regression equation relating body weight and linear body measurements of rabbits

BWT= -3.259 + 0.0557HL +0.0471BL + 0.093HG + 0.0545EL + 0.0747TL
R= 0.952 , R.sq =90.6% , R.sq(adj) =89.3%

Analysis of variance

Source	DF	SS	MS	F	P
Regression	5	6.088	1.218	67.67	0.00
Error(residual)	36	0.631	0.018		
Total	41				

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