EFFECT OF DIETARY INCLUSION OF ORGANIC ALTERNATIVES TO ANTIBIOTIC GROWTH PROMOTERS ON GROWTH PERFORMANCE OF FUNAAB ALPHA CHICKENS

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ABSTRACT

This study was conducted to determine the effect of garlic, synbiotic, organic acidifier as alternative to synthetic antibiotics on growth performance of pullet strain of FUNAAB alpha chickens. A total of 150 pullet strain of FUNAAB alpha chicks were divided into 5 treatments, each treatment comprising of 30 birds sub-grouped into 3 replicates of 10 chicks each in a Completely Randomized Design. Birds on the Control Treatment (T0) were fed chicks mash diets without any test ingredients. Treatments T1, T2, T3 and T4 birds were fed chicks mash with Garlic (3g per 1kg), Synbiotic (2g per 1kg of feed), Organic acidifier (3g per 2kg of feed) and synthetic antibiotics (0.5g per 1kg of feed) respectively. The data obtained were subjected to one-way analysis of variance. The result revealed that garlic, synbiotic, organic acidifier and synthetic antibiotics inclusion had no significant (P>0.05) effect on feed intake, feed conversion ratio and mortality. Test ingredients however, had significant (P<0.05) effect on final weight and weight gain. It was concluded that organic acidifier and synbiotic gave the best weight gain comparable to synthetic antibiotics.

Keywords: Weight gain, garlic, synbiotic, organic acidifier, FUNAAB alpha chickens

INTRODUCTION

The recent increase in human population, income, and standard of life has put pressure on the poultry sector to grow and create high-quality products to meet consumers' expectations. This has led to use of feed additives to improve animal performance, including growth, feed efficiency and layer performance in the poultry industry (khan *et al*.,2007).The additives include antibiotics, enzymes, antioxidants, pellet binders, antifungal, colored pigments, and flavoring agents. Synthetic antibiotics in poultry farming has however been outlawed in certain developed nations because of the threat it poses to human health (Rehman and Haq, 2014).

Since synthetic antibiotics have been criticized for their potential negative impact on the food chain, researchers have been searching for natural alternative feed additives. Natural herbs and plants have received a lot of support among the many poultry feed additives available for chicken nutrition due to their extensively acknowledged positive benefits on poultry health and productivity. Garlic (Incharoen *et al.,*2010), Synbiotics (Gilbson and Roberfroid 1995), and organic acids (Park *et al*., 2016) are amongst organic materials reported to negatively affect bacterial development**.**

Hence, this study aim to determine the effect of dietary inclusion of Garlic, synbiotic and organic acidifiers, as an alternative to the use of synthetic antibiotics on growth of pullet strain of FUNAAB Alpha chickens.

MATERIALS AND METHODS

Experimental site

The experiment was conducted at the Poultry Unit of Institute of Food Security, Environmental Resources and Agricultural Research (IFSERAR), Federal University of Agriculture Abeokuta (FUNAAB), Ogun State. The climate is humid and located in the forest zone of south-western Nigeria. It has average relative humidity of 80% per annum. The site is 133m above sea level with latitude 7.230085N, and longitude 3.399006E. The mean annual precipitation and the temperature are 1,574,93916mm and 25.77^{0}C respectively. (IFSERAR GIS Unit 2023).

Experimental procedure

Garlic powder was sourced from an open market in Abeokuta. Commercial organic acidifiers powder (Formycine Gold Px), synbiotic powder (Innovated Lummance) were obtained through feed miller and used according to the manufacturer recommended doses.

One hundred and twenty (150) day-old pullet strain of FUNAAB Alpha chicks were purchased from Federal University of Agriculture Abeokuta (FUNAAB) hatchery and distributed into five treatments, replicated thrice with ten birds in each replicate from the first day of brooding and rearing. Birds on Control had no test ingredients, T_1, T_2, T_3 and T_4 were given garlic, synbiotic, organic acid and synthetic antibiotics respectively, through the feed as presented in Table 1, for a period of 56 days. Feed and were given *ad libitum* throughout the period of the experiment.

Table 1: Composition of experimental chicks mash

Ingredients	**Quantity (kg)**
Maize	50.00
Fish meal	2.50
Soy bean	12.00
Groundnut cake	9.80
Palm kernel cake	5.00
Wheat offal	16.00
Bone meal	2.00
Oyster shell	2.00
Lysine	0.10
Methionine	0.10
*Chicks premix	0.25
Common Salt	0.25
Total	**100**
Determined Analysis (%)	
Crude Protein	15.58
Crude Fibre	5.47
Ether extract	4.08
Ash	3.60
Calcium	1.35
Phosphorus	0.37
Lysine	0.63
Methionine	0.36
Energy(Kcal/kg)	2477.55

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

Data collection

The body weight of FUNAAB alpha chicks per replicate was weighed at the commencement of the experiment and subsequently on weekly basis to estimate average weight gain. Weekly feed intake was measured as the difference between the feed offered and leftovers. Feed conversion ratio (FCR) was calculated. A record of mortality was kept as it occurred in order to estimate survivability.

$$\text{Feed intake(g)} = \frac{\text{Total feed supplied (g)} - \text{Total left over(g)}}{\text{Total number of birds}}$$

$$\text{Weight gain (g)} = \text{Final weight (g)} - \text{Initial weight (g)}$$

$$\text{Feed Conversion ratio} = \frac{\text{(FCR)} = \text{Feed intake (g)}}{\text{Weight gain (g)}}$$

Percentage mortality was determined as the number of dead birds divided by the number of birds stocked, multiplied by 100.

Statistical Analysis
All data collected were subjected to Analysis of Variance (ANOVA) in a Completely Randomized Design (CRD) using Statistical Analysis Software (SAS 2012). Significant ($p<0.05$) means among variables were separated using Duncan Multiple Range Test of the software.

RESULTS AND DISCUSSION

Results

The effect of dietary inclusion of garlic, synbiotic, organic acidifier, and synthetic antibiotics on growth performance of pullet strain of FUNAAB Alpha chickens

The effect of dietary inclusion of garlic, synbiotic, organic acidifier, and synthetic antibiotics on growth performance characteristics of pullet strain of FUNAAB Alpha chickens is presented in Table 2. There were no significant ($P>0.05$) differences in feed intake, feed conversion ratio and mortality at the inclusion of garlic, synbiotic, organic acidifier and synthetic antibiotics used in this experiment. Final weight and weight gain were however influenced significantly ($P<0.05$), by the test ingredients used in this experiment. The birds on the control diet and the ones fed diet containing organic acidifier recorded higher ($P<0.05$) values of final weight while the birds fed diet containing garlic had the least ($P<0.05$) value. Birds on control diet and organic acidifier however, had statistically similar final weight with birds fed diet containing synbiotic and synthetic antibiotics. Birds fed diet containing organic acidifier recorded the highest ($P<0.05$) weight gain when compared with the birds fed diet containing garlic. The values recorded are however statistically similar with the values of birds on control diet, synbiotic and synthetic antibiotics.

Table 2: Effect of dietary inclusion of garlic, synbiotic, organic acidifier and synthetic antibiotics on growth performance of pullet strain of FUNAAB Alpha chickens.

Parameters	Control	Garlic	Synbiotic	Organic acidifier	Antibiotic	SEM
Initial weight(g)	88.5	78.25	83.33	82.60	81.57	2.39
Final weight(g)	871.48^{a}	759.54^{b}	825.92^{ab}	917.22^{a}	822.96^{ab}	18.78
Weight gain(g)	782.98^{ab}	681.29^{b}	742.59^{ab}	834.63^{a}	741.40^{ab}	18.26
Feed intake(g)	2373.24	2299.67	2472.06	2684.86	2547.43	82.96
Feed intake/day (g)	56.51	54.75	58.86	63.92	60.65	1.98
FCR	3.03	3.39	3.33	3.21	3.46	0.10
Mortality	6.67	10	10	3.33	6.67	1.53

^{ab}Means with different superscript along same row are significantly different ($P<0.05$)

DISCUSSION

Chicks fed diets with garlic inclusion in this current study had the least final weight and weight gain. This result disagrees with the findings of Brzoska *et al*. (2015) who reported that chickens appetites were stimulated by garlic extract (2.25 mL/kg of feed), leading to noticeably higher feed consumption and, consequently, larger body weight gains. which this is further supported by Sheoran *et al*. (2017), who hypothesized that the inclusion of garlic in birds' diets led to the increase in weight gain. Garlic may speed up salivary flow and gastric juice secretion in chicken diet, which may lead to better digestibility and increased body weight gain. The low final weight and weight gain obtained from this study may be due to the findings of Issa and Omar, 2012 who reported that additions of garlic may minimize palatability of the diets due to pungency and as a result, consumption of feed and body weight of the animal may decrease.

Iinclusion of synbiotics into chicks feed significantly improved final body weight and weight gain in this study and this result is in agreement with the findings of Mokhtari *et al*., (2015), who reported that the use of synbiotic in poultry diets by adding various stimuli significantly improved the body weight gain. This result can be attributed to the ability of synbiotic to offer a balanced intestinal microbiota in the broilers and boost up growth performance.

The findings of this study showed that inclusion of organic acidifier into chicks feed significantly improved the weight gain and this result is in agreement with the findings of Agboola *et al*., (2015) who reported that in the chick's phase and overall period, the use of organic acidifier alone in diets

without antibiotics increased body weight gain and also helps to prevent the negative effects of heat stress on poultry populations especially during hot seasons. This result could be attributed to the ability of organic acidifier to lower the gut pH at which the activity of protease and beneficial bacteria optimized and proliferation of pathogenic bacteria are minimized by dietary acidification through direct antibacterial effect destroying their cell membrane (Partanen and Nava 2009). Additionally, low pH in the diet and digestive tract acts as a microbial barrier, reduces buffering capacity and improves nutrient digestibility, resulting in enhanced growth performance (Pearlin *et al*. 2020).

CONCLUSION

Based on the result of this research, it can be concluded that inclusion of organic acidifier and synbiotic improved weight gain FUNAAB alpha pullet strain chickens similar to what was obtained in synthetic antibiotics. Both organic acidifier and synbiotic can replace synthetic antibiotics developed as growth promoters in the large array of feed additives available.

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