Original Research Article

EFFECT OF CALCIUM (CaA) AND PHOSPHORUS (P) ON GROWTH PERFORMANCE OF BROILER AT FINISHER PHASE.

ABSTRACT

Performance of broiler finisher fed diets containing cassava flour meal (0% CFM, 20% CFM and 30% CFM), tagged T_1, T_2 and T_3 were compounded, respectively. In a four weeks experiment, using one hundred and fifty (150) Ross 308 birds were used in an experimental group replicated five times each treatment had 10 birds per treatment group. Feed intake and body weight gain of the bird were determined and compared. Result of feed intake and mortality was significantly different ($P<0.05$) for all treatment while body weight gain, and feed conversion ratio showed that there was no significant difference ($P>0.05$) for all treatment. Feeding birds with diets containing cassava flour meal at finisher phase enhance the growth performance. However, it is recommended that; the optimum inclusion level of cassava flour meal in poultry diet by including level in future trial and further research should be direct towards hematological indices and proximate analysis.

KEYWORDS: EFFECT CALCIUM, PHOSPHORUS, PERFORMANCE, BROILER AND FINISHER PHASE. Calcium, Phophorus, Broiler performance, Finisher Phase,

INTRODUCTION

Minerals are needed for all normal life processes, and the physiological importance of minerals for farm animals, including poultry, is well documented (Spears, 1999; Underwood and Suttle, 1999). Minerals comprise about 43% of the body composition of most vertebrate animals. Although 12 minerals are known to be essential for the chick, meeting the need for calcium (Ca) and phosphorus (P) is perhaps the greatest concern to the nutritionist. This is because they are required in relatively high quantities and provision of inadequate amounts could lead to adverse effects. (Waldroup, (1999).

The nutritional role of Ca is closely linked to that of P, and more than 70% of the ash in the animal body consists of Ca and P, mainly found in the bones. The skeleton of birds contains approximately 99% of the Ca and 80% of the P of body reserves (Suttle, 2010). They are therefore the main constituents of the skeleton, which underlines their important role in bone formation. Ca and P have interdependent functions in bone characteristics and formation, which is why they are often, discussed together (Kheiri, *et al.*, 2006). Even though only a small percentage of the total body concentration of these minerals is found in the blood, their presence in extra cellular fluids is essential (Ansar *et al*., 2004).

Due to their variations in their needs for Ca and P, broiler chickens are especially susceptible to bone abnormalities. The performance of the modern broiler has changed considerably in recent years, even though their diets have not changed proportionately. (Williams *et al*., 2000). Breeding for rapid growth to unprecedented body weight has been highly successful in broilers. In 1925, it took approximately 16 weeks to raise a 1.1 kg chicken, but broiler chicken strains

now reach 2.5 kg in less than 7 weeks (N.C.C., 2006). Daily growth rates have increased from 25 to 100 g, an increase of more than 300% (Knowles *et al.,* 2008).

Materials and Methods

The Study Area

This research work was conducted in the Department of Animal Science, Federal University of Agriculture Zuru, the area is geographically located in the Gguinea Ssavanna on the latitude 11^0 405N and longitude $5^0$2.39E of the equator (Baba *et al.,* 2013).

Experimental Birds

The birds used for this experiment were source from Zarm Farm in Oyo State in Nigeria. The strains used are Ross 308 and was purchased at day old. One hundred and fifty (150) broiler birds were used for this research.

Experimental Diets

The experimental diet used for the research was formulated using the available feed ingredients such as maize, groundnut cake, bone meal, vitamin-mineral premix, methionine, lysine and salt. The diet was fed to the birds at varying calcium and phosphorus inclusion levels. The gross and chemical compositions of the experimental diets to be used are shown in table 1 below.

Table 1. Gross and chemical composition of the experimental diets

	Finisher diets		
	Treatments		
	T1(control)	T2 (CFM 20%)	T3(CFM 30
Maize	60.00	40.00	30.00
Cassava flour	-	20.00	30.00
Palm oil	-	0.30	0.40
Soybean meal	3.00	5.00	7.50
G/nut cake	23.00	24.00	23.50
Wheat offal	8.00	4.00	2.00

Fish meal	0.20	0.20	0.40
Blood meal	1.50	2.00	2.00
Bone meal	1.80	2.00	1.70
Limestone	1.50	1.50	1.50
Lysine	0.25	0.25	0.25
Methionine	0.25	0.25	0.25
Premix	0.25	0.25	0.25
Salt	0.25	0.25	0.25
Total	**100.0**	**100.0**	**100.0**
Calculated chemical composition			
ME (kcal/kg)	2946.00	2940.00	2947.00
CP (%)	20.20	20.20	20.20
Lysine (%)	0.90	0.90	1.0
Methionine (%)	0.5	0.5	0.5
Ca (%)	1.10	1.10	1.10
P (%)	0.5	0.5	0.5

Experimental Design

One hundred and fifty (150) broiler birds were used for the experiment. They were randomly divided into three treatment groups of 50 birds each. Each treatment group was further sub-divided into 5 replicates each with ten birds per replicate. Each treatment was fed one of the experimental diets for four weeks.

Data Collection

Feed intake was recorded daily by subtracting the amount offered from the left over of the previous day. Body weight gain was monitored weekly and mortality was recorded as it occurs.

Statistical Analysis

The data collection was subjected to analysis of variance (ANOVA) using the Stat View Statistical Package (SAS, 2003).

Results and Discussion

Performances Characteristic

At the end of this research, bird fed diets with a lowest level of calcium and phosphorus diet (T1) Consumed more feed (4639.87) gram/bird ($P<0.05$) compared to those on the other treatment 2 and 3, respectively T2 - 3366.06 gram/bird and T3 -3846.19g/bird ($P>0.05$). (Table 2) Similarly bird fed diet containing lowest level of calcium and phosphorus (T1) has the highest weight gain (1379.02) g/b compared to the other treatment (T2) 1119.88g/b T3 1282.37g/b, respectively. The value recorded for (T1) was statistically similar ($P>0.05$) to those recoded for T2 and T3, respectively.

Table 2: Performance of broilers fed diets containing different inclusion levels of calcium & Phosphorus of finisher phase

Parameters	T1	T2	T3	SEM
Initial weight (g/bird)	292.00	326.00	305.00	11.62
Final body weight(g/bird)	1683.98	1445.88	1534.52	87.38
Feed intake (g/bird)	4639.87[a]	3366.06[a]	3846.11[b]	198.27
Feed intake(g/bird/day)	165.71[a]	120.21[a]	137.39[b]	7.08
Body weight (g/bird)	1379.02	1119.88	1282.37	86.40
Body weight grain(g/bird/day)	49.24	39.70	48.80	3.08
Mortality (%)	2.80[b]	0.80[a]	5.20[c]	0.28
Feed conversion ratio	3.00	3.03	3.39	0.29

[abc] Mean within a row with different superscript are significantly ($P<0.05$) different.

Results of this study indicated that high supplementation levels of Ca and P tTended to decreased feed intake. (This is in accordance with Jegede *et al.*, 2005) theywho earlier reported that feed intake was significantly (P<0.05) depressed by high levels of Ca supplementation. Suttle (2010) also reported that high CaA:aP ratios resulted in lower feed intake. In this study, the reduction in feed intake was more pronounced at the finisher phase (P<0.05). Similarly, Waldroup (2000) reported that during the later stages of production, when a significant amount of feed is consumed; the requirement of supplemental phosphorus by boilers is low. Thus in his study, he reported that broilers had satisfactory growth rate with low levels of phosphorus between 0-28 days of age.

Weight gain was negatively affected by the high Ca and P supplementation (P<0.5). Bar *et al.* (2003) reported that body weight gain was negatively affected as level of Ca in the feed increased from 0.40 to 2.00% and from 0.55 to 0.85%, respectively.

The excess of these dietary mineral may have negatively affected the performance of the chickens. Tamin *et al.* (2004) also reported that high dietary supplementation of Ca (25.9 vs 11.8 g/kg) reduced chick performance and the digestibility of glutamic acid, leucine and phenylalanine, but increased the digestibility of lysine and histidine.

Similarly, Whithead *et al.* (2003) also reported that increasing the Ca content of diets form 0.46 to 1.30% lead to a linear reduction in body weight gain. McDonald and Shafey (1987) reported that excess Ca has been shown to reduce growth rate and increase feed conversion ratio, and that the reduction in growth is considered to result from altered Ca, and not ratios, as both calcium carbonate and phosphate are known to depress growth and increased FCR. FCR values did not differ between the treatments. This is similar to the findings of Whithead *et al.* (2003) who

reported that increasing Ca from 0.46% to 1.30% did not significantly affect FCR. Whithead *et al.* (2003) also reported that high calcium intake increased FCR but did not affect weight again.

The mortality rate was insignificant between (P<0.05) T1 (2.80%) and T3 (5.20%) (P<0.05) which mortality was recorded for the diet with the lowest Ca and P level, through the difference was not significant. Bui (2000) earlier fed two levels of dietary Ca (0.85% and 1.10%) to chicks between 5-8 weeks of age, and reported that the diet containing 1.10% Ca supplemented with 150 ppm vitamin C had the lowest mortality and the group fed on 0.85% Ca without supplemental Vitamin C had the highest mortality (P>0.05).

CONCLUSION

It is recommended that more researches needs to be conducted ~~needs~~ to ascertain the optimum levels of Ca and P for broilers in the hot sub-humid zone of north western Nigeria. Due to the seasonal variation in the weather conductions in this ecological zone, such trials should be carried out at difference seasons of the year in order to ascertain any seasonal effect on Ca and P utilization.

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