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Prediction of body live weight from body length and heart girth of rabbit

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Target Audience: Rabbit Farmers, Researchers, Rabbit Consumers

Abstract

Linear body measurements of forty – eight (48) domestic rabbits in terms of body length (BDL) and heart girth (HG) were taken along with body weight (BW) and correlated with one another. The body measurements were evaluated as predictor of body weight. The two parameters measured were strongly and positively correlated with one another. The Pearson's correlation coefficient (r) for body length and heart girth was r = 0.93. The regression equations of body measurements with BLW were positive with higher coefficient of determination (75 – 95%). The body length had a higher strength of prediction (95%) compared to the heart girth, which had lower prediction (75%). The regression or prediction equations generated from body measurements are positive and strong and can be accurately employed to predict the relative body weight of rabbits in the field and market with the use of tape rule without rabbit slaughter.

Key words: Linear body measurements, rabbits, body live weight, prediction value

Description of Problem

Rabbits (*Oryctolagus cuniculus*) are good source of meat that is tasty, of good quality and similar to chicken meat with no religious taboos against its consumption. They grow rapidly because they are efficient at converting concentrates and forages to meat beside their high productivity and fecundity. Rabbits are grown in hutches or cages; provide table meat for the farmer and the family and serves as a source of income (1). Rabbit meat is nutritious, high in protein, low in cholesterol (2). These qualities make rabbit production the panacea to animal protein deficiency in developing countries (3). Availability of rabbit meat and other products depend fully on the selection of breed and traits that are of economic importance. The development and evaluation of some rabbit breeding programs depend upon accurate knowledge of both environmental and genetic parameters (4).

Body weight is of utmost importance in determining the growth rate of an animal and its price during sales period in farms and market. Farmers and prospective buyers often use visual appraisal which may not be accurate during marketing as the weighing scale is not always available. Therefore the use of ruler or tape for simple morphometric body measurement with relevant prediction equation will be a useful tool in determining body weight under emergency and market conditions (1). Linear body measurements had been used to predict body live weight in

poultry, goat, sheep and cattle (1). (5) also reported that linear body measurement can be used to establish a tool for estimating the weight and growth potential of rabbit, hence making pricing and marketing of rabbit easier on the farm and market. This study, therefore, aimed at predicting body weight from linear body measurement of rabbits.

Materials and Methods

Experimental Site

The experiment was carried out at the Rabbitary Unit of the Teaching and Research Farm Directorate, College of Animal Science and Livestock Production Farm, Federal University of Agriculture Abeokuta. The university is located on latitude 7^0 10N and longitude 3^0 2'E and lies in the south western part of Nigeria. Mean annual rainfall is about 1037mm and mean monthly ambient temperature ranged from 28^0C in December to 36^0C in February with a yearly average relative humidity of about 82%. The vegetation represents an interphase between the tropical rainforest and the derived savannah (6).

Experimental Animals and Management

This study was carried out with a total number of 48 rabbit kits weaned at 6 weeks. The animals were reared in individual hutches in row cages made of metal and wire gauze for 8 weeks under intensive system of management. The hutches were thoroughly washed and disinfected prior to the stocking of the animals. All routine management operations such as feeding, cleaning and medications were duly observed. Feed and water were given *ad libitum*. The nutrient composition of the commercial feed used is shown in Table 1.

Data collection

Body length (which was measure as the distance or length between the anterior part of the shoulder to the junction between the hips and the tail), heart girth (measure as the body circumference just behind the fore leg) and body weights were taken with flexible tape rule (cm) and sensitive weighing scale for 8 weeks post weaning.

All measurements were taken in the morning before feeding of animal to avoid variation in values (7).

Statistical analysis

All data obtained were subjected to descriptive statistic, Pearson correlation and regression analysis using SAS. Prediction equations for BLW were generated from each of the linear measurement and their respective coefficient of determination (R^2) was used to indicate and compare the efficiency or accuracy of prediction. The regression model used was

$Y = a + bX$ for single variable and

When Y =dependent variable or BLW; a = intercept b = regression coefficient of parameters determined and the X are independent variables or body linear measurement.

Results

The descriptive statistic of body weight and linear body measurement of rabbits is shown in Table 2. The mean body live weight BLW, BDL and HG are 1.58kg, 24.2cm and 24.9cm respectively. The BLW had a deviation of 473.87 while BDL had higher deviation than HG at 2.56 and 1.18 respectively. In Table 3, higher and significant ($P<0.05$) correlation ($r = 0.97$) was obtained between BLW and BDL while lower and significant ($P<0.05$) correlation ($r = 0.91$) was obtained between HG and BLW. Correlation between BDL and HG was positive, strong and high ($r =0.93$).

Table 4 shows the linear relationship between body measurement and body live weight of rabbit. The regression equations of the selected body measurements with BLW

were positive, the coefficients of determination for BDL and HG were positive and high (R^2 = 95% and R^2 = 75%, respectively), with BDL recording higher prediction value (R^2 = 95%) than HG (R^2 = 75%).

Discussion

The result of this study shows that body live weight increases as the morphometric structure increases. The R^2 values for the prediction equation were high and positive indicating that the equations could be used to predict the body weight efficiently. High and positive R^2 value for any regression model indicates the reliability of such predictive equation.

This is in line with the findings of (8) and (9) that under standard management system of rabbit production, as the body weight increases so also the body dimension increases. The high and positive correlation between the body live weight and body linear measurement r = 0.97 and r = 0.91 for BDL and HG respectively, are in accordance with earlier report of (1) who recorded higher correlation r= 0.92 between BLW and HG also r = 0.87 between BLW and BDL in their study on estimation of inter-relationship between body weight and morphometric structural measurements of domestic rabbits reared under matured rubber plantation. (10) and (5) also observed higher and positive correlation between body weight and linear body measurement. The regression equation of body measurement with BLW are positive, the coefficients of determination for BDL and HG were high and positive (R^2 = 95% and R^2 = 75% respectively); this shows that their degrees of predictability were also greater or higher. This observation is in accordance with other report on other animals like goat, sheep, chicken, cattle etc (11, 12, 13, 14, 15) on prediction of body weight from linear body measurements. Hence, using any of the two regressions or prediction equation so generated from this study based on their strong relationship or correlation coefficient determination, BLW can be predicted with accuracy. (8) reported that body weight and body size parameter in growing rabbit genotype were positively correlated. Also the simple linear equation developed using the body size parameter as independent variables can be used to predict bodyweight of rabbit genotypes. The BLW of rabbit can be predicted by merely using tape rule to measure body length or heart girth. This is very easy and faster than taking the whole body linear measurements (tail length, head length, keel length, thigh length, heart girth, shoulder width) since the aim is to provide a tool that can be used with limited time to get the body live weight in rural community or market when sensitive weighing scales are not readily available or visible.

Conclusion and Application

1. There were positive, strong and significant relationships between body live weight and other linear body measurements of rabbit's population under study.
2. The regression or prediction equations generated from body measurements are positive and strong and can be accurately employed to predict the relative body weight of rabbits in the fields and markets with the use of tape rule without rabbit slaughter. This will also facilitate ensure easy and faster approaches towards selection of rabbits for body weight related purposes.

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Table 1: Composition of feed concentrate (%, as declared)

Crude Protein	16.00
Fat and oil	5.00
Crude Fibre	7.00
Calcium	1.60
Available Phosphorus	0.45
Lysine	0.75
Methionine	0.36
Salt	0.30
Metabolic energy (Kcal/kg)	2470

Table 2: Descriptive statistic of body weight and body length and heart girth of rabbit

Body parameters	N	Mean	Standard deviation	SEM
Body live weight BLW(Kg)	48	1.58	473.87	0.08
Body length BLD(cm)	48	24.2	2.56	0.45
Heat girth HG(cm)	48	24.9	1.18	0.38

Table 3: Pearson correlation coefficient, among body weight, body length and heart girth of rabbit

Body parameters	BLW	BDL	HG
BLW	1.00		
BDL	0.97*	1.00	
HG	0.91*	0.93*	1.00

* Significant at P<0.05)

Table 4: Linear relationship between body weight and the selected linear body dimensions (body length and heart girth) of rabbit

BLM (cm)	Regression equation	R^2%
Body length (BDL)	BLW (kg) = -2.775 + 0.18BL	95
Heart Girth (HG)	BLW (kg) = -7.53 + 0.366HG	75