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RESEARCH ARTICLE

Body Weight and Morphological Traits of Large White and Kolbroek Pig Breeds

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Abstract

The aim of the study was to determine the morphological features of Large White and Kolbreok pig breeds based on relationship among body weight. A total of twenty-four weaned (12 Large White, 12 Kolbroek) at the age of eight weeks; male sex animals were randomly allocated into 3 groups of 4 for each breed. The traits BW, EL, HL, RL, RH; RW, HG and WH were analysed by using Generalized Linear Model (GLM) procedure of SAS (2003). The linear body measurement data was collected by tape measure. The Kolbroek pig breed had a mean of 5.00 kg at 2 months of age male and Large White had 5.17 kg body weight. They was no significant different ($p>0.05$) in the body weight between the two breeds. Kolbroek pig had long head length, rump length, heart girth than Large White ($p>0.05$). In all body measurements were positive and significant ($p<0.05/0.01/0.001$). The highly significant morphological variable correlation coefficient between BW includes BL, RL, RW, and HG of 0.76; 0.57; 0.78; 0.68 respectively ($p<0.001$) and correlation coefficient between BW includes EL was not significant ($p>0.05$). To conclude the ear lengths had been shown poorly with other body measurements and contributes less total variable of body conformation. The Kolbroek pig had lower body weight than Large White pigs.

INTRODUCTION

In pig production the main objective is to produce lean muscle, which is dependent on type of breed, nutrition, sex and management (O'Quinn, 2000). There are many traits of economic importance; growth performance and feed conversion efficiency being the two critical traits that determine the success of pig industry (Kyriazakis and Whittemore, 2005). Growth is an increase in size and mass of the body, as a result of development and cell enlargement and feed conversion is the measure of animal efficiency in converting feed mass into increase in body mass (Brown *et al.*, 2011). Feed intake is an essential determinant of performance that may also reflect the health status of pigs (Bruininx *et al*., 2001).

The linear body measurements are closely related to body weight for the pigs and other farm animals counting goats and sheep, cattle and poultry (Tyasi *et al*., 2015a). The linear body measurement such as chest girt, heart girt, wither height and body length are used to evaluate body demission to an animal's overall body size (Tyasi *et al*., 2015b). Body weight is an important attributes in animal production as it forms the basis for not only assessing growth and

feed efficiency but is also making economic and management decision (Tyasi *et al*., 2015b). The estimating of body weight using morphmetric measurement is very practical in smallholder's livestock and poultry producers.

Indigenous breeds are generally considered inferior to improved exotic breeds because they are less productive in intensive production systems. Their small carcass that cannot be cut into large meat potions is also another reason for their discrimination (Ndiweni and Dzama, 2004; Masenya *et al*., 2011).

Determination of the magnitude of differences in growth performance and feed conversion efficiency of exotic and indigenous breeds in extensive and intensive production is very important, to provide fair value of these two pig types in different systems of production.

Materials and methods

Study Site

The study was conducted at Fort Cox College of Agriculture and Forestry. The agriculture college is situated in the Eastern Cape province of South Africa and is located in the False Thornveld which is characterized by mean annual rainfall of 480mm and means annual temperature of 18.7°C. The site is 450-500m above sea level and lies along latitude 27°01'E and latitude 32°46'S at an altitude of 450-500m above sea level.

Experimental Design

The Randomised Complete Block Design (RCBD) was used in this experiment. The animals were divided into 3 groups, 4 animals per group for each breed, with body weight (BW) as a blocking factor.

The model: $Y_{ijk} = \mu + \alpha_i + \beta_i + \Sigma_{ijk}$

Y_{ijk} = response variables (morphological features)

μ = overall constant mean

α_i = breed effect

β_i= body weight effect

Σ_{ijk} = random error

Animal management

A total of twenty-four weaned (12 Large White, 12 Kolbroek) at the age of eight weeks; male sex animals were randomly allocated into 3 groups of 4 for each breed. The Kolbroek pigs were purchased from village in different families and the Large White pigs were purchased from Fort Cox College of Agriculture. The pigs were housed in intensive system.

Morphological traits

Different body proportions were measured using a tape measure (with record taken to nearest cm). The morphological measurements that were recorded include: Head length, which is the distance between the snout and occipital bone; Ear length; Body length, which is the distance from point of the shoulder to the pin body; Rump height, which is the distance between highest point of the hip bone and ground; Rump width, which is the distance between the external iliac tuberosities; Rump length, which is the distance between end ischion and the beginning of rump; Heart girth, which measure the circumference of the chest over back; Wither height, which is the distance from shoulder blades to the ground.

Results and Discussion

Table1. Least square means of morphological traits by breed type

	Breed			
Trait	Kolbreok	Large White	±SE	P-value
BW	5.00	5.17	0.46	0.80
HL	15.25	13.75	0.58	0.08
EL	8.42	9.75	0.48	0.06
BL	38.17	40.17	1.69	0.43
RH	24.67	28.00	1.41	0.11
RL	12.00	11.75	0.56	0.11
RW	19.42	21.00	1.20	0.36
HG	43.08	40.92	0.53	0.33
WH	26.92	31.08	1.58	0.07

BW=body weight; HL= head length; EL=ear length; BL=body length; RH=rump height; RL= rump length; RW=rump width; HG=heart girth; WH=wither height; NS=not significant. BW: measured in kilograms (kg) and the other traits measured in centimetres (cm).

The least square mean, standard error, p value of each morphological trait measures by type of breed are presented in Table 1. The Kolbroek pig breed had a mean 0f 5.00 kg at two months of age male and Large White have 5.17 kg body weight. There was no significant different ($p>0.05$) in the body weight between the two breeds. The results differ from the finding of Masenya *et al*. (2011), who reported that body weight of Kolbroek pig is lower compared to Large White pig breed. Furthermore, Chimonyo *et al*. (2005) reported that southern Africa indigenous pigs (Kolbreok) are small in size compared to exotic pig breed (Large White). All morphological variable measures were found not differ significantly. Although Large White has high body weight compared to the Kolbreok, in the studies found the Large White has lower in HL, RL and HG than Kolbreok. Addis (2012) found that the indigenous chicken was express as low growth rate, produce small size egg, small clutch size and low production of egg performances. The head length of Kolbroek was higher than for the Large White. Adeola *et al*. (2013) reported that the snout of NIP indigenous pig breed had a snout than the CBP. Kolbroek breed has study legs, strong and is good forager and efficient of high roughage rations. They are two significant important traits such as size and body conformation (Mavule *et al*., 2013).

Large White pig breeds are the most remarkably for large size and good, and also known for its ability to produce hybrid vigour in crossbreeding. Small size may yield a better ability to survive under insensitive condition than large size, as an evolutionary adaptation to condition of low-input production. Indigenous breeds are smaller with shorter than exotic breeds (Adeola *et al*., 2013). Type of feed and method of feeding greatly influence the feed efficiency, growth rate and breeding efficiency of pigs. The pigs that are raised on restricted feeding have a high growth rate, low back and high lean percentages in the carcass of their descendants.

Table 2: Coefficients of correlation among morphological traits in Large White and **Kolbroek pigs**

Trait	BW	HL	EL	BL	RH	RL	RW	HG	WH
BW		0.42*	0.23^{NS}	0.76***	0.47*	0.57**	0.78***	0.68***	0.44*
HL			0.36^{NS}	0.60***	0.31^{NS}	0.63***	0.28^{NS}	0.57**	0.23^{NS}
EL				0.42*	0.55**	0.56**	0.35^{NS}	0.18^{NS}	0.46*
BL					0.53**	0.55**	0.55**	0.67***	0.37^{NS}
RH						0.53**	0.61***	0.26^{NS}	0.92***
RL							0.53**	0.52**	0.53**
RW								0.56**	0.57**
HG									0.69^{NS}
WH									

***P <0.001; **P<0.01; *P <0.05; NS= not significant

Correlation coefficient among body weight and morphological traits in Large White and Kolbroek pig breeds are shown in Table 2. In all body measurements were positive and significant ($p<0.05$). The highly significant Morphological variable correlation coefficient between BW includes BL, RL, RW, and HG of 0.76; 0.57; 0.78; 0.68 respectively ($p<0.001$) and correlation coefficient between BW includes EL was not significant ($p>0.05$). This shows that depending on genetic correlation, selection for these traits could have resulted in responses in the correlation trait. The morphological measure of RH is significant with ($p< 0.05$) and EL is not significant because the ($p>0.05$). Adeola *et al*. (2013) found that correlation coefficient were highly significant among NIP and CBP includes NC, BH, RH, BL, IW, PG, HG, TL and LB ($p<0.001$). HG, WH, RW, and BL were highly significant correlation with body weight. Positive and highly significant correlations among body weight measurements indicate high predictability. The ear length were not significant, Mavule *et al*. (2013) reported that ear length and tail length with other body traits are notable in correlation matrix. These traits are determined by non-additive genetic effects and seemingly less breeding programmes is not lead to significant improvement of body weight and other measurement that are economic important. Linear body measurements such as heart girth, wither height and body length are used in evaluating the body size or weight of pigs. They are provided good information on performance, productivity and carcass characteristic of animals. Linear body measurements could be used in estimating growth rate, body weight, and feed utilization and carcass features in livestock production industry. Changes in linear body measurement are resultant effects of tissue growth which is evident in muscle growth and fat tissue deposition.

Conclusion

Indigenous breeds kept in extensive production system performed better than exotic breed, due to their ability to utilize high fibrous diet. The hardness and adaptation to harsh management condition compensate for their low productivity. The ear length has been shown to be poorly related with other body measurements. Morphological measurements such as HG, RW, and BL are useful for estimating and predicting a body weight in Kolbroek and Large White pigs.

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