

Comparative performance and water intake of four breeds of broiler chickens fed a popular commercial diet in Kuta

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Abstract

Low protein intake and rapid human population growth in addition constitute a major problem facing developing countries. To solve this problem of lack of adequate intake of animal products and to increase the output by majority of Nigerians, there is the need to improve poultry and poultry products production by putting a lot of effort in the production of highly reproductive animals becomes very important. The aim of this work is to compare the performance of four breeds of broiler chickens fed a popular commercial Diet in Kuta. One hundred and twenty, day-old chicks of different breeds, and thirty each (Arbor acre, Marshal, Anak, Cobb) were selected and randomly allotted to four treatments with three replicates each in a completely randomized experimental design. Result from the experiment revealed that there was no significance ($P < 0.05$) difference among the treatments in terms of water intake, feed intake body weight gain and feed conversion efficiency. Anak and Cobb breeds has the highest numerical values for the most of the performance indices measured such as average weekly feed intake (1425.60g, 1272.60g), total feed intake (4714.3g, 4509.8g), average weekly water intake (4046.40ml, 4317.00ml), total water intake (12698.7ml, 14527.6ml), average weekly body weight gain (298.51g, 348.13g), and feed conversion ratio (4.87, 3.67). This research show that the Cobb breed have superior performance compare to other breeds on the same feed and under same environmental condition in Kuta. This implies that the production of the four mentioned breeds can perform in Kuta but the feed is more favourable to Cobb breed.

Keywords: Comparative, Performance, breeds, broiler, Chicken

Introduction

Poultry refers to all domesticated birds rendering economic service to man. It consists of different birds species such as chicken, turkey, pigeons, ducks and others, with chicken being the most important of all species to human diet (Adegbola, 1989) Poultry is one of the important animal protein sources for the ever growing Nigerian Population, thus making significant contribution to the human nutrition and economic development (Obiola, 1992). The poultry industry has in recent years occupied a leading position among agricultural industries in many parts of the world. Poultry meat and eggs serve as important sources of high quality animal protein in those areas of the world that have protein insufficiency (Aduku, 1992). In the past decade, the poultry industry has

undergone very rapid development and it is expected that this development will be more pronounced in developing countries than in developed regions of the world (Onu *et al.*, 2000). This is because most developed countries have already reached self-sufficiency, while developing countries are yet to. Intensive poultry production was introduced into Nigeria over fifty years ago and has developed rapidly especially in the last few decades as an important livestock enterprise in the country (FAO, 2000). The rapid expansion of the poultry industry is due to the attractive attributes of poultry which include the ability to adapt easily, high economic value, rapid generation time and a high rate of growth that can result in the production of meat within 7 to 8 weeks and first egg within eighteen weeks of the first

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chick being hatched. Poultry industry contributes more than 75% of the total livestock production in Nigeria (Hassan, 2010). Feeding is found to be one of the very important aspects of animal production (Abednego *et al.*, 2010). Feeds are chemical substance given to animal for life sustenance and hunger satisfaction. Feeds are chemical composed of substance known as nutrient some of which are protein, minerals, carbohydrates, fats and oils, water and vitamins. These nutrients have definite function in the body. Most natural feeds contain these nutrients in the same proportion and it is important because no matter how much merit an animal has inherited from its ancestors, its maximum capacity for growth and production can be attained only if it is properly nourished, comfortable and healthy. Efficiency with which feeds are utilized is of great importance to poultry farmers. Farmers are naturally attracted and make more profit with feed which when fed to the animal have high conversion efficiency and good quality and quantity product Abednego *et.al.* (2010).

Feed constitute about 60-65% of the total cost of production Dafwang (1987). The importance of feed quality cannot be over emphasized as it combines with feed quantity to dictate the level of performance in poultry but millers no longer give due consideration to the quality desired by end users rather they are after quantity to make huge profit from their sales.

Measure of productivity of animals is expressed based on feed conversion efficiency Lacy and Vast (1999). Feed conversion ratio is a composite trait affected by body weight, feed intake and growth rate while being tested. Obviously the lower the conversion the more efficient an animal is. The feed conversion of a flock can be considerable of economic importance to broiler grower.

The aim of this work is to compare the

performance of four breeds of broiler chickens fed a popular commercial Diet in Kuta.

Materials and methods

Description of area of the study

The study was carried at the teaching and research farm of Niger college of Agriculture Mokwa, Kuta study Centre. Kuta is characterized by two seasons which are wet (March to October) and dry season (November to March). Kuta lies between latitudes 3° 20' and 7° 41' North of equator and Longitudes 8° and 11° 3' East of the Greenwich.

Sources of experimental animals

One hundred and twenty, day-old broiler chickens comprising the four different breeds (30 each) were sourced from different hatcheries were sourced from different commercial hatcheries at Ibadan Oyo State, Nigeria. The breeds sourced were Arbor acre, Marshal, Cobb and Anak. The feed was sourced from commercial feed factory (Sunnah Feed Production Enterprise) along Bosso Road, Bosso local Government Area of Niger State.

Experimental design

One hundred and twenty broiler chickens comprising the four different breeds (30 each) in a Completely Randomized Design (CRD).. The house was partitioned into four pens in order to have four treatments and each treatment had three replicates with ten birds each. Treatment 1 – Arbor acre breed, 2 – Marshal Breed, 3 – Cobb breed, and 4 – Anak breed. The experiment was conducted in two phases, the brooding and the finishing phase.

During brooding, Sunnah starter was measured and fed to the birds in each pen every 24 hours and the left over feed was measured. The same process was done for work to determine the total water intake.

The birds were vaccinated against Newcastle disease (Gumboro and Lasota) between the first week and fourth week

(Starter phase). During the finishing phase, Sunnah Finisher of same company was used. Standard hygiene measures were maintained throughout the experimental period. The experiment lasted 8 weeks

Data collection

Data collected was on the following parameters

Water intake

A known quantity of fresh water was given to the birds at the same time as feed. The water intake was obtained by deducting the quantity of left over from the quantity of water offered.

Average feed intake

This was obtained by subtracting the quantity of left over feed from the quantity of the feed that was supplied to the birds per day divided by the number of birds for each replicate.

Average body weight gain

The initial weight of the chicks was taken at the beginning of the experiment by weighing all the chicks in each replicate and dividing by the number of the birds. Subsequently, the average weekly body weight gain was obtained by subtracting the body weight of the previous week from the weight of the present week.

Feed conversion ratio

This was obtained from the average feed intake per week and the average weight gain per week for each bird.

FCR =

$\frac{\text{Average feed intake per bird per week}}{\text{Body weight gain per bird per week}}$

Carcass analysis

At the end of the experiment, eight birds two from each treatment were used for carcass analysis. The birds were starved for 24 hours after weighing each bird to enable easy evisceration. The bird was slaughtered by cutting the jugular vein using sharp knife. The birds were weighed again to determine the slaughter weight. Hot water was used to defeather the birds by

immersing in 60° C for 30 seconds in accordance to the procedure of Mounteny (1996). The birds were defeathered immediately and washed in cool water and then weighed. The legs, head, and the neck were cut and crop removed, the abdomen was cut open and the visceral removed. The abdominal fat was removed and wing removed by cutting anteriorly, the drumstick and the thigh was removed to separate the back cut and the breast meat. A cut was made across the rib joints that connect them. Weight of the carcass parts, abdominal parts and the internal organs (visceral) was determined as studied by Adebambo (2012).

Data analysis

Data collected were subjected to one-way Analysis of Variance (ANOVA) using SPSS (2008) version 16.0. Least significance Difference (LSD) was used to separate the mean at (P<0.05) significance difference.

Results

Average water intake per bird of four different breeds of broiler chickens

Table 1 shows the weekly average water intake per bird. There was significant (P<0.05) difference starting from week 1 to week 4 with treatment 4 having the highest water intake values of 634.44, 1097.83, 1461.67 and 2077.33 mL respectively; at week 5 and 6, there was no significant difference in the water intake in all the treatments. However, total water intake (TWI) shows a significant (P<0.05) difference in all the treatments with treatment 4 having the highest value of 14527.6 mL and treatment 1 having the lowest value of 9724.2 mL for the total water intake.

Average feed intake per bird (g) of four different breeds of broiler chickens

Table 2 shows the weekly average feed intake. There was a significant (P<0.05) difference at week 1, 2, 3, 4 and 5 with treatment 3 having the highest value of

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333.09g and 937.80g at week 1 and 5, respectively. There was no significant difference in all the treatments at week 6 though treatment 3 has the highest value. Total feed intake (TFI) show no significant difference in all the treatments.

Average weekly body weight gain per bird (g) of four different breeds of broiler chickens

Table 3 shows the result of the average weekly body weight gain per bird. The

Table show a significant ($P < 0.05$) difference at week 2, 3, 5 and 6 with treatment 4 having the highest values of 121.33g, 162.67g, 363.49g and 348.13g at week 1, 2, 5 and 6 respectively. Weeks 1 and 4 show no significant difference. There was a significant ($P < 0.05$) difference in Total body weight gain (TBWG) among all the treatments with treatment 4 having the highest value of 1631.6g and treatment 1 having the least value of 1238.9g.

Table 1: Average weekly water intake per bird (ml) of four different breeds of broiler chicken

WEEKS	T1	T2	T3	T4	SEM	LOS
1	336.43 ^d	406.84 ^c	473.63 ^b	634.44 ^a	18.55	*
2	700.55 ^c	728.15 ^c	865.89 ^b	1097.83 ^a	31.03	*
3	1236.75 ^c	1335.96 ^{ab}	1496.63 ^a	1461.67 ^{ab}	36.41	*
4	1602.67 ^c	1846.74 ^b	1858.93 ^a	2077.33 ^a	52.79	*
5	2382.00	3163.70	3290.50	3372.80	332.73	NS
6	3465.80	4036.80	4046.40	4317.00	419.99	NS
TWI	9724.2 ^c	11548.3 ^b	12698.7 ^b	14527.6 ^a	558.22	*

Mean of the same superscript are not significantly different ($P < 0.05$), mean of the different superscript are significantly different. (*): Significant NS: not significant T1: Arbor acre T2: Marshall T3: Anak T4: Cobb
TWI: Total Water Intake SEM: Standard error of Mean LOS: Level of Significance

Table 2: Average weekly feed intake per bird (g) of four different breeds of broiler chicken

WEEKS	T1	T2	T3	T4	SEM	LOS
1	257.85 ^b	287.96 ^a	333.09 ^a	330.00 ^a	16.55	*
2	443.72 ^c	510.20 ^b	576.77 ^a	585.00 ^a	15.32	*
3	442.25 ^c	496.75 ^b	556.24 ^a	570.83 ^a	8.76	*
4	545.25 ^b	576.20 ^b	682.15 ^a	653.20 ^a	18.13	*
5	653.20 ^b	784.80 ^{ab}	973.80 ^a	831.10 ^{ab}	80.68	*
6	1134.90	1213.60	1425.60	1272.60	110.88	NS
TFI	4492.2	4436.0	4714.3	4509.8	47.89	NS

Mean of the same superscript are not significantly different ($P < 0.05$), mean of the different superscript are significantly different. (*): Significant NS: not significant T1: Arbor acre T2: Marshall T3: Anak T4: Cobb
TFI: Total Feed Intake SEM: Standard error of Mean LOS: Level of Significance

Table 3: Average weekly body weight gain per bird (g) of four different breeds of broiler chicken

WEEKS	T1	T2	T3	T4	SEM	LOS
1	93.33	89.15	118.20	121.33	10.98	NS
2	104.00 ^b	102.91 ^b	87.70 ^b	162.67 ^a	17.43	*
3	224.17 ^b	265.65 ^{ab}	306.98 ^a	210.00 ^b	23.04	*
4	250.00	265.71	339.68	305.00	50.56	NS
5	341.11 ^a	330.72 ^a	341.13 ^a	363.49 ^a	15.40	*
6	278.81 ^a	1244.7 ^c	1461.1 ^b	1631.6 ^a	50.30	*
TBWG	1238.9 ^c	1244.7 ^c	1461.1 ^b	1631.6 ^a	50.30	*

Mean of the same superscript are not significantly different ($P < 0.05$), mean of the different superscript are significantly different. (*): Significant NS: not significant T1: Arbor acre T2: Marshall T3: Anak T4: Cobb
TBWG: Total Body Weight Gain SEM: Standard error of Mean LOS: Level of Significance

Average weekly feed conversion ratio of four different breeds of broiler chickens

Table 4 shows the result of average weekly feed conversion ratio of four different breeds of broiler chickens. The Table shows a significant (P<0.05) difference among the

treatments in weeks 2, 3 and 6. Also, there was no significant difference in all treatments in weeks 1, 4 and 5. There was also significant (P<0.05) difference in Total feed conversion ratio with T4 having the best value of 2.70.

Table 4: Average weekly feed conversion ratio of four different breeds of broiler chicken

WEEKS	T1	T2	T3	T4	SEM	LOS
1	2.78	3.41	2.82	2.72	0.21	NS
2	4.23 ^{ab}	5.67 ^{ab}	7.50 ^a	3.60 ^b	1.16	*
3	1.98 ^b	1.89 ^b	1.85 ^b	2.82 ^a	0.26	*
4	2.17	2.20	2.33	2.50	0.36	NS
5	1.93	2.40	2.93	2.30	0.31	NS
6	4.10 ^{ab}	5.67 ^a	4.87 ^{ab}	3.67 ^b	0.57	*
TFCR	3.61 ^c	3.58 ^c	3.23 ^b	2.70 ^a	0.11	*

Mean of the same superscript are not significantly different (P<0.05), mean of the different superscript are significantly different. (*): Significant NS: not significant T1: Arbor acre T2: Marshall T3: Anak T4: Cobb TFCR: Total Body Weight Gain SEM: Standard error of Mean LOS: Level of Significance

Discussion

The research result showed that the Cobb breeds have the highest value for water intake which means that Cobb breed regulates body temperature better than the other breeds used in the study. This may be attributed to their genetic factor which make the breed adopt better to the environmental condition which is in agreement with the findings of Boyles (2003), that poultry production involves the use of large amount of water; limitation to water intake depress animal performance drastically more than any nutrient deficiency. The Cobb breeds have highest value for body gain (1631.6) and the best feed conversion ratio figure (2.70) which suggest that Cobb breed response to Sunnah feed better than other breeds under Kuta weather condition. Cobb breed utilizes the feeds it consumed more efficiently than the other breeds used though it consumed less feed than the Anak breed. This may be due to the genetic makeup of the Cobb breed which serves as an advantage over other breeds which make them adapt faster to Kuta environmental control than other breed used in the study. This is in agreement

with the findings of Abednego *et al.* (2010). Also, Egena (2009) stated that broiler chickens fed with quality feed and water ad-libitum at different growing stages maximizes growth. The Cobb breeds had the best feed conversion ratio over the other breeds used in the study. This finding is in agreement with the result obtained by Lacy and Vast (1999) that the lower the feed conversion efficiency the more efficient the animal. This is most likely due to the breed type and adaptability to the environmental condition of Kuta.

Conclusion

Based on result obtained from this study, it can be concluded that Cobb breed have good performance over the Arbor acre, Marshall and Anak breeds with respect to feed efficiency, highest water intake, fast growth rate.

Also, the Arbor acre breed showed slow growth, low feed conversion efficiency and less feed and water intake and while Cobb breed under good management could possibly be better for production in Kuta with minimum cost of production due to its low feed intake and fast growth rate.

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Recommendation

Cobb breed is therefore recommended for production in Kuta area since the breed is more economical in terms of good feed utilization, high water intake and fast growth rate. It is also recommended that further research should be carried out on more breeds.

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