# GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF THREE BROILER LINES

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**ABSTRACT**

*A total of ninety (90) birds were used to evaluate the growth performance and carcass characteristics of three Broiler lines. The experiment was carried out at the University of Abuja teaching and research farm. A total of ninety (90) birds comprising of thirty (30) Cobb, thirty (30) Ross and thirty (30) Abor Acre were used for this study and was divided into three treatments with five replicates in a completely randomized design. The experiment lasted for 8 weeks. Data was collected on growth performance and carcass characteristics and the data collected was subjected to one way analysis of variance using SPSS. The data collected on growth performance was weekly body weight (g) which was collected using a sensitive digital scale, while the data collected on carcass was weight of cut up parts, live weights and dressed weights which was done by stunning the bird, cutting its jugular vein, scalding the bird, plucking the bird and then cutting the bird into various parts such as Head, wing, feet, drums, thigh, breast, back, neck and internal organs. The results revealed there was significant ($p<0.05$) difference in growth performance with the Cobb (1471.38g) having superior performance compared to Ross (1358.48g) and Abor Acre (1117.60g) at eight weeks. The result on carcass characteristics also revealed significant ($p<0.05$) differences between strains with Cobb having superior live weight. There was significant ($p<0.05$) difference between strains on the carcass characteristics of the birds with Cobb having the highest live weight (1558.33g) and also recording the highest dressing percentage (92.53%) followed by Ross with a live weight of 1430.00g and Abor Acre weighing 1149.66g, Based on dressing percentages Abor Acre (89.93%) was the second highest after Cobb, followed by Ross (83.10%). The cut off parts percentages of Ross mostly performed better than the other lines in terms of Drums 10.20%, Head 3.40% Wings 5.54%, Breast 19.08%, Thigh 9.15%, Feet 4.32% and Back 15.86%. The Cobb line was second after Ross with dressing percentages of Drums 8.09%, Head 4.99% Wings 4.68%, Breast 17.39%, Thigh 7.82%, Feet 4.31% and Back 13.86% with Abor Acre coming last with Drums 5.61%, Head 3.09% Wings 4.48%, Breast 10.57%, Thigh 5.86%, Feet 4.49% and Back 9.32%. Based on its superior performance, Cobb broiler is recommended to broiler farmers in Nigeria*

**Keywords:** Broiler, Carcass, Growth, Dressing Percentage

## INTRODUCTION

The contribution of poultry to animal protein supply cannot be over emphasized (Ahmed *et al.,* 2018). Poultry products such as meat and egg are excellent sources of animal proteins necessary to meet human protein requirements (Olawumi *et al., 2012*). Over the years, the Nigerian poultry industry has witnessed the introduction of different broiler chicken strains (Ojedapo *et al.,* 2016). The realization of the full growth potentials of these introduced strains is largely expected to depend on their genotypic traits which have an effect on their production capacity (Essien and Adeyemi, 1999) as well as environmental conditions such as the nutritional and climatic variables. It then implies that the poultry producer needs to select stock which has the genetic potential for fast growth rate and early attainment of market weight under the existing climatic conditions of the given environment.

Carcass evaluation is a way to describe the

quality of a livestock in terms of their suitability and commercial value for various end usage including retail cut and processed meat. The common broiler strains in the Nigeria market include Marshall, Abor Acre Plus, Cobb, Ross, Hubbard, Anak, Cockerel, Neoiler/Kroiler (Olawumi *et al.* 2012 and Amao *et al.,* 2015), there are contradictory reports on the superiority of the most common strains of broilers with regards to their carcass traits. The carcass yield of broiler chicken is of primary concern to the producer and consumers (Sam *et al.,* 2019). Demand for high quality cut-up (parts) and further processed convenience foods have driven the poultry industry to change its marketing practices (Watts and Kennett, 1995). According to (Olawumi *et al.,* 2012) most carcass traits are strain and sex dependent. Factors affecting carcass composition include diet, age, sex, genotype and management (Sogunle *et al.,* 2010). As stated by (Ojedapo *et al.,* 2013), the Nigeria poultry has over the years witnessed the introduction of different broiler strains. In a study conducted by Akporhuarho *et al.,* (2015), similar dressing yield was recorded for Marshall and Cobb. Rahimi *et al.,* (2006) also reported no significant difference in carcass traits of Abor Acre and other strain studied. Abd-Elwahab, (2016) found no significant difference in dressing percentage between Cobb and Abor Acre. It has been noted by Havenstein *et al.,* (2003) that carcass yield increases as body weight increases, In other studies by Nasser *et al.,* (2019), heavier Cobb crosses had larger breast weights and these in turn affected the weight and yield of other parts.

Selection of high quality strains to further improve the poultry industry is of necessity, broiler farmers need to be aware of the strain with the best dressing yield and the strain that attains table weight more rapidly, Within the last one decade, there has been an intensified study on the genetic, physiological, nutritional and growth performance of such imported hybrids as Cobb, White Ross, Lohmann Brown, Hypercom, Hubbard, Anak, Shaers, and Perduc among others (Essien and Adeyemi, 1999). It is therefore necessary to assess the performance of the strains involved. The main goal of broiler rearing is production of quality broiler carcasses that will be acceptable for the consumers. This will help broiler farmers to establish the bird's adaptive characteristics as well as its profitability in our environment. This study will shed more light on the broiler strain with the best growth performance among the three strains (Ross, Cobb and Abor Acre), the research will also assist in appropriately grading each strain's commercial value. The evaluation and of the various strains will also give information on their genetic potential for growth and other performance traits. This study will also be carried out to determine the variation in the dressing yield and other carcass traits of Ross, Cobb and Abor Acre strains of broiler chicken.

## MATERIALS AND METHODS

### *Experimental Site*

The experiment was carried out in the University of Abuja, Faculty of Agriculture research farm which is located in the Gwagwalada local Government, Abuja.

### *Experimental Birds and Management*

A total of ninety (90) day old broiler chicks were obtained from a known and reliable farm, consisting of 30 Ross, 30 Cobb, and 30 Abor Acre. The chicks were brooded for four weeks using a combination of light bulbs and Charcoal stoves as a source of heat. They were fed with broiler starter diet from day old to four weeks of age and later fed with broiler finisher diet till the end of the experiment. Throughout the period of the experiment, routine immunization and treatment protocols were followed.

### *Experimental Design*

The chicks were randomly allocated to three treatments of broiler lines in a completely randomized design format. Each treatment had five (5) replicates with six (6) birds per replicate. The birds were in the experimental treatment from day old to eight weeks of age. Treatment one (1) was Ross, treatment two (2) was Cobb, while treatment three (3) was Abor Acre.

**Data Collection**

The following parameters were collected and determined over a period of eight weeks.

***Growth Performance Traits***

The body weight of the birds was taken at day old initially and then weekly. Each bird was wing tagged for easy identification. The birds were weighed with a digital sensitive weighing scale and the weight was taken in grams (g).

***Carcass Evaluation and Organ Evaluation***

After taking the final body weights of the birds at eight weeks, the method of Scott *et al.,* (1969) was used. The birds were starved of feed overnight and nine (9) birds (three per treatment) from each of the lines were randomly selected for carcass evaluation. The selected birds were slaughtered by severing their jugular veins, scalded and plucked. The birds were de-feathered after placing them in hot water, plucked and eviscerated. The dressed birds were measured to obtain the dressed weight before cutting into parts: head, wing, feet, drum, thigh, breast, neck, back cut and internal organs such as intestine, liver and gizzard were weighed separately. Dressed weight, slaughtered weight, cut parts and internal organs were expressed as percentages of their live weight to obtain their relative weight.

Head Weight (g)/ Live Weight (g) × 100 = Head Weight Percentage (%)
Dressed Weight (g) / Live Weight (g) × 100 = Dressed Weight Percentage (%)
Liver Weight (g) / Live Weight (g) × 100 = Liver Weight Percentage (%)
Breast Weight (g)/ Live Weight (g) × 100 = Breast Weight Percentage (%)
Wing Weight (g)/ Live Weight (g) × 100 = Wing Weight Percentage (%)
Drums Weight (g)/ Live Weight (g) × 100 = Drums Weight Percentage (%)
Thigh Weight (g)/ Live Weight (g) × 100 = Thigh Weight Percentage (%)
Feet Weight (g)/ Live Weight (g) × 100 = Feet Weight Percentage (%)
Neck Weight (g)/ Live Weight (g) × 100 = Neck Weight Percentage (%)
Back Weight (g)/ Live Weight (g) × 100 = Back Weight Percentage (%)
Gizzard Weight (g)/ Live Weight (g) × 100 = Gizzard Weight Percentage (%)
Intestine Weight (g)/ Live Weight (g) × 100 = Intestine Weight Percentage (%)

**Statistical Analysis**

Data collected was subjected to one way analysis of variance based on the completely randomized design, using statistical package for social sciences (SPSS, 2011). Significant differences among means were separated using Duncan`s Multiple Range Test procedure (Duncan, 1995).

**RESULTS**

**Growth Performance Parameters in Three Broiler Lines**

The table 1 revealed significant ($p<0.05$) difference across all treatment groups except in week 6 and 7 which were not significantly ($p> 0.05$) different. The findings of this study were not in agreement with of Kareem *et al.* (2021), however in the second week, Ross had the highest weight recorded and in the third week Cobb had the highest weight recorded. The fourth and fifth week had Ross have the highest weight and Cobb have the highest weight, from the sixth week to the eight week Cobb had the highest weight Udeh and Ogbu, (2011) reported significant differences in body weight of Marshal, Arbor acre and Ross broiler chickens at weeks 1, 2, 3 and 4. This result disagreed with the report of Olawumi *et al.,* (2012a) who found no significant effect on body weight at 5 and 7 weeks of age, but agreed with those of Enaiat *et al.,* (2010) and Razuki *et al.,* (2011) who obtained significant strain differences in live weight of broiler chickens. In agreement with the present study, Deeb and Lamont (2002), Rondelli *et al.* (2003), Zhao *et al.* (2009) and Taha *et al.* (2010) observed that strains differed in growth rate and weight gain at different ages. Their findings also corroborate those of Pingel *et al.* (1990) who reported that age was the major determinant of growth and physiological development in chicks. However,

this study disagreed with a study by Udeh *et al.* (2015), in which from week 5 to 7, Abor Acre was the most superior in body weight compared to the other broilers whose body weights were not significantly ($p>0.05$) different from each other at this period.

Table 1: Growth Performance Parameters

| Week | T1 | T2 | T3 | SEM |
|---|---|---|---|---|
| 1 | $42.65^{ab}$ | $43.46^{a}$ | $30.77^{b}$ | 1.55 |
| 2 | $136.39^{a}$ | $135.12^{ab}$ | $77.59^{b}$ | 7.83 |
| 3 | $214.10^{ab}$ | $216.66^{a}$ | $161.19^{b}$ | 7.02 |
| 4 | $310.85^{a}$ | $303.46^{ab}$ | $242.95^{b}$ | 9.84 |
| 5 | $393.06^{ab}$ | $424.66^{a}$ | $332.33^{b}$ | 12.04 |
| 6 | 1101.63 | 1074.45 | 933.21 | 36.20 |
| 7 | 1216.30 | 1148.81 | 990.81 | 36.98 |
| 8 | $1358.48^{a}$ | $1471.38^{a}$ | $1117.60^{b}$ | 46.56 |

Note: a, b and ab superscripts denote significant ($p<0.05$) differences while S.E.M stands for Standard error mean; T1= Ross, T2=Cobb, T3= Arbor Acre

**Carcass Characteristics in Three Broiler Lines**

The table 2 shows the relative organ and primal cut out parts of the three broiler strains used in the experiment. The result reveled significant ($p< 0.05$) difference across all treatment groups for most parameters measured except in the percentage thigh, feet, liver, intestine and gizzard which were not significantly ($p> 0.05$) different. Cobb strain had the highest live weight (1558.33g) followed by Ross (1430.00g) while the least live weight was recorded in Abor acre strain (1149.66g). Cobb strain also had the highest dressing weight and dressing yield of 1447.00g and 92.53% while the least values of (1031.33g and 89.93%) were recorded in Abor Acre strain. These contradicted the research of Akinwunmi and Odunsi (2013) which stated that Abor Acre strains had the highest live weight and dressing percentage compared to other strains studied. The similarity in the dressing yield of Cobb strain in this study went in line with the reports of Akporhuarho and Unukevwere (2015) who reported similar dressing yield for Marshall and Cobb broiler strains. The Ross strain showed the highest breast weight compared with other strains which was in line with the findings of Malo *et al.* (1997), similarly, (Souza *et al.,* 1995) reported higher breast yield that favored Ross strains. Rahman, (2014) also reported the superiority of Cobb broiler strain over Ross strain carcass weight, major cut portions and dressing percentage. However, thigh parts were not significantly different among strains as percentage of dressing weights. Ross strains had the highest wing weight followed by Cobb and Abor acre strains. Abd- Elwahab (2016) however, reported no significant difference in thigh, breast, and other primal cuts of Cobb and Abor Acre broiler. The neck of Abor Acre also weighed the least among the three strains studied; these went in line with the study of Fadare *et al.,* (2020). The least value of gastro-intestinal tract weight and percentage was found in Abor Acre strain followed by Cobb strain in this study, The effect of strain was not significant ($p>0.05$) on the leg weight and its relative percentage.

The three strains had similar relative percentage of liver despite that the highest weight was recorded for Cobb strain. (Makka, 2016) also reported similar liver percentage for the Abor acre strain. (Ojedapo *et al.,* 2015) reported that Cobb and Marshall bred of broiler had similar, liver and gizzard weight. In the study conducted by Akporhuarho and Unukevwere, (2015), similar liver, intestine, lung weight were found in Abor Acre and Marshall Strain.

Table 2: Carcass Characteristics in Three Broiler Lines

| Parameters | T1 | T2 | T3 | S.E.M |
|---|---|---|---|---|
| LIVE WEIGHT(G) | 1430.00$^{ab}$ | 1558.33$^{a}$ | 1149.66$^{b}$ | 73.89 |
| DRESSING WEIGHT(G) | 1186.66$^{ab}$ | 1447.00$^{a}$ | 1031.33$^{b}$ | 73.95 |
| Dressing Yield(%) | 83.10$^{b}$ | 92.53$^{a}$ | 89.93$^{ab}$ | 1.76 |
| Head(%) | 3.40$^{ab}$ | 4.99$^{a}$ | 3.09$^{b}$ | 0.37 |
| Breast(%) | 19.08$^{a}$ | 17.39$^{ab}$ | 10.57$^{b}$ | 1.40 |
| Wing(%) | 5.54 | 4.68 | 4.48 | 0.29 |
| Drum(%) | 10.20$^{a}$ | 8.09$^{ab}$ | 5.61$^{b}$ | 0.82 |
| Thigh(%) | 9.15 | 7.82 | 5.86 | 0.71 |
| Feet(%) | 4.32 | 4.31 | 4.49 | 0.33 |
| Neck(%) | 3.82$^{a}$ | 2.57$^{ab}$ | 1.89$^{b}$ | 0.34 |
| Liver(%) | 2.36 | 2.65 | 3.02 | 0.21 |
| Gizzard(%) | 2.13 | 2.62 | 2.71 | 0.22 |
| Intestine(%) | 8.87 | 8.91 | 8.58 | 0.48 |
| Back(%) | 15.86$^{a}$ | 133.86$^{a}$ | 9.32$^{b}$ | 1.05 |

Note: a, b and ab superscripts denote significant ($p<0.05$) differences while S.E.M stands for Standard error mean; ; T1= Ross, T2=Cobb, T3= Arbor Acre

## CONCLUSION

Based on the findings of this study Cobb had the highest body weight at eight weeks among the other strains used in this study, followed by Ross and Abor Acre strain. Cobb also had the best dressing yield followed by Ross and Abor Acre. The Ross line had the best cut out portions among the three broiler lines studied although Cobb registered more head weight than Ross and Abor Acre. The internal organs of the Cobb strain had more weight than both the Ross and the Abor Acre strain. From this study, it can therefore be concluded that strains have a significant effect on Carcass and they also affect growth.

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