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Predictability of live body weights of locally adapted rabbit kits using their linear body measurements

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ABSTRACT

Records of linear body measurements and body weights of rabbits kept at the Rabbit unit of the University of Cape Coast Teaching and Research farm were used to determine the relationship and predictability of live weights of locally adapted rabbit kits at different ages. Data were analysed using both simple linear and multiple regression models with Minitab statistical software. The mean body weights of kits at 6, 10 and 14 weeks were 723.4±0.09, 1333.0±30.8 and 1871.9±31.9 grams, respectively. Low to high correlations exited between body weight and many of the linear body measurements of kits at ages 6, 10 and 14 weeks. The R^2 of linear regressive models were relatively higher at 10 weeks compared to 6 and 14 weeks. Heart girth (HG) and height at withers (HW) were relatively better predictors of kits' body weight. Multiple regression equations recorded higher R^2 than simple regression equations with the R^2 ranging from 41.5 to 66.9%. It is recommended that simple regression equations using HW and HG should be used in predicting the body weights of rabbit kits as they are relatively more reliable to use by rural rabbit producers and farmers.

Keywords: Kits; regression equation; body weight; linear body measurements; Ghana

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Introduction

Rabbit rearing is increasingly becoming popular in Ghana. This could be attributed to the fact that rabbits are prolific and fast growers with short gestation period and generation interval. In addition, the management of rabbit is quite simple and do not require cumbersome housing system making them suited for backyard and subsistence farming (Lukefahr *et al*., 2013). Moreover, they do not compete with man for feed resources and are able to convert cheap feed resources into high quality protein (Alawa *et al*., 1990; Joseph *et al*., 1996; Yusuf *et al*., 2010). These qualities make them suitable potentials to bridge the animal protein gap in developing countries such as Ghana and also combat food insecurities in parts of sub-Saharan Africa.

The need to improve economically important traits in livestock is necessary in order to enhance the role of livestock to mitigate the animal protein deficiency in developing countries. For successful genetic improvement programmes, breeders should have a better understanding of the genetic factors that affect economically important traits (Akanno & Ibe, 2006). Selecting rabbits for fast growth is based on the premise of their body weights. The various morphological parts of the rabbit develop differently with variations in the development and these confer on them shape, form and body proportion as the animal ages (Olutogun *et al*., 2003).

In Ghana, most of the rabbit farmers operate on small and medium scales with few tens to hundreds of animals. Many of these rabbit farmers have little or no formal education and some commenced rabbit farming as a hobby, and hence do not have simple weighing scales for measuring the weights of their animals during sales of animals, administration of medication and breeding purposes. In most of these rabbit farms, body weight was generally assessed using visual appraisal and animal's age which leads to biases and the results not representative of the true value of animals in terms of pricing them for sale.

The use of alternative means in determining weight of animals depends on the ease of their usage and accuracy. The use of morphological measurements may be suitable to predict weight in the absence of a weighing scale. Measurement of morphometric traits are important, according to Verma *et al*. (2015), since they can be used in defining breed and suitable for describing the conformation and developmental capability of animals and thus help in making decisions on commercialization (Osario *et al*., 2002). Knowledge of linear body measurements have been helpful in predicting weight and carcass traits in sheep, cattle, goats, poultry and grasscutter (Sowande & Sobola, 2008; Tadesse & Gebremariam, 2010; Birteeb *et al*., 2012; Adenowo & Omoniyi, 2004; Hagan *et al*., 2016).

Studies of the genetic and phenotypic correlations among morphometric traits of livestock are necessary in genetic improvement programmes as they help in designing accurate selection index and making selection decisions. In addition, the knowledge of the interrelationship among traits could be an impetus for genetic improvement. There is, however, limited information on the interrelationship of linear body measurements and the use of these measurements in predicting live body weight of locally adapted breeds of rabbits raised in Ghana. The objective of this study therefore was to investigate the relationship of live body weight and linear body traits of locally adapted rabbits at various infantile ages and to predict body weight using the linear body measurements at different ages.

Materials and Methods

Location of study

The study was conducted at the Rabbit Grower Unit of the Department of Animals Science of the School of Agriculture's Teaching and Research Farm of the University of Cape Coast, Ghana. The rabbit unit is located in the city of Cape Coast which lies 17 m above sea level. The area has an average temperature range of 24°C to 32°C and annual precipitation of about 1149 mm with an average humidity of 85%. The rabbit grower unit has a GPS address of CC-188-2957.

Experimental animals

The rabbits used for the study were offspring of eight bucks and 26 does. Females were sent to the buck's cage for mating and were observed to ascertain that mating has been successful. The females were observed for pregnancy and non-pregnant does were re-mated until conception was achieved. Before kindling, that is 25 days after successful mating, nest boxes were provided to the pregnant does. On the day of kindling, boxes were inspected to remove and record mortalities at birth. The young ones were inspected daily to remove dead ones. Kits fed on dams' milk until 21 days of age. At day 21, both does and their young kits were fed together since the milk of the does were insufficient to provide the nutrition the young kits needed. The kits were left to be with the does for up to six weeks and then weaned. After weaning, the kits were fed separately from their dams.

Housing and management

Rabbits were housed in groups of two according to their sex and sire-line in a self-cleansing wooden cage. Rabbit houses were cleaned every day to maintain strict hygiene kept at the farm. For the purposes of identification, the rabbits were tagged with a plastic ear tag. The rabbits were fed with formulated feed of 16% crude protein and 2400 kcal Metabolizable Energy and fed ad libitum in earthen ware bowls every morning. Feed that has been soiled with faeces or urine was changed the next day. An automatic nipple drinking system has been installed to provide water ad libitum. Rabbits were provided with routine prophylactic treatment every other month against worm infestation.

Data collection and analysis

Live body weights and linear body measurements were taken from 92 rabbits. These rabbits were selected based on their age (6 to 14 weeks) and the physical conditions. The live body weight was taken with a 5000 grams capacity weighing scale (Mettler Toledo, UK) with a precision of 0.1 g whilst the morphometric body measurements were taken with a flexible plastic measuring tape. Linear body measurements (LBMs) were taken at the growing phase of rabbits in the growing unit. The LBMs were taken at 6, 10 and 14 weeks of age. The sex and sire line of rabbits were recorded before linear body measurements were taken on each rabbit. The LBMs taken in this study were:

- Body length (BL) - the distance from the shoulder to the junction between the pin bone.
- Height at withers (HW) – the distance from the withers to the ground when the animal is standing.
- 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.
- Tail length (TL) - the distance from the junction of the hip to the tip of the tail.
- Leg length (LL) – the distance from the hind foot to the hock joint of the back leg.

All linear body measurements were taken in the morning prior to feeding the animals. All measurements were taken by the same personnel.

Correlation analysis: The correlation analyses among live body weight and morphometric traits were carried out according to Equation 1 below using Minitab 19.1 (2019) statistical software to assess the relationship among linear body parameters and body weight of rabbit kits aged 6, 10 and 14 weeks old.

$$r_{xy} = \frac{\sum(x_{i-\bar{x}})(y_{i-\bar{y}})}{\sqrt{\sum(x_{i-\bar{x}})2(y_{i-\bar{y}})2}} \quad \text{Equation 1}$$

r_{xy} – the correlation coefficient of the linear relationship between the traits x and y

x_i – the measured values of trait x

$\bar{x}$ – the mean of the values of trait x

y_i – the measured values of trait y

$\bar{y}$ – the mean of the values of trait y

Regression analysis: Linear body measurements were regressed on live body weights at 6, 10 and 14 weeks using Model 2. Multiple linear regressions of body measurements of kits on body weights at 6, 10 and 14 weeks were done using Model 3 below.

$BW = \beta 0 + \beta X + \varepsilon$

Model 2

$\beta = Cov[BW,X]/var[X]$

$BW = \beta 0 + \beta_i X_i + \cdots + \beta_n X_n + \varepsilon$

Model 3

Where,

BW is live body weight of rabbits at 6, 10 or 14 weeks;

β0 is the intercept of the regression equation;

βi is the i^{th} regression coefficient of the i^{th} linear body trait (X_i) retained in the model;

βn is the n^{th} regression coefficient of the n^{th} linear body trait (X_n) retained in the model;

ε is the random error.

After identifying 6 major explanatory variables (BL, HW, HG, EL, LL and TL) for predicting body weight in the simple linear regressions, the linear body measurements were combined in a multiple regression analysis to ascertain their combined predictive ability.

Results and Discussion

The mean body weights and linear body measurements (BW, BL, HG, EL, LL and TL) of the rabbits at 6, 10 and 14 weeks and the standard deviations of the traits are presented in Table 1. The mean body weights and linear body measurements increase with advancement in age.

TABLE 1

Mean body weights and linear body measurements ± standard deviations (SD) of rabbits at ages 6, 10 and 14 weeks

		6 weeks	**10 weeks**	**14 weeks**
Traits	**N**	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**
Body weight, g	92	723.4 ± 148.2	1333.0 ± 240.9	1871.9 ± 223.2
Height at withers, cm	92	7.14 ± 1.16	10.59 ± 0.96	11.70 ± 0.75
Leg length, cm	92	7.15 ± 0.96	8.92 ± 0.76	10.23 ± 0.91
Heart girth, cm	92	17.52 ± 1.56	22.16 ± 2.17	25.40 ± 2.41
Body length, cm	92	21.26 ± 3.09	27.37 ± 3.32	33.23 ± 2.79
Ear length, cm	92	8.68 ± 1.16	11.06 ± 1.05	12.15 ± 1.08
Tail length, cm	92	5.38 ± 0.92	7.18 ± 0.87	9.08 ± 1.50

The phenotypic correlations among linear body measurements and live body weights of male and female rabbits at 6, 10 and 14 weeks of age are presented in Tables 2, 3 and 4. The correlation coefficients were mostly low to medium, positive and significant ($p < 0.05$) at all ages studied. The correlations between HW and BW, and HG and BW were largely higher in female rabbits than in male rabbits. In addition, the correlations of BW with HW and HG were higher than the correlations of BW with other linear body traits. Negative correlations existed between BL and EL at ages 6 and 10 weeks but not 14 weeks.

TABLE 2
Phenotypic correlations among the morphometric measurements and live body weight of rabbits at 6 weeks of age

	BW	HW	LL	HG	BL	EL
			Males			
HW	0.366*					
LL	0.461*	0.122				
HG	0.552*	0.097	0.499*			
BL	0.356*	0.309*	0.242	0.359*		
EL	0.331*	0.430*	0.374*	0.218	-0.036	
TL	0.524*	0.519*	0.468*	0.345*	0.333*	0.564*
			Females			
HW	0.205					
LL	0.561*	0.164				
HG	0.609*	-0.033	0.566*			
BL	0.488*	0.107	0.205	0.495*		
EL	0.297*	0.355*	0.315*	0.004	-0.179	
TL	0.488*	0.598*	0.311*	0.215	0.239	0.525*

[1]BW – Body weight; HW – Height at withers; LL – Leg length; HG – Heart girth; BL –Body length; EL – Ear length; TL – Tail length
[2]*Phenotypic correlations were significant at $p < 0.05$

TABLE 3
Phenotypic correlations among the morphometric measurements and live body weights of rabbits at 10 weeks of age

	BW	HW	LL	HG	BL	EL
			Males			
HW	0.472*					
LL	0.685*	0.465*				
HG	0.533*	0.272	0.334			
BL	0.407*	0.493*	0.076	0.421*		
EL	0.283	0.096	0.633*	0.126	-0.078	
TL	0.652*	0.183	0.462*	0.458*	0.274	0.372*
			Females			
HW	0.724*					
LL	0.530*	0.635*				
HG	0.604*	0.430*	0.293			
BL	0.294	0.186	0.002	0.378*		
EL	0.407*	0.296	0.137	0.160	-0.193	
TL	0.595*	0.514*	0.494*	0.192	-0.077	0.460*

[1]BW – Body weight; HW – Height at withers; LL – Leg length; HG – Heart girth; BL –Body length; EL – Ear length; TL – Tail length
[2]*Phenotypic correlations were significant at $p < 0.05$

TABLE 4

Phenotypic correlations among the morphometric measurements and live body weights of rabbits at 14 weeks of age

	BW	HW	LL	HG	BL	EL
			Males			
HW	0.677*					
LL	0.143	-0.054				
HG	0.347	0.449*	-0.350			
BL	0.383*	0.220	0.583*	0.049		
EL	0.577*	0.392*	0.446*	-0.028	0.198	
TL	0.144	0.010	0.723*	-0.259	0.419*	0.436*
			Females			
HW	0.654*					
LL	0.027	-0.160				
HG	0.707*	0.697*	-0.177			
BL	0.588*	0.528*	0.521*	0.483*		
EL	0.460*	0.454	0.502*	0.175	0.569*	
TL	-0.052	-0.100	0.550*	-0.473*	0.349	0.296

[1]BW – Body weight; HW – Height at withers; LL – Leg length; HG – Heart girth; BL –Body length; EL – Ear length; TL – Tail length

[2*]Phenotypic correlations were significant at $p < 0.05$

Tables 5, 6 and 7 present the simple linear predictive equations for the live body weights of male and female rabbits at weeks 6, 10 and 14. The R^2 of the predictive equations of rabbit body weights at 6 weeks were relatively lower than those of weeks 10 and 14. At 6 weeks old, HG predicted BW of rabbits relatively better than other morphometric traits (Table 5). At 10 weeks of age, LL and HW predicted BW best in male and female rabbits, respectively (Table 6). Height at withers and HG also predicted BW better in male and female rabbits, respectively (Table 7).

TABLE 5

Simple linear predictive equations for body weights of male and female rabbits at 6 weeks of age using linear body measurements and their adjusted coefficients of determination (R^2)

Regression equations	Adjusted R^2 (%)
Males	
BW = 357 + 52.0HW	11.8
BW = 218 + 71.7LL	19.7
BW = -160 + 51.0HG	29.2
BW = 378 + 16.67BL	11.0
BW = 386 + 39.9EL	9.3
BW = 260 + 86.3TL	26.1

Females	
BW = 551 + 23.2HW	2.0
BW = 111 + 84.6LL	29.9
BW = -345 + 60.3HG	35.6
BW = 196 + 24.24BL	22.1
BW = 348 + 42.1EL	6.7
BW = 311 + 76.2TL	18.4

[1]BW – Body weight; HW – Height at withers; LL – Leg length; HG – Heart girth; BL –Body length; EL – Ear length; TL – Tail length

TABLE 6

Simple linear predictive equations for body weights of male and female rabbits at 10 weeks of age using linear body measurements and their adjusted coefficients of determination (R^2)

Regression equations	Adjusted R^2 (%)
Males	
BW = 119 + 115.8HW	19.6
BW = -658 + 224.1LL	45.1
BW = 70 + 58.1HG	26.1
BW = 709 + 24.20BL	13.7
BW = 800 + 51.2EL	4.9
BW = 268 + 148.5TL	40.7
Females	
BW = -664 + 188.8HW	50.6
BW = -156 + 164.9LL	25.4
BW = -182 + 67.2HG	34.1
BW = 577 + 26.1BL	5.2
BW = -90 + 126.0EL	13.5
BW = -296 + 229.5TL	33.1

[1]BW – Body weight; HW – Height at withers; LL – Leg length; HG – Heart girth; BL –Body length; EL – Ear length; TL – Tail length

TABLE 7

Simple linear predictive equations for body weights of male and female rabbits at 14 weeks of age using linear body measurements and their adjusted coefficients of determination (R^2)

Regression equations	Adjusted R^2 (%)
Males	
BW = -521 + 203.1HW	43.8
BW = 1512 + 34.0LL	0.0
BW = 1138 + 28.5HG	8.9
BW = 991 + 26.0BL	11.6
BW = 551 + 107.7EL	31.0
BW = 1682 + 19.6TL	0.0
Females	
BW = -313 + 189.0HW	39.4
BW = 1820 + 6.9LL	0.0
BW = -263 + 84.6HG	47.0
BW = -493 + 72.2BL	30.7
BW = 493 + 115.2EL	16.5
BW = 1973 - 9.2TL	0.0

[1]BW – Body weight; HW – Height at withers; LL – Leg length; HG – Heart girth; BL –Body length; EL – Ear length; TL – Tail length

The coefficient of determination of the multiple regression equations were generally higher than those of simple linear regressions and the R^2 for multiple regression equations ranged between 41.5% and 47.1% for 6 weeks old rabbits (Table 8), 66.4% and 67.6% for 10 weeks old rabbits (Table 9), and 56.8% and 58.3% for 14 weeks old rabbits (Table 10).

TABLE 8

Multiple linear predictive equations of male and female rabbits at 6 weeks of age and their adjusted coefficients of determination (R^2)

Regression equations	Adjusted R^2 (%)
Males	
BW = -448 + 27.7HW + 21.6LL + 35.7HG + 37.0TL	42.4
BW = -410 + 25.2HW + 40.4HG + 46.2TL	42.2
BW = -459 + 25.7HW + 21.4LL + 34.0HG + 2.86BL + 35.9TL	41.5
Females	
BW = -722 + 32.3LL + 30.5HG + 13.65BL + 24.4EL + 31.1TL	47.1
BW = -546 + 39.5LL + 28.5HG + 11.02BL + 45.6TL	46.4
BW = -696 - 5.5HW + 33.0LL + 29.3HG + 13.83BL + 24.6EL + 35.6TL	46.5

[1]BW – Body weight; HW – Height at withers; LL – Leg length; HG – Heart girth; BL –Body length; EL – Ear length; TL – Tail length

TABLE 9

Multiple linear predictive equations of male and female rabbits at 10 weeks of age and their adjusted coefficients of determination (R^2)

Regression equation	Adjusted R^2 (%)
Males	
BW = -1071 + 213.1LL + 13.85BL - 45.9EL + 87.0TL	67.6
BW = -1176 + 204.1LL + 12.3HG + 11.75BL - 43.5EL + 79.1TL	67.4
BW = -1082 + 4.2HW + 209.6LL + 13.37BL - 45.3EL + 87.6TL	66.4
Females	
BW = -2113 + 96.3HW + 34.0HG + 14.2BL + 44.9EL + 112.8TL	67.3
BW = -1766 + 99.7HW + 36.2HG + 11.2BL + 133.5TL	66.9
BW = -1544 + 104.5HW + 41.2HG + 122.7TL	66.7

[1]BW – Body weight; HW – Height at withers; LL – Leg length; HG – Heart girth; BL –Body length; EL – Ear length; TL – Tail length

TABLE 10

Multiple linear predictive equations of male and female rabbits at 14 weeks of age and their adjusted coefficients of determination (R^2)

Regression equation	Adjusted R^2 (%)
Males	
BW = -815 + 123.4HW - 55.8LL + 23.1BL + 84.7EL	57.9
BW = -1255 + 122.2HW + 13.5HG + 14.27BL + 71.0EL	57.4
BW = -973 + 110.2HW - 43.3LL + 9.5HG + 21.2BL + 85.1EL	57.2
Females	
BW = -495 - 121.5LL + 79.6BL + 82.6EL	58.3
BW = -1164 - 46.8LL + 58.7HG + 32.9BL + 78.5EL	57.4
BW = -300 - 97.8LL + 96.7BL	56.8

[1]BW – Body weight; HW – Height at withers; LL – Leg length; HG – Heart girth; BL –Body length; EL – Ear length

The significant ($p < 0.05$) and positive relationships between the BW and most of the linear body parameters of rabbits at 6 weeks of age corroborate report of Ologbose *et al*. (2017) who found a significant and positive relationship between linear body parameters and body weight of weaner rabbits. This implies that in a homogenous environment, rabbits could be selected for superior body weight using some of their linear body parameters. In addition, sale of rabbits could be done by using some of their linear body measurements. A study by Akanno and Ibe (2006) also found a positive and strong relationship between live weight and linear body parameters of 6 weeks old rabbits in Nigeria. However, EL and BL did not significantly ($p > 0.05$) correlate with BW for male and female rabbits, respectively which is contrary to the findings of Oke *et al*. (2011) and Okoro *et al*. (2010) both of whom reported significant correlations between BW and morphometric parameters of rabbits including EL and BL.

The generally medium correlation coefficients between BW and linear body parameters in this study is contrary to the findings of Oke *et al*. (2011) who reported very high associations between body weight and linear body parameters (0.865 – 0.958) of weaner rabbits. The generally large correlation coefficients between HG and BW in both sexes at different ages of rabbits observed in this study is in agreement with the findings of Ologbose *et al*. (2017) and Obike and Ibe (2010) who reported high correlations between HG and BW of adapted exotic rabbit genotypes in Nigeria. The non-significant relationship between BL and EL in male and female rabbits at 6 and 10 weeks is contrary to the reports of Oke *et al*. (2011) who found only high and significant relationships among the body traits that were studied in Dutch breed. According to Oke *et al*. (2011), BW was positively correlated with HW, BL, EL, TL and HG which is in consonance with the results of this study. Oke *et al*. (2011) in their report stated that BL had the highest correlation with BW of rabbits which is dissimilar from the findings in this study. In the current study, the highest correlation was observed between BW and HG in both male and female rabbits aged 6 weeks.

The mostly positive and significant ($p < 0.05$) correlations between BW and linear body measurements of 10 weeks old rabbits agrees with report of Chineke (2005). Although EL and BL correlated positively with BW, they were not significant in both sexes which is in agreement with Ebegbulem (2012) who also reported a non-significant correlation between these body measurements (EL and BL) and BW. The generally medium to high significant correlations between BW and linear body measurements of 10-week old rabbits ranging from 0.41 to 0.72 are slightly below the range of 0.60 and 0.94 reported by Akinsola *et al*. (2014) in Nigeria.

Relatively few morphometric traits were significantly ($p < 0.05$) correlated with BW at 14 weeks of age relative to the other lower ages (6 and 10 weeks). The significant correlations between the linear body parameters and BW were generally medium to high ranging from 0.38 to 0.71. The correlation coefficients of 0.14 to 0.68 found between BW and other traits agree with the findings of Ologbose *et al*. (2017) who also reported higher associations especially between HW and BW. The medium correlation coefficient between LL and BW (0.33), and high correlation between HG and BW (0.71) observed in the female rabbits at 14 weeks old agreed with the results of Ologbose *et al*. (2017) in Nigeria. A number of the correlations among the morphometric traits were negative however many of these correlations were not significant ($p > 0.05$). Contrary findings have been reported in other studies at similar ages (Akinsola *et al*., 2014; Ebegbulem, 2012; Oke *et al*., 2011; Okoro *et al*., 2010; Ologbose *et al*., 2017).

The use of linear body measurements in predicting the live body weights of rabbits have been reported by several workers (Akanno & Ibe, 2006; Yakubu & Ayoade, 2009; Ebegbulem, 2012; Ologbose *et al*., 2017). The coefficients of determinations or predictability of single linear body measurements in predicting BW at 6 weeks were generally low (2% to 35.6%). Heart girth was the best predictor of BW in both male and female rabbits at six weeks of age and this is in agreement with Ebegbulem (2012) who also reported HG as the best predictor of BW at different ages. However, Akanno and Ibe (2006) have reported that body width and body length are best predictors of body weight at six weeks. Ologbose *et al*. (2017) have also reported that HG predicted body weight best in male weaners whereas HW was the best predictor of body weight for female weaners at six weeks of age.

At 10 weeks old, the R^2 of the predictive equations for rabbits were relatively higher than the R^2 of the linear equations at six weeks. Height at withers and LL best predicted BW in female and male rabbits, respectively. This finding is contrary to the finding of Yakubu & Ayoade (2009) that HG best predicted BW of rabbits at 10 weeks. The difference in the two findings could be partly attributed to the management and breeds of rabbits used in the two studies. At 14 weeks, HG and HW were best predictors of BW in female and male rabbits, respectively. However, Okoro *et al*. (2010), and Egena (2010) have both reported that HW was the best predictor of weight for female rabbits.

The use of multiple linear regression equations gave better predictions of BW at weeks 6, 10 and 14 with R^2 ranging from 41.5% and 67.6% compared to simple linear regression equations. The increase in the predictably of multiple regression equations in predicting body weight could be attributed to the multi-dimensional approach in assessing live weights of rabbits. This will increase the robustness of such equations. Multiple linear regression predictive equations at 10 weeks yielded slightly higher R^2 than those of 6 and 14 weeks. Hagan *et al*. (2016) have also reported higher R^2 for multiple linear regression equations compared to simple linear regression equations in grasscutters.

Conclusion and Recommendation

Many of the linear body measurements correlated positively with the body weight across all ages and for both sexes. Although tail length was lowly correlated with BW at 14 weeks, many of the linear body measurements (HW, LL, HG, and BL) were moderately and highly correlated with BW at ages 6, 10 and 14 weeks. Heart girth and HW that strongly correlated with BW could be used in prediction of live weights of rabbits between 6 and 14 weeks. The varied positive and negative relationships among the traits studied suggest a selection index could be used to optimally improve all traits at the same time.

Heart girth, HW or LL were the single traits that predicted the live weights of rabbits with adequate level of accuracy across the three ages. Heart girth best predicted the body weight of rabbits at 6 weeks of age, whereas at 10 weeks of age, LL best predicted the body weight of male rabbits with HW being the best predictor of their female counterparts. Height at withers and HG best predicted body weight of male and female rabbits at 14 weeks of age. However, better prediction of live body weight is obtained with a combination of linear body measurements in rabbits at the same.

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