Correlation Between Body Weight and Morphometric Traits in Local and Exotic Chickens fed Graded Levels of *Moringa oleifera*(Lamarck) Seed Meal

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Abstract
Moringaoleifera (Lamarck) seed is a potential novel feedstuff that can be incorporated into poultry nutrition in Nigeria. *Moringa oleifera* is a potential cheaper alternative than the current conventional feedstuff. However, the performance response may vary between different chicken genotypes.The objectives of this study is to evaluate the effects of dietary inclusion of *Moringa oleifera* Seed Meal (MOSM) on the correlation between body weight and morphometric body parameters of local and exotic chickens. Four experimental diets containing 0, 5, 10 and 15 % MOSM were used. Data were analyzed using the Pearson Correlation model. The study showed that the association between morphometric parameters and body weights decreased significantly ($p<0.05$) with increasing levels of MOSM (r decreased from 0.72 to 0.52). This study concluded that 5% dietary inclusion of MOSM would improve growth performance in YENLC and Marshall broilers.

Introduction
Recently, there has been interest in the utilization of *Moringa oleifera* commonly called horseradish tree or drumstick tree, as a protein source for livestock (Makkar and Becker, 1997; Sarwatt*et al*., 2002). *Moringa oleifera* have quality attributes that make it a potential replacement for soyabean meal or fish meal in non-ruminant diets. *Moringa oleifera* can easily be established in the field, has good coppicing ability, as well as good potential for forage production. Sarwatt*et al*. (2004) reported that *Moringa oleifera* foliages are a potential inexpensive protein source for livestock feeding. The advantages of using *Moringa oleifera* for a protein resource are numerous, and include the fact that it is a perennial plant that can be harvested several times in one growing season and also has the potential to reduce feed cost. *Moringa oleifera*is in the group of high-yielding nutritious browse plants with every part having food value (Duke, 1998).

The effect of MOSM on body parameters was necessary as it is established that diets influenced the phenotypic expressions of different genotypes of chickens. However, body weight of chicken is a phenotypic expression of their genetic make- up under prevailing environmental condition and feeding regime. It is established that body weight play a pivotal role in the marketability of chickens. Variations in the body weight within a flock can be ascribed to variation in the genetic make-up and environmental condition (diet composition/quality inclusive) (Fayeye and Owoeye, 2016).

For effective livestock characterization as it relates to different genotypes, the evaluation of body size and conformation are highly important as reported by Ibe (1989). Morphometric or qualitative analyses of form, structure, shape and size of an animal were reported useful in contrasting, size and shape of animals (Ajayi*et al*., 2008). Morphometric indices would also point to the potentials of some body parts and the impact of genotype on these parameters when fed graded level of MOSM.

Phenotypic correlation between body weight and morphometric traits of different genotypes and the impact of MOSM on these trait could help in the selection programme and also the developmental response of different genotype to the same diet under the similar environmental

condition. The study to evaluated the effects of dietary inclusion of *Moringa oleifera* Seed Meal (MOSM) on the correlation between body weight and morphometric body parameters of local and exotic chickens.

MATERIALS AND METHODS

The study was carried out at the Livestock Section of the Teaching and Research Farm of the Federal College of Animal Health and Production Technology, Moor Plantation, Ibadan. The city has coordinates of 70 24' 7.0632'' N and 30 55' 2.3268'' E.The test ingredient, *Moringa oleifera*seed, was sourced from Kaduna metropolis. The seeds were air dried at room temperature after which the meal was prepared. The seeds of *Moringa oleifera* were then milled and incorporated into the chickens' diets in appropriate proportion.The eggs of Yoruba Ecotype Nigeria Local Chickens (YENLC) were sourced from Ayede and Erunmu environments in Egbeda Local Government, Oyo State and hatched at Bronco Hatchery, Oluyole Extension, Ibadan. Marshall broilers were sourced from Obasanjo Farm, Ibadan, Oyo State.

Ninety-six Marshall broiler chicks and ninety-six YENLC of mixed sexes were randomly allotted to four dietary treatments containing graded levels of MOSM: 0% (diet 1), 5% (diet 2), 10% (diet 3), 15% (diet 4) fed independently to the broiler chicks and local chickens such that each treatment comprised of three replicates of eight birds each in a 2 x 4 factorial design. The experimental animals were weighed before feeding at the commencement of the feeding trial and every 7 days thereafter until the end. The experiment lasted for eight weeks.

The morphometric indices were determined to enable the comparative studies between the exotic and the local chickens.

Linear body measurements - shank length (SL), thigh length (TL), keel length (KL), body girth (BG), wing length (WL) and body length (BL) were determined.

Pearson correlations between body weight and morphometric quality traits were assessed for the two genotypes of chickens and the four graded levels of MOSM for all the chickens irrespective of the genotypes using SPSS Version 20 (2012).

RESULTS AND DISCUSSION

Correlation of body parts of YENLC irrespective of diet

There were positive correlations between the body weights and all the morphometric indices measured. However, there was low and no significant ($p > 0.001$) relationship between body weight and wing length, shank length, body length, keel length and body girth for YENLC. (Table 1), however, there were positive correlations between the body weights and all the morphometric indices measured. However, there were high positive significant ($p<0.001$) relationship between body girth and body length ($r=0.757$) and thigh length and body length ($r=0.702$) for Marshall Broilers (Table 2).

There were positive correlations between the body weights and all the morphometric indices measured. However, there were high positive significant ($p<0.001$) relationship between all the morphometric parameters and body weights of birds YENLC and Marshall Broilers fed then control diet (0% MOSM). (Table 3) while it was observed that there were positive correlations between the body weights and all the morphometric indices measured. However, there were high positive significant ($p<0.001$) relationship between all the morphometric parameters and body weights of birds YENLC and Marshall Broilers fed with diets with 5% MOSM. (Table 4). The relationship however compared well with the control (0% MOSM).

Also, there were positive correlations between the body weights and all the morphometric indices measured for birds fed 10%MOSM. However, there were high positive significant ($p<0.001$) relationship between all the morphometric parameters and body weights of birds YENLC and Marshall Broilers fed with diets with 10% MOSM except with body length and keel length with significant ($p<0.01$) low positive correlation coefficient ($r=0.482$).(Table 5).

However, when compared with the control (0% MOSM), the association between body length and keel length and keel length and thigh length decreased from high to medium.
There were positive correlations between the body weights and all the morphometric indices measured for birds fed 15%MOSM (Table 6). However, there were high positive significant ($p<0.001$) relationship between all the morphometric parameters and body weights of birds YENLC and Marshall Broilers fed with diets with 10% MOSM except with body length and keel length with significant ($p<0.01$) low positive correlation coefficient ($r=0.482$). When compared with the control (0% MOSM), the association between body length and body weight and body girth and body weight reduced from high to medium while MOSM at 15% in the diet strengthened the relationship between keel length and wing length.

Table 1. Phenotypic Correlations between body parts and body weight of YENLC

	BW	TL	WL	SL	BL	KL	BG
BW	1						
TL	0.301*	1					
WL	0.225	0.653**	1				
SL	0.207	0.645**	0.623**	1			
BL	0.115	0.644**	0.479**	0.507**	1		
KL	0.138	0.244*	0.298*	0.350**	0.062	1	
BG	0.197	0.455**	0.306*	0.331**	0.217	0.587**	1

BW – Body Weight, TL- Thigh Length, WL – Wing Length, SL – Shank Length, BL – Body Length, KL – Keel Length, BG – Body Girth

Table 2. Phenotypic Correlations between body parts and body weight of Marshall Broilers

	KL	BG	BW	TL	WL	SL	BL
KL	1						
BG	0.418**	1					
BW	0.199	0.668**	1				
TL	0.218*	0.651**	0.470**	1			
WL	0.203	0.533**	0.355**	0.608**	1		
SL	0.556**	0.678**	0.456**	0.506**	0.366**	1	
BL	0.332**	0.757**	0.573**	0.702**	0.514**	0.588**	1

BW – Body Weight, TL- Thigh Length, WL – Wing Length, SL – Shank Length, BL – Body Length, KL – Keel Length, BG – Body Girth

Table 3. Phenotypic Correlations between body parts and body weight of YENLC and Marshall Broilers fed 0% MOSM

	BW	TL	WL	SL	BL	KL	BG
BW	1						
TL	0 .816**	1					
WL	0.855**	0.874**	1				
SL	0.793**	0.857**	0.736**	1			
BL	0.879**	0.885**	0.828**	0.835**	1		
KL	0.722**	0.781**	0.665**	0.871**	0.764**	1	
BG	0.923**	0.912**	0.888**	0.869**	0.936**	0.811**	1

BW – Body Weight, TL- Thigh Length, WL – Wing Length, SL – Shank Length, BL – Body Length, KL – Keel Length, BG – Body Girth

Table 4. Phenotypic Correlations between body parts and body weight of YENLC and Marshall Broilers fed 5% MOSM

	BW	TL	WL	SL	BL	KL	BG
BW	1						
TL	0.720**	1					
WL	0.703**	0.850**	1				
SL	0.803**	0.868**	0.859**	1			
BL	0.811**	0.891**	0.871**	0.928**	1		
KL	0.728**	0.797**	0.841**	0.869**	0.879**	1	
BG	0.829**	0.840**	0.840**	0.933**	0.906**	0.910**	1

BW – Body Weight, TL- Thigh Length, WL – Wing Length, SL – Shank Length, BL – Body Length, KL – Keel Length, BG – Body Girth

Table 5. Phenotypic Correlations between body parts and body weight of YENLC and Marshall Broilers fed 10% MOSM

	BW	TL	WL	SL	BL	KL	BG
BW	1						
TL	0.778**	1					
WL	0.707**	0.806**	1				
SL	0.753**	0.733**	0.818**	1			
BL	0.624**	0.870**	0.768**	0.706**	1		
KL	0.782**	0.566**	0.741**	0.826**	0.482**	1	

BG	0.837**	0.818**	0.807**	0.787**	0.706**	0.794**	1

BW – Body Weight, TL- Thigh Length, WL – Wing Length, SL – Shank Length, BL – Body Length, KL – Keel Length, BG – Body Girth

Table 6. Phenotypic Correlations between body parts and body weight of YENLC and Marshall Broilers fed 15% MOSM

	BW	TL	WL	SL	BL	KL	BG
BW	1						
TL	0.745**	1					
WL	0.748**	0.900**	1				
SL	0.699**	0.877**	0.952**	1			
BL	0.524**	0.795**	0.762**	0.756**	1		
KL	0.662**	0.751**	0.812**	0.814**	0.712**	1	
BG	0.641**	0.813**	0.816**	0.812**	0.689**	0.876**	1

BW – Body Weight, TL- Thigh Length, WL – Wing Length, SL – Shank Length, BL – Body Length, KL – Keel Length, BG – Body Girth

The high correlation between body weight and morphometric measurement was in support with the report of Fayeye and Owoeye (2016) and Yahaya*et al*. (2012) who reported high correlation coefficients Isa Brown and Fulani Ecotype chickens and Hubbard and ArborAcre broiler strains.The knowledge and information on morphometric parameters are highly essential for understanding an animal and its reproductive biology in particular (Ojedapo*et al*. 2012).

The result was also in agreement with the report of Ojedapo*et al*. (2012) who reported that growth traits showed increase in all body measurements as growth line. It also agreed with the report of Pingel*et al.* (1990) that these morphometric relationships could be utilized for the genetic improvement of growth.

Conclusion

There were high positive correlations ($p<0.01$)among the parameters in 0% and 5% MOSM inclusion, however at 5%, the association between body length and keel length and keel length and thigh length decreased from high to medium. At 15% MOSM, the association between body length and body weight and body girth and body weight reduced from high to medium.

It is therefore recommended that feeding both genotypes of chickens - YENLC and Marshall broilers up to 5% MOSM would further improve the growth parameters.

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