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Production functions on growth, carcass characteristic and organ weight of indigenous chicken genotypes in the warm wet climate of Nigeria

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ABSTRACT

One hundred and eleven (111) day old indigenous chicks made up of twelve (12) naked neck, twenty one (21) frizzle feathered, forty-five (45) normal feathered and thirty three (33) short flight feathered chicks obtained from a hatch of twelve (12) males and seventy two (72) females self-mated parent stock were used in this experiment. The chicks were randomly distributed based on their parental genotypes into four treatment groups replicated thrice and were fed *ad-liitum* on the same diets for a period of twenty-six (26) weeks. Data collected were analyzed using R statistical package for stochastic frontier production functions growth performance and to analyze the carcass weight and the cut-up parts. The regression analysis of estimated effect of age and feed intake on the different chicken genotypes using the Cobb-Douglass model revealed a high R-square values of 97% among the indigenous chickens. The values of the cut-up parts and organ weight revealed that naked neck had consistently higher values and was significantly different ($P<0.05$) from the other chicken genotypes in terms of breast weight (191.38±9.58g), back weight (185.50±7.43g), liver weight (26.63±0.98g) heart (6.75±0.53g) and gizzard weight (46.13±4.43g). The study therefore recommended the use of Cobb-Douglas production function due to its ability in satisfying the economic, statistical and econometric criteria indicating that the weight of the chickens in grams was explained by age and feed intake and also advocated the improvement of naked neck indigenous chicken due to its cut-up parts and organ weight advantage over the other chicken genotypes.

Keywords: Carcass weight, Cobb-Douglass, organ weight, indigenous chicken genotypes, regression analysis.

INTRODUCTION

Fowl is one of the common domestic animals kept throughout the tropics and it descended from the red jungle fowl Gallus *gallus domesticus* (Vaisanen *et al.*, 2005). White meat such as chicken meat is considered superior in health aspects to red meat because of comparably low contents of fat, cholesterol, and iron which are important for men. Consumers also acknowledge the relatively low price, the typically convenient portions, and the lack of religious restriction against its consumption (Jaturasitha, *et al.*, 2004). The meat from poultry contains several important classes of nutrient and many consumers relatively prefer the local chicken compared to their exotic counterparts because of its leanness and lower purchasing price. Proportions of major carcass tissues and distribution of these tissues throughout the carcass is important to carcass value. Considering superiority in the health aspect of meat, poultry production are generally known for their great potentials in improving animal protein status (Adeniji, 2005) because of their comparably low contents of fat, cholesterol, and iron which are of great importance in human’s diet. Despite that, many consumers relatively prefer the indigenous chicken compared to their exotic counterparts because of its leanness, lower purchasing price and the lack of religious restriction against its consumption (Jaturasitha, *et al.*, 2004). Proportions of major carcass tissues and distribution of these tissues throughout the carcass is important to carcass value. Indigenous chicken meats are capable of addressing food insecurity in rural households, creating opportunity for smallholder farmers to rely on it for nutritional requirements in order to meet the increasing world population requirement of 35g of animal protein source per caput per day recommended by FAO, (2006). Researchers have suggested that although the growth performance of local chicken is less efficient than that of commercial broilers, the quality of their meat is more suitable for premium chicken meat (Castellini *et al.*, 2002: Gordon and Charles, 2002). For accuracy and better judgment of the growth performance, growth rate of individual chicken and carcass characteristics, the proportion of major carcass parts in Nigeria indigenous chicken needs to be established. This study was therefore design to investigate the different production functions on growth, carcass characteristic and organ weight of four indigenous chicken genotypes with the aim of determining the best production function for estimating age and feed intake on body weight, as well as the variation in carcass and organ weight among the four indigenous chicken genotypes in the warm wet ecological zone of Nigeria.

MATERIALS AND METHODS

Study area

The experiment was carried out at the poultry unit of Benson Idahosa University, Benin City, Nigeria. The area lies within the geographical coordinate of longitude 5^0 04’ East and 6^0 43’East and latitude 5^0 44’ North and 7^0 34’North. It has a prevailing tropical climate with a mean annual rainfall of 2162mm, average annual temperature of 27.6^0 C and a mean relative humidity of 72%. (NAA, 2014).

Animal and Management

A total of 84 foundation indigenous chickens comprising of 72 females and 12 males that had not yet started to lay were purchased from villages in Afon, laduba, Buduba, Ago-oja, Reke, Ogbondoroko, Oja-oba, Oja-tutun, and other villages in Ilorin, Kwara state. Others were from Ogbomosho and Osogbo in Osun state as well as from Auchi and Benin City in Edo State of Nigeria. They serve as the parent stock used to produce the experimental chickens used in this study. The local chickens were brought to Benson Idahosa University Teaching and Research Farm in the months of May and June 2015. After two weeks of adaptation to the new environment, they were separated on the basis of genotypic feather distribution in four groups comprising of eighteen (18) hens and three (3) cocks each for naked neck, frizzle feather, normal feather and short flight chickens respectively. Natural mating within genotype was carried out by maintaining a mating ratio of six (6) hens to one (1) cock for the different indigenous chicken genotypes to ensure good mating. Before this time their pen were all cleaned and disinfected. Wood shavings were used as litter materials, feeders and drinkers were provided and adequately spaced. At lay, eggs were collected, weighed and incubated per area in the incubator to prevent the mix up of the expected chicks. At hatch, a total of one hundred and eleven (111) day old chicks were used in the experiment comprising of twelve (12) naked neck, twenty one (21) frizzle feather, Forty five (45) normal feather and thirty three (33) short flight feather chickens respectively. They were placed into four treatment based on their parental phenotypic feather distribution background. Each genotype was made up of unsexed chicks which were replicated thrice and assigned into their various pen in a completely randomized design. The unequal number of the experimental chickens was as a result of the different hatchability percentage from the four different inbred strains.

Experimental Diets

The composition of the diets used for the experiment is shown in Table 1. Chicks mash with 2830.93 Kcal/KgME and 21.16% of crude protein was used from hatch to 8 weeks, growers feed diet with 2685.80 Kcal/KgME and 17.35% of crude protein was used as feed for a period of 8 – 20 weeks, and that was followed by the layer feeds diets with 2502.90 Kcal/KgME and 17.02% crude protein from 22 – 26weeks. Ingredients for the formulation were bought and milled from a reputable feed stock dealer. Feed and cool clean water were provided *ad-libitum* during the period of the experiment. Within the first few weeks, flat trays were used as feeders but were subsequently replaced with constructed wooden feeders. To avoid feed wastages, the feeders were not filled up to meet its capacity but ensured adequate feed was available. Feed intake (FI) was determined as the difference in the quantity of the feed offered (FO) to the birds in each week and the feed left (FL) at the end of the week. (FI = FO – FL). Body weight (BW) was calculated weekly by subtracting the initial weight (IW) at the beginning of each week from the final weight (FW) at the end of each week (BW = FW – IW). The routine management practice for the experimental period involves twice daily feeding, washing and rinsing of drinkers, cleaning of feeders, observing for sick chickens, checking for mortalities, administration of antibiotics and multivitamin supplements when necessary, keeping of appropriate records and occasional changing of litter material were carried out.

Table 1: Composition of experimental diets

Feed Ingredients (%)	Chick Mash	Grower Mash	Layer Mash
Maize	51.00	50.00	44.70
Soybean Meal (SBM)	27.00	11.00	12.00
Wheat offal	-	15.00	16.00
Brewer Dried Grain (BDG)	17.00	20.50	19.00
Bone Meal	2.60	2.00	3.10
Limestone	1.50	1.00	4.00
Lysine	0.10	-	0.15
Methionine	0.10	-	0.15
Salt	0.35	0.35	0.35
Premix	0.35	0.15	0.55
Total	**100kg**	**100kg**	**100kg**
Calculated chemical and energy composition			
Crude protein(%)	21.16	17.35	17.02
Crude fibre (%)	5.12	5.96	5.81
Calcium (%)	1.43	1.07	2.52
Phosphorus (%)	0.91	0.88	1.03
Ether extract (%)	4.24	4.67	4.44
Ash (%)	3.10	3.25	3.24
TDN(%)	75.66	64.10	70.10
Lysine (%)	0.44.	0.50	0.60
Methionine (%)	0.37	0.30	0.42
Energy (Kcal/KgME)	2830.93	2685.80	2502.90

Growth performance

The initial weights of the chicks were taken before the commencement of the study and subsequently every week. Other records collected on the chick study include feed intake (FI), live body weight (BW) which were measured weekly per genotype. Body weight and feed intake were modeled using linear function,

$Yi = \mu + Gi + ei$

Where Yi = Observation for a given variable

μ = Overall general mean common to all observations

Gi = Genetic effect due to jth genotype (i= 1, 2, 3, 4)

Regression models were used to estimate the effect of age and feed intake on the body weight of the four different indigenous chickens used in the study. This function was estimated using the ordinary least square (OLS) method. The explicit form of the functions are represented as

$$Y = f(X_1\ X_2\ \mu i) \text{ ------- } (1)$$

Where:

Y = Weight of birds in grams

X_1 = Age of birds in weeks

X_2 = Feed in grams

μi = Error term

The four production function used includes the Linear, Cobb- Douglas, Semi-log and Exponential functions. This was done to ensure an appropriate functional form in order to determine the extent of significance of age and feed intake on the weight of the different chicken genotypes. The lead equation was selected based on F ratio significance and the level of significance of the estimated coefficient of determination R^2 (%), the higher the R^2

value the better . The general forms of the equation are as shown below.

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \epsilon$ (Linear) - - (2)

$LnY = \beta_0 + \beta_1 LnX_1 + \beta_2 LnX_2 + \epsilon$ (Cobb-Douglas) - - - (3)

$Y = \beta_0 + \beta_1 LnX_1 + \beta_2 LnX_2 + \epsilon$ (Semi-Log) - - - - (4)

$LnY = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \epsilon$ (Exponential) - - - (5)

Where:

Y= weight of birds in gram

X_1 = Age (weeks)

X_2 = Feed intake (gram)

ϵ = Error term

ßo = constant

$ß_1$ to $ß_2$ = parameter to be estimated.

Carcass characteristics

At the end of the experiment, a total of thirty two (32) chickens comprising of two (2) males and six (6) females were selected on the basis of their closeness to their mean weight. They were deprived of feed overnight, weighed, tagged, slaughtered and allowed to completely bleed before de-feathering manually. The carcass was dissected into the different cut-off parts following the procedure described by Kleczek *et al.*, (2007): Head was separated by cutting off between the occipital condyle and the atlas. Neck was obtained by cutting along the line joining the cephalic border of the coracoids. Wings were removed by cutting through the shoulder joint. Shanks were detached by cutting off through the sesamoid (hock) joint. Thigh/Drumstick was obtained by cutting through the hip joint (from the pubic process, through the groin towards the back, and then along the backbone, starting from the anterior border to the pelvis). The breast was obtained by a double cut through the cartilaginous junctures of the ribs from the interior border of the backbone towards the coracoids while the back was obtained from the dorsal-lumber quarter which made up the remaining part of the carcass. They were weighed using sensitive scale and organs such as kidney, liver, heart and gizzard were equally weighed using the sensitive weighing scale.

Statistical Analysis: Data collected were statistically analyzed using one way analysis of variance (R package 2017) appropriate for complete randomized design and significant means were separated using Duncan multiple range test.

RESULTS

Growth Performance

Presented in Tables 2, 3, 4, and 5 are the results of the regression analysis of the estimated effect of age and feed intake on body weight of naked neck, frizzle feathered, normal feathered and short flight feathered indigenous chickens respectively. The four models tested were Linear, Cobb-Douglas, Semi-log and exponential functions. Out of the four functional forms tested, Cobb-Douglass function was chosen as the lead equation based on significance of the coefficients, F-value and R-square as presented in Table 6. For the normal feathered chicken, the estimated feed intake was negative but significant at 1 % level. The result of feed intake showed a coefficient of 0.0132 grams and 0.0289 grams for naked neck and short flight feathered chickens, respectively. This shows that a 100% increase in feed intake will increase the weight of the birds in grams by 1.32 % and 2.89 % for naked neck and short flight feathered chickens, respectively. A 100 % increase in feed intake will decrease the weight of the chickens in grams by 9.01 % in normal feathered chickens and by 3.38 % in frizzle feathered chickens. The results showed that the R-square from the lead equation (Cobb-Douglas) was high 97.34 %, 97.16 %, 96.62 % and 97.46 % for naked neck, frizzle, normal and short wing feathered chickens, respectively. F-ratio of the four models was significant at 1 % level. The normal feathered chickens had the highest F-ratio value of 11,114.98 while the least value of 4,221.66 was recorded in naked neck chickens as shown in Table 6.

Table 2: Estimated effect of age and feed intake on body weight of naked neck indigenous chicken

Variables	Linear	Cobb-Douglas	Semi-log	Exponential
Constant	24.72	3.64	-820.71	4.17
	(1.26)	(46.01)***	(-9.81)***	(80.50)***
Age	36.11	1.01	145.90	0.23
	(9.94)***	(29.84)***	(4.07)***	(24.37)***
Feed intake	0.03	0.01	149.44	-0.0005
	(2.35)**	(0.63)	(6.76)***	(-13.88)***
R^2	0.92	0.97	0.82	0.91
F- Ratio	1324.04	4221.66	(520.95)	1144.43
P-value	0.000000***	0.000000***	0.000000***	0.000000***

*** and ** represent-1% and 5% levels of significance respectively

Table 3: Estimated effect of age and feed intake on body weight of frizzle indigenous chicken

Variables	Linear	Cobb-Douglas	Semi-log	Exponential
Constant	-20.20	3.69	-925.04	4.12
	(-1.46)	(30.85)***	(-8.78)***	(88.31)***
Age	44.206	1.07	54.87	0.24
	(15.59)***	(23.76)***	(1.38)	(24.7232)***
Feed intake	-0.03	-0.03	184.19	-0.0007
	(-2.33)***	(-1.08)	(6.71)***	(-14.26)***
R^2	0.92	0.97	0.81	0.89
F- Ratio	1602.91	5084.88	640.65	1164.81
P-value	0.000000***	0.000000***	0.000000***	0.000000***

*** represents 1% level of significance

Table 4: Estimated effect of age and feed intake on body weight of normal indigenous chicken

Variables	Linear	Cobb-Douglas	Semi-log	Exponential
Constant	8.09	3.86	-1225.07	3.91
	(0.91)	(37.12)***	(-17.40)***	(127.14)***
Age	36.20	1.12	-79.98	0.31
	(16.30)***	(30.61)***	(-3.22)***	(40.05)***
Feed intake	-0.02	-0.09	273.53	-0.0015
	(-1.54)	(-3.29)***	(14.77)***	(-27.53)***
R^2	0.91	0.97	0.84	0.89
F- Ratio	3738.64	11114.98	2000.38	3232.50
P-value	0.000000***	0.000000***	0.000000***	0.000000***

*** represents 1% level of significance

Table 5: Estimated Effect of Age and Feed intake on Body weight of Short flight Indigenous Chicken

Variables	Linear	Cobb-Douglas	Semi-log	Exponential
Constant	22.02 (2.15)**	3.36 (30.17)***	-1325.86 (-18.59)***	3.95 (101.67)***
Age	28.66 (13.55)***	0.97 (23.95)***	-132.43 (-5.08)***	0.25 (31.08)***
Feed intake	0.03 (1.79)**	0.03 (0.97)	306.06 (16.01)***	-0.001 (-18.93)***
R^2	0.93	0.97	0.88	0.90
F- Ratio	2436.39	7435.17	1471.90	1832.47
P-value	0.000000***	0.000000***	0.000000***	0.000000***

*** and ** represents 1% and 5% levels of significance respectively

Table 6: Estimated effect of age and feed intake on body weight of four different indigenous chickens

Variables	Naked neck Cobb-Douglas	Frizzle Cobb-Douglas	Normal Cobb-Douglass	Short wing Cobb-Douglass
Constant	3.64 (46.01)***	3.69 (30.85)***	3.86 (37.12)***	3.36 (30.17)***
Age	1.01 (29.84)***	1.07 (23.76)***	1.12 (30.61)***	0.97 (23.95)***
Feed intake	0.01 (0.63)	-0.03 (-1.08)	-0.09 (-3.29)***	0.03 (0.97)
R^2	0.97	0.97	0.97	0.97
F- Ratio	4221.66	5084.88	11114.98	7435.18
P-value	0.000000***	0.000000***	0.000000***	0.000000***

*** represents 1% level of significance

Body weight of Naked neck = 3.64 + 1.01 (age) + 0.01 (feed intake) + e

Body weight of Frizzle = 3.69 + 1.07 (age) – 0.03 (feed intake) + e

Body weight of Normal = 3.86 + 1.12 (age) – 0.09 (feed intake) + e

Body weight of Short flight = 3.36 + 0.97 (age) + 0.03 (feed intake) + e

Carcass Characteristics and Organ Weight of Four Indigenous Chicken Genotypes Presented in Table 7 are the least square mean, standard errors and the coefficient of variation of four indigenous chickens used in this experiment. The result shows that there was no significant difference (P<0.05) in live-weight of the chicken genotype used, but naked neck genotype had the highest mean value of 1129±76.98g, followed by normal (1032.13±55.49g), frizzle had (1015±46.02g) and the least value of 957±53.75g was shown by short wing chicken genotype. The effect of genotype shows significant difference (P<0.05) on the weight of the chickens after bleeding (dead weight) between naked neck weighing 1104.5±74.51g and short wing chickens weighing 920.625±51.63g but there was no significant different (P>0.05) between frizzle and normal chickens weighing 975.875±45.94g and 1000.875±55.22g as well as between naked neck and short flight feathered chickens respectively. Feather weight from frizzle chickens were not significantly different (P>0.05) from the feather weight of normal and naked neck chickens but they are significantly different (P<0.05) from the feather weight of short flight feathered chickens. Normal chickens recorded the highest feather weight of 55.25±2.75g, followed by frizzle weighing 47.125±3. 45g, naked neck weighing 44.875±5.16g while short flight feathered had the least feather weight of 35.88± 2.07g

Carcass cut-up parts

The values of the cut up parts of the four genotypes are presented in same Table 7 shows that the head, neck and thigh/drumstick were not different statistically at 5% level among the genotypes but other cut were. Breast weight in naked neck chickens was not statistically different (P>0.05) from normal feathered chickens but statistically different (P<0.05) from frizzle feathered and short wing chickens with naked neck having higher weight of 191.38±9.58g, and the least value of 154.38±137.99g for the short wing chickens. Wing weight in naked neck chickens was not significantly different (P>0.05) from frizzle and normal feather chickens but significantly different (P<0.05) from short wing chickens with naked neck having the highest value of 93±6.86g, Back weight of naked neck chickens had higher value of 185.5±7.43g and significantly difference (P<0.05) from the other chicken genotypes that had 163.75±10.29g, 160.375±5.35g and 154.75±4.33g for short wing, normal feathered and frizzle feathered chickens, respectively. Shank weight was not significantly different (P>0.05) among the chicken genotypes.

Presented in Table 8 are the mean, standard error (±SE) and coefficient of variation (CV) (%) of organ weight as affected by genotypes. Parameters on the different organ weight showed some level of statistical differences (P<0.05). The gizzard weight of naked neck though weighed higher than that of normal feathered chicken, there was however no significant difference (P>0.05) between them but there were significant difference (P<0.05) between the naked neck chicken and the two others (frizzle and short wing feathered chickens). Heart weight in naked neck was not significantly different (P>0.05) from the heart weight of frizzle feather chicken but significantly different (P<0.05) from the heart weight of normal feathered and short wing feathered chicken, respectively. Naked neck weighed 6.75±0.53g followed by frizzle feathered chicken weighing 5.75±0.41g, while short wing and normal feathered chickens showed no difference in weight (4.75±0.53g). The liver weight of naked neck was significantly different (P<0.05) from the other chicken genotypes weighing 26.63±0.98g followed by frizzle feathered weighing 21.88±1.29g, normal feathered liver weighing 19.88 ±1.76g while the short wing chickens had the least liver weight of 18.5±.63g. The proventriculus weight of naked neck was not significantly different (P>0.05) from that of short wing weighing 7.38±.0.32g and 7.25±.0.53g respectively but they were significantly different (P<0.05) from the proventriculus weight of 5.5±0.33g and 4.88±.0.35g recorded by frizzle and normal feathered chickens respectively. The weight of the intestine also shown that naked neck and frizzle feathered chickens were not significantly different ((P>0.05) weighing 62.25±3.24g and 62±4.41g respectively but they were significantly different (P<0.05) from the weight of 51.25±10g and 50.25±2.74g recorded by normal and short wing chickens respectively.

Table 7: Mean, standard errors (± se) and coefficients of variation (CV) (%) for carcass weights as affected by genotypes

Parameters	N	Naked Neck	CV %	Frizzle feathered	CV %	Normal feathered	CV %	Short flight feathered	CV %
Live weight (g)	8	1129.38±76.98	19.27	1015.00±46.02	12.83	1032.13±55.49	15.21	957.00±53.75	15.89
Dead weight (g)	8	1104.50±74.51[a]	19.08	975.88±45.94[ab]	13.31	1000.88±55.22[ab]	15.60	920.63±51.63[b]	15.86
Feather weight (g)	8	44.88±5.16[ab]	32.52	47.13±3.45 [a]	20.71	55.25±2.75 [a]	14.08	35.88±2.07 [b]	16.35
Cut-up parts (g)									
Head weight	8	41.50±5.60	38.19	41.50± 3.31	22.57	38.75±3.89	28.40	37.25±4.53	34.43
Neck weight	8	66.25±7.40	31.60	59.50±5.21	22.75	60.25±5.55	26.04	52.75±5.38	28.87
Breast weight	8	191.38±9.58[a]	14.16	154.75±136.23 [b]	14.31	168.88±6.35[ab]	10.64	154.38±137.99[b]	12.69
Wing weight.	8	93.00±6.86 [a]	20.85	83.25±7.13[ab]	24.24	85.50±6.66[ab]	22.03	69.50±5.58 [b]	22.69
Thigh/Drumstick weight	8	250.25±24.78	28.00	221±18.11	23.17	220.25±19.80	25.42	186.38±21.73	32.97
Back weight	8	185.50±7.43 [a]	11.33	154.75±4.33 [b]	7.91	160.38±5.35 [b]	9.43	163.75±10.29 [b]	17.78
Shank weight	8	42.75±5.21	34.46	35.00±2.75	22.24	33.50±4.05	34.18	30.38±3.91	36.40

[a,b] Means within rows carrying different superscripts differ significantly (P<0.05).

Table 8: Mean, Standard Errors (± SE) and Coefficients of Variation (CV) (%) for Organ Weight as Affected by Genotypes

Parameters	N	Naked Neck	CV (%)	Frizzle feathered	CV (%)	Normal feathered	CV (%)	Short flight feathered	CV (%)
Gizzard wt.	8	46.13±4.43[a]	27.14	34.25±1.10[b]	9.07	41.00±1.51[ab]	10.43	36.50±1.88[b]	14.57
Heart weight	8	6.75±0.53[a]	22.04	5.75±0.41[ab]	20.26	4.75±0.53[b]	31.33	4.75±0.53[b]	31.33
Liver weight	8	26.63±0.98[a]	10.42	21.88±1.29[b]	16.65	19.88±1.76[b]	25.00	18.50±0.63[b]	9.58
Proventriculus weight	8	7.38±0.32[a]	14.42	5.50±0.33[b]	16.83	4.88±0.35[b]	20.32	7.25±0.53[a]	20.52
Intestine weight	8	62.25±3.24[a]	14.72	62.00±4.41[a]	20.11	51.25±1.0[b]	5.49	50.25±2.74[b]	15.41

[a, b] Means within rows carrying different superscripts differ significantly (P<0.05).

DISCUSSION

The coefficient of determination (R^2) measures the variation in the dependent variable (weight of bird) as explained by the independent variables (age and feed intake) in the model. Age as a variable was significant at 1% level in the models. This is in agreement with Terfa and Terwase (2011) who stated that, Cobb-Douglas production function is used more than the others because it satisfies the economic, statistical and econometric criteria of many studies than others. The results further showed that the estimated feed intake were not having positive influence on the weight of the frizzle feathered chickens, hence was not significant (P>0.05).The outcome showed that if $R^2 = 0.9716$, it means 97.16% of the variation in weight was explained by age and feed intake. This is an indication that 97.34 % of the variation in the weight of the chickens in gram was explained by the independent variables (age and feed intake) in naked neck chickens. In the same vein 97.16 %, 96.62 % and 97.46 % of the variation in the weight of the chickens in gram was explained by the independent variables (age and feed intake) in frizzle, normal and short flight feathered indigenous chickens respectively. Apart from 3.4g difference between the short flight and the normal feathered indigenous chickens with respect to back weight, the short wing feather chickens seemed to have the lowest cut parts mean values for all the traits among the four chicken genotypes. The naked neck consistently had the highest mean values for all the cut parts including the shank which was not part of the report of Isidahomen *et al.* (2012). The significantly (P<0.05) higher breast weight and back weight of the naked neck over the other genotypes was in tandem with the report of Pesti *et al.* (1994) and Isidahomen *et al.* (2012). Younis and Cahaner (1999) reported that the effect of naked neck allele on breast yield could be attributed to lower subcutaneous fat deposit or to increased blood flow in the breast area which becomes the cooling site due to mass reduction in its feather coverage. Naked neck chicken was also significantly favoured in terms of relative organ weight among the four genotypes compared in the study. Since all the chickens were feed *ad-libitum* on the same diet and were also housed in the same environment, the variation can therefore be attributed to genetic effect which apparently favoured its performance thereby leading the exhibition of these characteristics (Adamako *et al*., 2009).

CONCLUSION

The regression analysis of estimated effect of age and feed intake on the different indigenous chicken genotypes using the Cobb-Douglass model revealed a high R-square values among the indigenous chickens indicating that the weight of the chickens in grams was explained by age and feed intake. The values of the cut-up parts and organ weight revealed that naked neck indigenous chickens consistently had higher values and was significantly different (P<0.05) from other chicken genotypes in terms of breast weight and back weight as well as in liver, heart and gizzard weight which will give it an advantage in chicken parts market.

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