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Full Length Research Paper

Phenotypic correlation of bodyweight and linear body measurement in Chinchilla rabbits (*Orycotolagus cuniculus*)

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Data on bodyweight and linear body measurements (LBMs) namely ear length (EL), heart girth (HG), body length (BL), head to shoulder (HS), leg length (LL) and tail length (TL) of 178 Chinchilla breed of rabbits at 3, 6 and 8 weeks of age were analyzed to obtain the phenotypic correlation between the various LBMs on one hand and LBMs on bodyweight on the other. The value of the Pearson's linear correlation coefficient defined by the Greek alphabet rho ( ) determines the level of relationship between the LBMs. It ranged from 0.36 - 0.91, 0.47 - 0.82 and 0.34 - 0.71 in weeks 3, 6 and 8 weeks respectively. This shows that as the animal grows, there is a positive relationship between its bodyweight and LBMs. This implies that a particular LBM or a combination of it can be used to determine the bodyweight or another LBM of a chinchilla rabbit. The values also showed high significance at 5, 1 and 0.1% respectively. This means that the probability of determining the bodyweight or LBMs using LBMs is possible at 95, 99 and 99.9 trial times respectively.

Key words: Chinchilla, breeds, linear body measurements, correlations.

INTRODUCTION

Improvement of rabbits is important in order to increase their contribution to the much needed animal protein in this part of the world. One of the pre-requisites for genetic improvement is the knowledge of genetic parameters for important economic traits (Akanno and Ibe, 2006). Rabbit producers are interested in the relationship that exists between bodyweight and physical characteristics, since this information would reflect in their feed efficiency and performance of the rabbits. According to Margherita (2008), because of the size and oral anatomy of rabbits, it is intrinsically difficult to perform a thorough oral examination and measurement on rabbits and rodents. Breeders need to establish the relationship that exists between these parameters and to organize the breeding programmes so as to achieve an optimum combination of bodyweight and good conformation for maximum economic returns (Khalil et al., 1987). This makes the work of the breeders easier and faster as effects can then be concentrated on traits that are easier to measure.

Breeds such as New Zealand, Dutch and Chinchilla remain the most commonly identified ones which have peculiar characteristics that distinguish them from one another. This study was conducted to identify the level of phenotypic correlation that exists between the linear body measurement and bodyweight of Chinchilla rabbits at 3, 6 and 8 weeks of age.

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MATERIALS AND METHODS

Linear body measurements (LBMs) and bodyweight records were taken using measuring tapes and weighing scales from 178 chinchilla weaner rabbits whose parents numbering 30 were housed and reared in the Federal University of Technology, Owerri (FUTO) teaching and research farm. FUTO teaching and research farm is located in Imo State, South Eastern Nigeria on a Longitude 6° 57' 36.0" and Latitude 5° 18' 39.6". The area has a maximum average daily temperature of about 33^0c with an annual average rainfall of about 2100 - 2500 mm with an average relative humidity of about 93%. This experiment was carried out for about 23 weeks from March 3rd to August 26th, 2006. These 30 matured parents comprised of seven stud bucks and 23 active does which were acquired from Patok farms, Naze Owerri, located on Longitude 7° 0' 45" and Latitude 5° 23' 13.2". The bucks and does were of a characteristic ash coat color with ear length ranging from 9 - 12 cm with a mean of 10.5 cm. Apart from these characteristics, the farm

Table 1. Phenotypic correlation of LBMs on Bodyweight of 3 weeks old chinchilla rabbits.

	BDYWT	EL	HS	LL	HG	BL	TL
EL	0.73*						
HS	0.51*	0.82**					
LL	0.71**	0.79*	0.91*				
HG	0.62*	0.82*	0.72**	0.72*			
BL	0.75*	0.73***	0.61*	0.63**	0.72*		
TL	0.36*	0.61*	0.48*	0.59*	0.61*	0.66*	

n = 176 rabbits. *, ** and *** = 5, 1 and 0.01% levels of significance respectively. BDYWT= Bodyweight, EL = Ear length, HS = Head to shoulder, LL = Leg length, HG = Heart girth, BL = Body length and TL = Tail length.

Table 2. Phenotypic correlation of LBMs and Bodyweight of 6 weeks old chinchilla rabbits.

	BDYWT	EL	HS	LL	HG	BL	TL
EL	0.71*						
HS	0.64*	0.62*					
LL	0.50*	0.69*	0.81*				
HG	0.81*	0.77**	0.82*	0.73*			
BL	0.89*	0.76*	0.72***	0.66*	0.72*		
TL	0.47*	0.53*	0.55*	0.68*	0.54*	0.82*	

n = 176 rabbits. *, ** and *** means 5, 1 and 0.01% levels of significance. BDYWT = Bodyweight, EL = Ear length, HS = Head to shoulder, LL = Leg length, HG = Heart girth, BL = Body length and TL = Tail length.

Table 3. Phenotypic correlation of LBMs on Bodyweight of 8 weeks old chinchilla rabbits.

	BDYWT	EL	HS	LL	HG	BL	TL
EL	0.53*						
HS	0.31*	0.46*					
LL	0.59*	0.68***	0.48**				
HG	0.59*	0.62*	0.46*	0.61*			
BL	0.56*	0.71*	0.53*	0.54*	0.42*		
TL	0.34*	0.50*	0.69*	0.63*	0.51*	0.71*	

n = 176 rabbits *, ** and *** means 5, 1 and 0.01% levels of significance. BDYWT = Bodyweight, EL = Ear length, HS = Head to shoulder, LL = Leg length, HG = Heart girth, BL = Body length and TL = Tail length.

owner assured us of the tentativeness of the breed type being a Chinchilla rabbit breed. The experimental design is a nested classification of a completely randomized design with the main treatment effect measured being the offspring's LBMs and their bodyweight. The animals were housed individually in three different hutches comprising of 48 compartments. Each of the hutches was assigned 2 males and 7 females while the kittens were housed separately after weaning. The experimental animals were fed *adlibitum* on commercial concentrates and forages to provide bulk and fiber with respect to other nutrients. The quantitative characters such as bodyweight, ear length, heart girth, body length, head to shoulder, leg length and tail length measured were done according to Gizaw et al. (2008), Akanno and Ibe (2006), Kathiravan (2008). They were taken at 3, 6 and 8 weeks of age respectively. The simple Linear Correlation Procedure of SAS (version 8, 1999) was used to establish the strength of linear relationship and association between the different LBMs together with the bodyweight using the model.

$$= \frac{x_i y_i}{x^2_i \quad y^2_i}$$

Where = Pearson's product moment correlation coefficient.
X_i = the first random variable of the ith LBM or Body weight.
Y_i = the second random variable of the ith LBM or Body weight.

This was achieved using the correlation procedure (PROC Corr)

Table 4. Chemical/nutrient composition of the commercial feed:

Nutrients	(%)
Crude protein	16.5
Crude fat	3.28
Crude fibre	5.0
Crude ash	12.9
Calcium	3.5
Phosphorus	0.65
Available phosphorus	0.36
Metabolizable energy	2.650 kcal/kg

(SAS Inst, 1999).

RESULTS AND DISCUSSION

The results of the correlation analysis are shown in Tables 1, 2 and 3 at weeks 3, 6 and 8 of age respectively. In all the ages, the correlation coefficient ( ) values were all positive which means that as any one LBM or bodyweight is increasing; a corresponding increase is expressed in the other. This shows that growth in this breed of rabbit is asymmetrical with other body parts. It is also indicative that as this breed of rabbit grows, all the other parts are growing concurrently (Tables 1 and 3). The values of the correlation coefficients also varied with different LBMs and bodyweight. This is indicative of the fact that there is variation in the different LBMs and bodyweight of the animals (Tables 1, 2 and 3). The probability values also indicated highly significant values for the correlation coefficient ( ) which means that there is significant degree of linear association between the variables that is the LBMs and bodyweights. These findings are in line with that of Akanno and Ibe (2006); Abdullah et al. (2003) and Akpan (1988). Although these authors were not breed specific, this study has shown that the Chinchilla breed of rabbit has a comprehensive growth rate even though the rate at which these body parts grow is yet to be established.

Conclusion

The result of this study indicates that in Chinchilla breed of rabbits there is a positive correlation coefficient between the LBMs and the bodyweight. This shows that unlike some breeds of rabbit which exhibit different growth pattern in relation to the LBMs, Chinchilla breed of rabbit has its unique growth pattern as exhibited in this study. This will help rabbit breeders to select and improve this breed of rabbit better. Table 4 shows the feed composition of the diets fed the rabbits during the experiment.

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