Effect of egg size and strain on growth performance of cockerel

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ABSTRACT

This study was conducted to determine the effect of egg size and strain on growth performance of cockerel chicks obtained from Dominant Black (DB) and Yaffa Brown (YB) strains of pullet. A total number of two hundred and seventy day-old cockerels hatched from three different egg sizes (i.e 45 chicks from small, medium and large egg sizes for each of DB and YB) were used for this study. Data obtained were subjected to analysis of variance in a 2 x 3 factorial experimental layout. The initial weight of the chicks was significantly ($P < 0.05$) influenced by the egg size. Final weight and average daily weight gain were the only growth parameters affected ($P < 0.05$) by egg size till the end of starter phase. The effect of strain on all the growth parameters measured were not significantly ($P > 0.05$) different. At the growing phase, feed intake decreased significantly ($P < 0.05$) with increase in egg size. It was concluded that setting of medium and large egg sizes could only be beneficial if the target was to sell chicks of the two strains at the end of chick phase.

Keywords: egg size, cockerel, performance, pullet

INTRODUCTION

Egg weight and chick weight at hatching are positively related (Khurshid *et al.*, 2003). The size of the embryo before and at hatching can be altered by the weight of the egg and the incubation environment (Wilson, 1991). The performance potentiality of the chicken depends, in part, on egg quality. Egg quality is an important parameter for embryogenesis as well as for 1-d-old chick quality and growth. In hatchery management, the judgement of the quality of a day-old chick is usually based on qualitative aspects, such as abnormalities and contamination. Thus, day-old chick quality when removed from the hatcher seems to be an all-or-none question. Improved quality of a broiler flock at slaughter age can only be realized with high quality day-old chicks as starting material. This ensures greater survivability and better growth potential during the first days or first week of life (Christensen, 2001). According to Deeming (1995), dayold chick quality can be related to several factors, such as incubator quality, incubation environment, and egg characteristics. The growth response of males to egg weight is greater than that of females (Joubert *et al.*, 1981). The report of Tufft and Jesen (1991) revealed that the effect of the egg weight on body weight at market age is independent

of the age of the breeders from which the eggs originated. The effect of breeder age seems to be largely associated with egg weight. Conversion of feed into body weight by growing broilers does not seem to be directly related to their egg weight of origin. A portion of the body weight advantage attributable to birds from heavy eggs may be related to their associated increased feed intake (Pinchasov, 1991). In general, many agree that it is preferable to have eggs of average weight to achieve good hatchability as far as chicken, turkey, ducks and ostriches are concerned (Brah *et al.*, 1999; Gonzales *et al.*, 1999). Due to paucity of information on post-hatching performance of cockerel chicks, the present study is designed to determine the effect of egg size on post hatching performance and carcass characteristics of cockerels hatched from small, medium and large size Nigerian eggs of two strains of pullet.

MATERIALS AND METHODS

Experimental Site: The experiment was carried out on deep litter in the poultry unit of the Teaching and Research Farm, University of Agriculture, Abeokuta, Ogun State. The site falls within the rain forest vegetation zone of South-Western Nigeria on

latitude $7^{\circ} 13' 49.46''\text{N}$, longitude $3^{\circ} 26' 11.98''\text{E}$ and altitude of 76 meters above sea level. The climate is humid with a mean annual rainfall of 1037mm. The annual mean temperature and humidity is 34.7°C and 82%, respectively.

Experimental Birds and Management: A total of eight hundred and ten (810) hatching eggs of different sizes from Dominant Black (DB) and Yaffa Brown (YB) strains of pullet (i.e. 405 eggs per strain) were bought from a reliable breeder farm in Ogun State. The eggs from each strain were weighed and arranged into three (3) groups i.e small (41.09g - 50.97g), medium (50.98g - 57.39g) and large (57.40g - 69.64g). Each treatment group contained one hundred and thirty five (135) eggs which were sub-divided into three (3) replicates of forty (45) eggs each in a 2×3 factorial design. A total number of two hundred and seventy day-old cockerels hatched from the three different egg sizes; 45 chicks from DB small (DBS), DB medium (DBM), DB large (DBL), YB small (YBS), YB medium (YBM) and YB large (YBL) egg sizes were used for this study. The chicks were intensively managed and randomly arranged into three replicates per treatment. Each replicate consisted of fifteen chicks. Feed and water were given to the birds *ad libitum*. Chick mash was given to the chicks for the first eight weeks while growers mash was supplied to the sixteenth week (Table 1). The experiment lasted for sixteen (16) weeks. The cockerels were raised on a deep litter system. The litter materials used was wood shavings. The birds were vaccinated against new castle disease and medications were provided against both gram negative and gram positive bacteria using broad spectrum antibiotics.

Carcass Measurement: At the end of 16th week, 6 birds per treatment were randomly selected, slaughtered, plucked and eviscerated. The live, bled, plucked and dressed weights were recorded. Also, cut-up parts (head, neck, wing, breast, thighs, drumstick, etc.), organs (heart, gizzard, liver, kidney and spleen) and offals (oesophagus, crop, small intestine, abdominal fat and caeca) were weighed as criteria for the measurement of carcass parameters (NRC, 1994). All weights were taken using sensitive scale (Acculation model 2001-Electric Digital scale) and expressed as percentage of the live weight.

Statistical Analysis: All data collected were subjected to two-way Analysis of Variance (ANOVA) in a 2×3 factorial experimental layout (SAS, 1999) while significantly ($P < 0.05$) different means were compared

using Duncan's Multiple Range Test in the same software.

RESULTS

The effect of egg size and strain on the performance of cockerel chicks is presented in Table 2. The egg size had significant ($P < 0.05$) effect on the means of initial weight, final weight and daily weight gain. Small chicks (33.95 g) were hatched from small eggs while large chicks (41.94 g) hatched from large eggs. The chicks maintained their size categories up to the end of chick phase. The final weight values ranged from 517.68 g (small-sized eggs) to 610.19 g (large-sized eggs) while medium-sized eggs recorded 591.31 g. Daily feed intake increased ($P > 0.05$) with increase in the weight of chicks. The effect of strain on the means of all the parameters measured were not significant ($P > 0.05$). However, DB had numerical higher values of initial weight, final weight, weight gain per day, daily feed intake and protein intake. The effect of interaction between egg size and strain on the growth performance of the cockerel chicks at the end of starter phase had significant ($P < 0.05$) differences on the initial, final and daily weight gain of the birds (Table 3). The final weight favoured DB medium, large and YB large sized egg while DB and YB small sized eggs recorded least values. The daily weight gain followed the same pattern with final weight of the chicks. At the end of growing phase, feed intake (g/day) and protein intake (g/day/bird) were significantly ($P < 0.05$) influenced by the treatment (Table 3). The final weights of the birds from small, medium and large-sized eggs (1242.91, 1287.49 and 1338.33 g, respectively) were statistically similar. The effect of strain on the growth parameters did not show any significant ($P < 0.05$) difference. It was observed that no mortality occurred in YB but DB recorded 4.28% mortality. The final weight obtained for DB was 1350.09 g while that of YB was 1229.07 g. The effect of interaction between egg size and strain was significant ($P < 0.05$) only on daily feed intake and protein intake (Table 4). The highest value of feed intake (97.12 g/day) was recorded for DBS while the other treatments were statistically ($P < 0.05$) comparable. Final weight ranged from 1150.00 - 1425.00 g. The highest value (1425.00 g) was obtained from DBM while the least value (1150.00 g) was from YBM. The feed efficiency for both DBM and YBL (0.16) appeared to be best among all the treatments. The carcass parameters which were significantly ($P < 0.05$) influenced by the effect of egg size were lungs, bone and small intestine (Table 5). Cockerels from medium-sized

eggs had the highest value (0.69%) of lungs while birds from small and large-sized eggs were statistically similar and the values were 0.60 and 0.64%, respectively. It was observed that birds from small-sized eggs had highest value (17.53%) of bone while those from large eggs recorded the least value of 15.86%. Though the live weights were not significant ($P>0.05$), the values obtained resulted from the initial egg weight. The values of live weight for small, medium and large were 1191.67, 1229.17 and 1235.83 g, respectively. The dressing percentage was in reverse order of the live weight and it ranged from 58.51 – 59.59%. The value of small intestine length (170.95cm) of birds from large-sized eggs was highest ($P<0.05$) while both small and medium-sized eggs were comparably (150.23 and 150.06 cm, respectively) similar. The two parameters that were significantly ($P<0.05$) affected by the effect of strain were the lung and the head. YB had higher values of lung and head (0.69 and 3.83% respectively) whereas DB recorded 0.60 and 3.40% respectively. Table 6 showed the effect of interaction between egg size and strain on the carcass characteristics of cockerels. The parameters significantly ($P<0.05$) affected include were hot dressed weight, lungs, head, wings, leg muscle and meat to bone ratio. Each group was favoured by different parameters. For instance, DBM recorded highest value of hot dressed weight, YBM had highest lungs, YBS for head and leg muscle, wings for DBS and meat to bone ratio for DBL and caecal weight for YBS. The means of dressing percentage ranged from 58.56 to 60.56% with DBM recording the highest value while the least value was from YBM. The highest mean value (2.22) of meat to bone ratio was obtained in DBL while the least value (1.81) was from DBS. The meat to bone ratio values of DBM, YBS, YBM and YBL were statistically comparable, the values were 1.97, 1.98, 2.00 and 1.94 respectively. The means of total muscle ranged from 31.12 – 34.78% while bone was 15.69 – 17.79%. Among the offals, small intestine length, large intestine weight, caecal weight and length were significantly ($P<0.05$) influenced. The birds from YBL recorded longest small intestine length (174.52 cm) while the shortest length (143.48 cm) was from DBS. The small intestine length of birds from DBM, DBL, YBS and YBM were similar. The birds from DBS were favoured with large intestine weight, and caecal length when compared with their counterparts in other treatment groups.

Table 1: Composition (%) of diets

Ingredients	Chick mash	Growers mash
Maize	40.00	50.00
Fish meal	2.00	-
Soybean meal	18.00	12.00
Palm kernel cake	10.00	-
Wheat offal	25.00	33.00
Bone meal	2.00	2.00
Oyster shell	2.00	2.00
Lysine	0.25	0.25
Methionine	0.25	0.25
*Chick's vit/mineral premix	0.25	-
**Grower's vit/mineral premix	-	0.25
Salt	0.25	0.25
Total	100.00	100.00
Calculated analysis (%)		
Crude protein	18.71	15.09
Ether Extract	5.09	4.95
Crude fibre	4.56	4.22
Ash	3.58	3.60
Calcium	1.62	1.87
Phosphorus	0.93	0.97
Lysine	0.73	0.62
Methionine	0.28	0.24
Energy (MJ/Kg)	10.32	10.17

*Premix (Univit. 15Roche) contained B1,1g; B2, 6g; B12, 0.02g; K3, 3g; E, 30g; biotin, 0.05g; folic acid, 1.5g; choline chloride, 250g; nicotinic acid, 30g; Ca-Pantothenate, 15g; Co, 0.4g; Cu, 8g; Fe, 32g; I, 0.8g; Zn, 40g; Mn, 64g; Se, 0.16g, BHT, 5g.

**Vit./Min. Premix contained: Premix (Embavit No 90) contained Vit. A, 10 000 000iu; D3, 2 000 000iu; E, 12 500iu; K, 1.30g; B1, 1.30; B2, 4.00g; D Calcium-Pantothenate, 1.30g; B6, 1.30g; B12, 0.01g; nicotinic acid, 15.00g; folic acid, 0.05g; biotin, 0.02g; Co, 0.20g; Cu, 5.00g; Fe, 25.00g; I, 0.06g; Mn, 48.00g; Se, 0.10g; Zn, 45.00g; choline chloride, 200.00g; BHT, 50.00g.

Table 2: Effect of egg size and strain on growth performance of cockerels (Starter phase)

Parameters	Egg size			Strain	
	Small	Medium	Large	Dominant Black	Yaffa Brown
Av. Initial weight (g)	33.95±0.59 ^b	36.70±1.21 ^b	41.94±0.89 ^a	38.26±1.39	37.13±1.49
Av. Final weight (g)	517.68±11.79 ^b	591.31±16.54 ^a	610.19±14.45 ^a	575.98±18.44	570.13±17.75
Av. Weight gain (g/day)	8.64±0.21 ^b	9.91±0.28 ^a	10.14±0.25 ^a	9.60±0.31	9.52±0.30
Av. Feed intake (g/day)	45.94±0.85	47.69±0.06	48.94±1.68	47.80±0.92	47.24±1.09
Feed Efficiency	0.19±0.01	0.21±0.01	0.21±0.01	0.20±0.01	0.20±0.01
Av. Protein intake (g)	8.60±0.16	8.93±0.13	9.16±0.31	8.95±0.17	8.84±0.20
Protein Efficiency Ratio	2.64±1.65	1.11±0.04	1.12±0.06	1.08±0.04	2.17±1.09
Mortality (%)	11.80±2.71	4.63±3.01	4.85±3.37	6.30±2.04	7.88±3.17

a,b, means in the same row with different superscripts differ significantly (P<0.05)

Table 3: Effect of interaction between egg size and strain on growth performance of cockerels (Starter phase)

Parameters	Strain					
	Dominant Black			Yaffa Brown		
	Egg size			Egg size		
	Small	Medium	Large	Small	Medium	Large
Av. Initial weight (g)	33.56±0.38 ^b	38.95±1.35 ^a	42.27±1.36 ^a	34.33±1.20 ^b	34.44±0.64 ^b	42.62±1.45 ^a
Av. Final weight (g)	507.74±15.44 ^b	610.95±16.21 ^a	609.26±9.26 ^a	527.62±18.92 ^b	571.67±26.82 ^{ab}	611.11±30.93 ^a
Av. Weight gain (g/day)	8.47±0.28 ^b	10.22±0.27 ^a	10.12±0.18 ^a	8.81±0.34 ^b	9.60±0.47 ^{ab}	10.15±0.53 ^a
Av. Feed intake (g/day)	46.30±1.56	48.49±0.91	48.60±2.27	45.58±1.03	46.88±0.85	49.28±2.98
Feed Efficiency	0.18±0.01	0.21±0.01	0.21±0.01	0.19±0.01	0.20±0.01	0.21±0.02
Av. Protein intake (g)	8.66±0.29	9.08±0.17	9.09±0.43	8.53±0.19	8.77±0.16	9.22±0.56
Protein Efficiency Ratio	0.98±0.04	1.13±0.05	1.12±0.07	4.30±3.30	1.09±0.07	1.11±0.12
Mortality (%)	12.17±1.05	3.70±3.70	3.03±3.03	11.43±5.95	5.56±5.56	6.67±6.67

a,b means in the same row with different superscripts differ significantly (P<0.05)

Table 4: Effect of egg size and strain on growth performance of cockerels (Growing phase)

Parameters	Egg size			Strain	
	Small	Medium	Large	Dominant Black	Yaffa Brown
Av. Initial weight (g)	517.68±11.79 ^b	591.31±16.54 ^a	605.56±14.45 ^a	575.98±18.44	570.13±17.75
Av. Final weight (g)	1242.91±87.85	1287.49±94.67	1338.33±39.00	1350.09±34.95	1229.07±76.34
Av. Weight gain (g/day)	12.95±1.61	12.43±1.44	13.00±0.65	13.82±0.60	11.77±1.23
Av. Feed intake (g/day)	91.64±2.52 ^a	88.19±0.98 ^{ab}	82.72±2.69 ^b	89.03±2.85	86.25±0.74
Feed Efficiency	0.14±0.02	0.14±0.02	0.16±0.01	0.15±0.01	0.14±0.01
Av. Protein intake (g)	13.83±0.38 ^a	13.31±0.15 ^{ab}	12.48±0.41 ^b	13.44±0.43	13.01±0.11
Protein Efficiency Ratio	0.94±0.28	0.93±0.25	1.04±0.07	1.03±0.05	0.91±0.10
Mortality (%)	2.38±2.38	1.67±1.67	2.38±2.38	4.28±2.18	0.00±0.00

a,b means in the same row with different superscripts differ significantly ($P < 0.05$)

Table 5: Effect of interaction between egg size and strain on growth performance of cockerels (growing phase)

Parameters	Strain					
	Dominant Black			Yaffa Brown		
	Egg size			Egg size		
	Small	Medium	Large	Small	Medium	Large
Av. Initial weight (g)	507.74±15.44 ^b	610.95±16.21 ^a	609.26±9.26	527.62±18.92 ^b	571.67±26.82 ^{ab}	611.11±30.93 ^a
Av. Final weight (g)	1320.83±54.38	1425.00±75.00	1304.44±42.40	1165.00±171.93	1150.00±142.40	1372.22±68.27
Av. Weight gain (g/day)	14.52±0.91	14.54±1.27	12.41±0.61	11.39±3.11	10.33±2.07	13.59±1.17
Av. Feed intake (g/day)	97.12±0.87 ^a	88.47±1.41 ^b	81.51±5.79 ^b	86.15±0.99 ^b	87.91±1.66 ^b	84.69±0.50 ^b
Feed Efficiency	0.15±0.01	0.16±0.01	0.15±0.02	0.13±0.03	0.12±0.02	0.16±0.02
Av. Protein intake (g)	14.66±0.13 ^a	13.35±0.21 ^b	12.30±0.87 ^b	13.00±0.15 ^b	13.27±0.25 ^b	12.78±0.08 ^b
Protein Efficiency Ratio	0.99±0.07	1.09±0.08	1.02±0.11	0.88±0.24	0.78±0.15	1.06±0.10
Mortality (%)	4.76±4.76	3.33±3.33	4.76±4.76	0.00±0.00	0.00±0.00	0.00±0.00

a,b means in the same row with different superscripts differ significantly ($P < 0.05$)

Table 6: Effect of Egg size and Strain on carcass Characteristics of Cockerels

Parameters	Egg size			Strain	
	Small	Medium	Large	Dominant Black	Yaffa Brown
Live weight (g)	1191.67±63.91	1229.17±70.83	1235.83±49.81	1265.56±36.29	1172.22±58.89
Hot dressed weight (g)	944.90±91.48	1046.02±70.83	1037.49±51.96	1076.88±32.57	942.06±69.61
Eviscerated weight (g)	714.90±46.26	732.29±44.80	728.73±46.02	765.05±27.52	685.57±42.03
Dressing percentage	59.59± 1.07	59.56±0.79	58.51±1.66	60.26±0.70	58.18±1.23
Organs¹					
Liver	2.06±0.07	1.92±0.08	1.91±0.66	1.93±0.04	2.00±0.07
Lungs	0.60±0.02 ^b	0.69±0.04 ^a	0.64±0.03 ^b	0.60±0.02 ^b	0.69±0.03 ^a
Heart	0.47±0.02	0.37±0.03	0.46±0.02	0.46±0.01	0.47±0.02
Kidney	0.16±0.01	0.16±0.01	0.15±0.01	0.15±0.01	0.16±0.01
Gizzard	3.28±0.11	3.49±0.09	3.36±0.12	3.36±0.08	3.39±0.09
Cut-up parts²					
Neck	4.32±0.23	4.41±0.14	4.72±0.20	4.58±0.14	4.39±0.17
Head	3.72±0.14	3.57±0.14	3.55±0.08	3.40±0.06 ^b	3.83±0.10 ^a
Wings	8.94±0.16	8.77±0.21	8.38±0.23	8.87±0.15	8.52±0.19
Thighs	9.32±0.27	9.49±0.17	9.31±0.35	9.48±0.18	9.27±0.25
Drumsticks	9.81±0.25	9.49±0.18	9.20±0.33	9.66±0.22	9.33±0.21
Shanks	4.87±0.15	4.78±0.18	4.75±0.17	4.87±4.58	4.73±4.39
Muscle³					
Breast	9.50±0.41	9.58±0.23	9.12±0.50	9.65±0.28	9.15±0.35
Leg	7.12±0.46	6.55±0.19	6.43±0.32	6.71±0.13	6.69±0.38
Total	32.74±0.96	34.27±1.30	32.88±1.53	33.49±0.85	33.11±1.21
Bone	17.53±0.64 ^a	17.33±0.43 ^{ab}	15.86±0.46 ^b	17.03±0.55	16.78±0.34
Meat : Bone	1.89±0.08	1.99±0.08	2.08±0.09	2.00±0.08	1.97±0.06
Offals					
Small intestine weight (%)	2.83±0.30	2.46±0.17	2.69±0.05	2.51±0.16	2.82±0.23
Small intestine length (cm)	150.23±5.64 ^b	150.06±5.39 ^b	70.95±7.55 ^a	154.44±5.24	159.72±5.82
Large intestine weight (%)	0.30±0.04	0.23±0.03	0.32±0.06	0.32±0.04	0.25±0.03
Large intestine length (cm)	10.78±0.27	10.37±0.77	10.31±0.33	0.44±0.39	10.54±0.43
Caecal weight (%)	0.39±0.03	0.35±0.02	0.44±0.05	0.36±0.04	0.42±0.02
Caecal length (cm)	16.17±2.00	16.22±0.43	18.82±0.58	18.13±1.04	16.01±0.96

a,b means with different superscript along the same row is significantly different (P<0.05)

1,2,3 percentage of live weight

Table 7: Effect of interaction between Egg Size and Strain on carcass Characteristics of Cockerels

Parameters	Dominant Black			Yaffa Brown		
	Small	Medium	Large	Small	Medium	Large
Live weight (g)	1283.33±49.44	1308.33±83.08	1205.00±54.08	1100.00±110.30	1150.00±112.55	1266.67±87.24
Hot dressed weight (g)	1089.50±49.79 ^{ab}	1121.15±69.04 ^a	1029.98±53.56 ^{ab}	800.29±161.20 ^b	980.88±89.49 ^{ab}	1044.99±94.81 ^{ab}
Eviscerated weight (g)	769.63±41.00	794.10±51.04	731.40±51.04	660.17±80.8	670.49±65.30	726.05±81.93
Dressing percentage	59.83±1.11	60.56±0.80	60.39±1.74	59.36±1.93	58.56±1.80	56.63±2.76
Organs¹						
Liver	1.96±0.06	1.80±0.07	1.94±0.10	2.15±0.11	1.96±0.15	1.88±0.08
Lungs	0.56±0.02 ^b	0.62±0.04 ^b	0.61±0.03 ^b	0.64±0.04 ^{ab}	0.77±0.06 ^a	0.67±0.04 ^{ab}
Heart	0.47±0.04	0.45±0.02	0.46±0.02	0.47±0.02	0.49±0.4	0.45±0.05
Kidney	0.15±0.01	0.16±0.02	0.14±0.01	0.16±0.01	0.17±0.01	0.16±0.01
Gizzard	3.15±0.09	3.41±0.15	3.51±0.17	3.40±0.21	3.56±0.11	3.21±0.14
Cut-up parts²						
Neck	4.20±0.26	4.49±0.14	5.05±0.22	4.43±0.40	4.34±0.26	4.39±0.28
Head	3.36±0.09 ^c	3.26±0.04 ^c	3.59±0.14 ^{bc}	4.09±0.14 ^a	3.89±0.20 ^{ab}	3.51±0.08 ^c
Wings	9.07±0.26 ^a	8.88±0.28 ^{ab}	8.67±0.23 ^{ab}	8.81±0.20 ^{ab}	8.66±0.32 ^{ab}	8.10±0.39 ^b
Thighs	9.10±0.35	9.65±0.22	9.68±0.32	9.53±0.43	9.33±0.26	8.94±0.61
Drumsticks	9.81±0.40	9.69±0.33	9.49±0.47	9.80±0.35	9.29±0.15	8.90±0.46
Shanks	4.71±0.21	4.90±0.22	5.01±0.23	5.04±0.21	4.67±0.29	4.49±0.22
Muscle³						
Breast	9.78±0.74	9.74±0.08	9.44±0.49	9.22±0.43	9.42±0.47	8.80±0.91
Leg	6.46±0.01 ^{ab}	6.82±0.20 ^{ab}	6.86±0.32 ^{ab}	7.79±0.87 ^a	6.29±0.29 ^b	6.01±0.51 ^b
Total	31.12±0.88	34.78±1.32	34.55±1.78	34.35±1.49	33.77±2.37	31.20±2.44
Bone	17.61±1.25	17.79±0.66	15.69±0.72	17.45±0.50	16.88±0.55	16.02±0.63
Meat:Bone	1.81±0.13 ^b	1.97±0.12 ^{ab}	2.22±0.13 ^a	1.98±0.11 ^{ab}	2.00±0.11 ^{ab}	1.94±0.11 ^{ab}
Offals						
Small intestine Weight (%)	2.36±0.09	2.43±0.25	2.73±0.42	3.31±0.55	2.49±0.26	2.66±0.32
Small intestine Length (cm)	143.48±6.25 ^b	152.45±8.20 ^{ab}	167.38±10.75 ^{ab}	156.97±9.09 ^{ab}	147.67±7.64 ^{ab}	174.52±11.40 ^a
Large intestine Weight (%)	0.27±0.05 ^{ab}	0.27±0.05 ^{ab}	0.42±0.11 ^a	0.33±0.07 ^{ab}	0.19±0.02 ^b	0.21±0.03 ^b
Large intestine Length (cm)	11.23±0.40	9.86±0.97	10.22±0.48	10.33±0.28	10.88±1.25	10.40±0.50
Caecal weight (%)	0.30±0.00 ^b	0.32±0.02 ^b	0.48±0.10 ^a	0.49±0.04 ^a	0.38±0.03 ^{ab}	0.39±0.03 ^{ab}
Caecal Length (cm)	19.33±2.86 ^a	16.12±0.66 ^{ab}	18.94±1.02 ^a	13.01±2.32 ^b	16.33±0.60 ^{ab}	18.70±0.65 ^a

a,b,c means with different superscript along the same row is significantly different (P<0.05)

1,2,3 percentage of live weight

DISCUSSION

The average live weight of cockerels was heaviest in the large-sized eggs than the other groups throughout the chicks phase and this confirmed the significance of big size-egg for incubation (Abiola *et al.*, 2008). Tufft and Jensen (1991) studied the effect of egg weight on broiler chick performance and reported that as hen age and egg weight increased, body weight gain of the chicks increased but feed efficiency was not affected. This result corroborates the findings of Farooq *et al.* (2001) and Petek *et al.* (2003), and indicates that hatching egg weight, chick weight and chick growth are interrelated in quail. At growing phase, the birds from small and medium eggs were able to catch up with their counterpart at the end of growing phase. This could be attributed to the higher feed and protein intake ratio by the two groups as compared to the large eggs group. One of the factors affecting growth rate in birds is feed intake according to Ayanwale and Eyo (2007). The advantage of initially higher weight attributable to a larger egg diminishes rapidly after hatching while food intake is the main factor affecting final body weight (Wyatt *et al.*, 1985). Though, the final weights of the cockerel at the end of the study were statistically similar, the highest weight obtained from cockerels from large egg may have resulted from the influence of hatching egg size and this is in agreement with the findings of Wilson (1991) who stated that the influence of egg weight remains until marketing when each gramme advantage at hatch translates into 2-13 g improvement in the body weight. The mortality throughout the rearing period was not significant ($P>0.05$) though, the birds from small eggs had higher numerical value of mortality at starter phase. These results were similar to the findings of Singh *et al.* (2003) who reported that the egg size had no effect on mortality pattern in chicken while age of parent affected the mortality pattern. The increased demand for processed poultry products places considerable interest in composition and quality of the carcass. Carcass of high quality is in most cases regarded as one with a large amount of muscle and small amount of bone and fat (Obioha, 1992). The proportion of dressed weight to live weight determines the carcass quality. Though the dressing percentages of the cockerel birds were not influenced by the egg size at the end of the study, the numerical decrease in the value with increase in egg size could be linked to significant effect of bone composition in each group. It can be concluded from the result of this study that setting of medium and large egg sizes could only be beneficial if the target

was to sell chicks of the two strains at the end of chick phase.

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