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Body Weight and Biometric Parameters of Piglets Reared under Intensive System of Management in the Humid Tropic

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Abstract

Purpose: A total of 60 pigs of both sexes (30 males and 30 females) reared under intensive system of management were randomly sampled and used in this study that lasted for 20 weeks, to assess the relationship between bodyweight and biometric parameters.

Methodology: Data obtained for bodyweight (kg), height (cm), body length (cm) and heart girth (cm) were subjected to Bivariate Pearson Correlation, analysed using SPSS version 25.

Findings: The result showed that despite higher numerical values recorded for female pigs, there were no correlation between sex and other body biometric parameters. However, body weight had strong correlation with other biometric parameters analysed. The body length had the highest direct contributions (r = 0.981) to body weight in male and female pigs respectively.

Unique contribution to theory, practice and policy: The forecast indices recorded in this work could be employed to predict bodyweight estimation and help in making management decision and breeding programs for genetic improvement in pigs.

Keywords: *Body weight, height, body length, heart girth, pigs, intensive management system.*

INTRODUCTION

Pig production is one of the most important livestock sector globally. Pork accounts for more than one-quarter of total protein consumed worldwide, approximately 35% of all meat production (Bruinsma, 2003; Food & Agricultural Organization, 2017). In more developed countries, pigs are raised in the intensive system and that makes it a very interactive business widely adopted in different parts of the world. The intensive system of management has high biologic and economic value with low labour input. The system has made it possible to raise pigs with good genetic quality and good growth performance. It is possible that the system has a positive effect on the body weight of pigs. To determine productivity, it is important to always measure the body weight and know the best way to identify the pigs.

Under intensive system of pig production, it may be easy to manipulate feeds and feeding ratio to enhance body weight. This may enable them convert feed easily and more effectively as they are not allowed to move around. Breeding can also be manipulated or controlled as mating will be well planned and effectively carried out in anticipation of good result (Personal communication, 2022). This makes it easy to reproduce animals with the phenotypic appearance wanted by the farmer, like nose print. Body dimensions have often been used in estimating body weight and appropriate pricing of meat animals generally (Akanno *et al.,* 2002; Ibe, 1990; James *et al.,* 2007; Machebe and Ezekwe, 2010). Kolawole and Salako (2010) reported that since there is a relationship between body measurement and live weight, it follows that body measurement can be used to predict live weight. These body measurements can easily be gotten under the intensive system of production. Biometric parameters commonly used in the prediction of body weight (BW) are body length (BL), heart girth (HG) and height (H). Therefore, the success of a breeder to produce for maximum economic returns relies on the ability to establish relationship that exist between identified parameters and an organized breeding programme to suit desired aim (Khalil *et al.,* 1987).

The body weight and biometric parameters of animals can be determined in so many ways, like the use of scales. Though weighing pigs by running them through the scale provides the most accurate measurement, it requires a good amount of time. Moreover, it may also inflict injuries and stress on both the animals and the producers (Marinello *et al.,* 2015). Animals can be measured manually using tapes to show the size of the girth, the body length and height of the pig. This method also give accurate measurement but requires extra skill to ensure accuracy, and subsequently, ensure accurate estimation of the body weight of the pigs before the finishing stage. This helps to reduce losses associated with the sorting process (Que *et al.,* 2016). The intensive system of management has some great advantages for instance; it promotes record keeping and other management practices including adequate health management. All these play very vital role in promoting the pigs' body weight and easy acquisition of biometric parameters that do not cause damage to the pigs.

The present study was therefore undertaken to determine which of the biometric parameters, amongst those commonly used in pigs, have the best predicting power of body weight in intensively managed stock of pigs.

MATERIALS AND METHODS

Experimental Site

The experiment was carried out at the Piggery Unit of the Teaching and Research Farm of Enugu State University of Science and Technology, Agbani, Nkanu West Local Government area, Enugu State, Nigeria. Agbani lies between the Latitude of 7^0 3'00E and Longitude of 6^0 3'00N in the humid tropics with a rainfall pattern. The total rainfall in the area ranges from

1500mm-2000mm with a mean of 1800mm. The vegetation cover of Enugu State consist of trees, shrubs, grasses, and legumes (Odo, 2021).

Experimental Materials

All the equipment used for the measurements and other identification purposes were purchased from the New Artisan Market, Enugu, Enugu State, Nigeria. They included:

a) Ear notcher: used to properly identify the pigs through ear-notching.
b) Tooth clipper: used to clip the needle teeth of the piglets, to avoid cannibalism
c) Scale: used in taking the weights of the pigs in kilogram (kg)
d) Measuring tape: used to measure the body length (cm) and heart girth (cm) of the pigs
e) Graduated measuring stick/ruler: used to measure the height (cm) of the pigs.

Experimental Animals and their Management

A total of 60 landrace piglets of both sexes (30 males and 30 females) were randomly selected for the study to assess the relationship between bodyweight and morphological traits using Bivariate Pearson Correlation. The piglets were tooth-clipped to prevent them from inflicting injuries on the teats of the sows. They were also given Iron supplementation (Iron dextran). Subsequently, they were ear-notched (for identification purposes) and creep-fed (21% CP) for eight weeks. They were weaned on attaining a weight of 20kg. All the piglets were managed under intensive care system where strict supervision was given to their feeding and medications.

Data Collection

Data were taken on live bodyweight (kg) and three (3) biometric indices namely: body length, heart girth and height, all in centimeters (cm). Scale, tape and graduated measuring stick (ruler) were used to measure the body weight (BW), body length (BL)/heart girth (HG) and height (H) of the pigs respectively. All measurements were carried out by the same person to avoid between-individual variation, and were done at 2-week intervals. Body length was defined as the length from the base of the neck to the base of the tail, and heart girth was defined as the circumference of the chest area just behind the forelegs where the tape was placed directly behind the front legs and wrapped around the heart girth and read directly behind the shoulders.

Statistical Analysis

Data obtained from the response variables were subjected to Bivariate Pearson Correlation, analyzed using SPSS version 25.

RESULTS AND DISCUSSION

The summary of the results of body weight and biometric parameters of pigs reared under intensive care system are presented on the table 1.

Table 1: Bivariate Pearson Correlation for body weight and biometric parameters of pigs reared under intensive system of management.

Correlations						
		Sex	**Height**	**Length**	**Heart Girth**	**Weight**
Sex	Pearson Correlation	1	-.019	-.183	-.060	-.113
	Sig. (2-tailed)		.883	.162	.647	.389
	N	60	60	60	60	60
Height	Pearson Correlation	-.019	1	.945**	.977**	.949**
	Sig. (2-tailed)	.883		.000	.000	.000
	N	60	60	60	60	60
Length	Pearson Correlation	-.183	.945**	1	.947**	.981**
	Sig. (2-tailed)	.162	.000		.000	.000
	N	60	60	60	60	60
Heart Girth	Pearson Correlation	-.060	.977**	.947**	1	.942**
	Sig. (2-tailed)	.647	.000	.000		.000
	N	60	60	60	60	60
Weight	Pearson Correlation	-.113	.949**	.981**	.942**	1
	Sig. (2-tailed)	.389	.000	.000	.000	
	N	60	60	60	60	60

***. Correlation is significant at the 0.01 level (2-tailed).*

The result of the analysis is presented in Table 1 above. Although the females had higher numerical mean values for all the body biometric parameters analysed, there was no correlation between sex and other morphometric measurements. Also, results of the experiment showed a highly significant (P<0.01) positive correlation between BW and HG (P<0.01; r = 0.942), BL (P<0.01; r = 0.981) and H (P<0.01; r = 0.949). Machebe and Ezekwe (2010) earlier reported strong positive correlation between BW and other biometric parameters as HG, BL and H in growing finishing gilts raised in the tropics. However, BW recorded no significant (P>0.01) correlation but rather a negative correlation with Sex (r = -0.113) of the pigs. This is contrary to the report by Egahi *et al.* (2011) that sex had a significant effect (P<0.05) on body weight and all the body dimensions measured with the males recording higher values than females in free range West African Dwarf (WAD) goats in the guinea savannah.

Estimates of correlation obtained from this study reflect active growth of different body dimensions in response to the increase in the weight of the pigs reared under intensive system. Given that the majority of genes influencing the configuration of an animal are of common action and not local, the formation of one part is found to greatly correlate with the formation of the other (Lener and Donald, 1996). Thiruvenkadan (2005) reported high correlations between body weight and morphometric measurements of pigs under intensive management system. Aziz and Sharaby (1993) reached similar inferences regarding correlations between body weight and body dimensions of pig reared under intensive system.

The implications of the positive relationships in the present study are that body weight could be estimated from body measurements, especially under intensive system where scales are not readily available. The association may also be useful as selection criterion, since positive correlations of traits suggest that the traits are under the same gene action (pleiotropy). The descriptive statistics of bodyweight and linear body measurements for male and female pigs reared under intensive care system are presented in table 2.

Table 2: Descriptive statistics for body weight (kg) and biometric parameters (cm) of pigs reared under intensive system of management.

	Male	Female	SEM
Height (cm)	42.88	43.51	0.18
Length (cm)	54.02	64.14	0.18
Heart Girth (cm)	35.67	37.30	0.34
Weight (kg)	35.46	42.62	0.17

The result showed that there were numerical variations in the body weight and other biometric parameters between the male and female pigs. Female pigs reared under intensive care system recorded higher numerical values for all the parameters evaluated, as it recorded 43.51cm for height, 64.14cm for length, 37,30cm for heart girth and 42.62kg for weight, compared to the male pigs which had the following values of 42.88cm, 54.02cm, 35.67cm and 35.46kg for height, length, heart girth and weight, respectively.

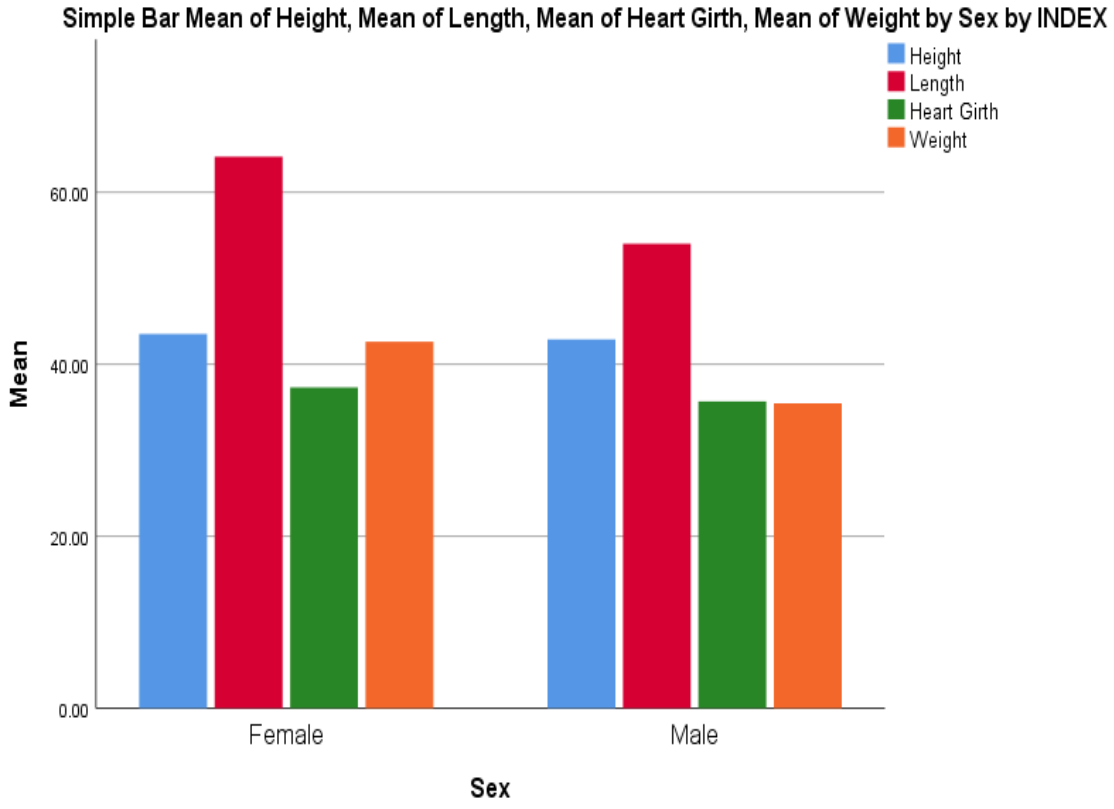

Fig 1. Body weight and biometric parameters of pigs reared under intensive care system.

The trend revealed the manifestation of sex difference in the pigs reared under intensive care system. This is similar to the report of Ogah *et al.* (2009) who earlier observed that female pigs had higher values than their male counterparts. On the other hand, Okpeku *et al.* (2011) observed that males had higher mean values for all measured morphological parameters in indigenous pigs in Southern Nigeria while Sebolai *et al.* (2012) reported significant differences ($P<0.05$) in bodyweight between male and female Tswana goats. However, Thiruvenkanden (2005) reported non-significant ($P>0.05$) sex differences in bodyweight and body measurements of pigs in South India.

CONCLUSION AND RECOMMENDATION

Correlation coefficients observed between body weight and biometric traits were positive and significant at $P<0.01$ implying that the bodyweight of pigs may be evaluated using morphological traits, particularly situations where scales are not readily available. The analysis also showed that length had the highest direct contribution to body weight in male and female pigs respectively. The implication is that length could be useful for selection and breeding programs in pig improvement for bodyweight.

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