# GROWTH PERFORMANCE OF TURKEY (*Meleagris gallopavo*) POULTS FED BUTYRIC ACID SUPPLEMENTED DIETS AS AN ALTERNATIVE TO ANTIBIOTICS GROWTH PROMOTERS

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**ABSTRACT**
The effects of butyric acid supplemented diets on growth performance as an alternative to antibiotic growth promoters was examined in a 28-day experiment using one hundred and sixty (160) (one-day old) Nicholas turkey poults. The experimental design was a Completely Randomised Block Design. Poults were brooded for 7 days, after which they were allotted to 4 dietary treatments with 5 replicates of 8 birds per replicate. The experimental feeds consist of four diets; treatment 1 was the Corn-SBM diet (basal diet/negative control); treatment 2 was the positive control, consisting of the basal diet and antibiotics (Oxytetracycline hydrochloride at 0.02g/1000g feed), treatment 3 had the basal diet and 0.2% butyric acid, while treatment 4 was the basal diet and 0.4% butyric acid. The inclusion of butyric acid to the corn-soya based diets did not positively affect the final weight and weight gain of birds at the end of 56 days of the feeding trial.

Keywords: Butyric acid, Growth performance, Turkey poults

## Introduction

The continued indiscriminate use of antibiotics in both man and birds poses a challenge of antibiotic resistance caused by antibiotic residues in meat and milk. This led to a ban on antibiotics use in feed formulation in Europe (Maron *et al*., 2013). This ban has brought about the need for researchers to find alternatives to the use of antibiotics in poultry production. Short-chain fatty acids (acetic, butyric and propionic acids) have been reported (Agboola *et al.,* 2015; Agboola *et al.,* 2018) to have a positive impact on broiler growth (Hassan *et al.,* 2010). It has been documented that these acids exhibit antimicrobial properties when dissociated by reducing intestinal pH (Van Immerseel *et al.,* 2006). Notwithstanding the progress made, there has been diverse recommended levels of organic acids that would successfully replace antibiotics. Therefore, the purpose of this study is to determine the potency of butyric acid and to establish a specific level of inclusion that will provide optimum performance and improve the integrity of the gut in turkey poults.

## Materials and methods

### Experimental site

This study was carried out in the Poultry Unit of the Teaching and Research Farm, University of Ibadan, Oyo State in the South West geopolitical zone of Nigeria, within the tropical rain forest region.

### Experimental birds, design and management

One hundred and sixty (160) one-day old unsexed Nicholas turkey poults were obtained from a reputable commercial hatchery and kept in a deep litter system. The poults were mass brooded for seven (7) days during which they were fed the negative control (basal diet). After which they were weighed, tagged and randomly allotted to four dietary treatments. Each dietary treatment had five (5) replicates of eight (8) poults per replicate in a Completely Randomised Design (CRD). The birds were reared in a well ventilated and illuminated standard poultry house.

### Experimental diets and feeding

The experimental feeds consist of four diets; treatment 1 was the Corn-SBM diet (basal diet/negative control); treatment 2 was the positive control, consisting of the basal diet and antibiotics

(Oxytetracycline hydrochloride at 0.02g/1000g feed); treatment 3 had the basal diet and 0.2% butyric acid, while treatment 4 was the basal diet and 0.4% butyric acid. The basal diet was a corn-soyabean diet formulated to meet the nutrient requirements (NRC, 1994) for starter phase 1(0 to 4 weeks) phases. Experimental diets and water were provided *ad libitum* in a feeding trial that lasted for 4 weeks.

**Table 1: Gross Composition (g/1000gDM) of experimental diets**

Parameters measured and calculated

The growth performance parameters calculated include feed intake and body weight gain. Feed conversion efficiency was calculated using the weight gain and feed intake values.

**Feed intake**

The weekly feed intake was determined by giving a known quantity of feed to the birds and collecting the leftovers. Feed remnants were weighed and subtracted from the initial weight of feed offered to determine the feed intake per replicate per week.

**Body weights**

The chicks were weighed at the beginning of the trial and subsequently weighed on weekly basis throughout duration of the experiment. The weekly weight gain was obtained by subtracting the weight of the preceding week from that of the present.

**Feed Conversion Ratio**

This was calculated per pen as the ratio of weight gained to the feed consumed.

$$\text{Feed Conversion Ratio (FCR)} = \frac{\text{Average feed intake(g)}}{\text{Average weight gain(g)}}$$

Data analysis

Samples collected were subjected to Analysis of Variance using (SAS,2008). Mean differences was separated using Duncan's Multiple Range Test

**Results and Discussion**

**The Effect of Butyric Acid Supplementation on the Performance Characteristics of Turkey Poults (29-56 days)**

The result on the influence of butyric acid supplementation on the performance of turkey poults as shown in Table 2. Final weight and feed intake of birds on control, antibiotic and 0.2% butyric acid supplemented diets were similar but significantly higher than those recorded for 0.4% butyric acid supplemented diet. Weight gain was similar for control and antibiotic supplemented diet but significantly different from 0.2% and 0.4% respectively.

**Table 2: Effect of Butyric Acid Supplementation on Performance and Cost Analysis of Turkey Poults (29-56 Days)**

| Parameters | T1 | T2 | T3 | T4 | SEM |
|---|---|---|---|---|---|
| Initial weight(g/bird) | 350.27 | 360.07 | 355.41 | 359.71 | 10.83 |
| Final weight(g/bird) | 980.43[a] | 963.99[a] | 917.64[a] | 875.52[b] | 39.06 |
| Weight gain(g/bird) | 630.16[a] | 603.93[a] | 562.23[b] | 515.81[b] | 31.26 |
| Feed intake(g/bird) | 1882.61[a] | 1796.31[a] | 1705.71[a] | 1442.98[b] | 95.55 |
| FCR | 2.99 | 2.97 | 3.03 | 2.79 | 0.26 |

Means within the same row with the same superscript are not significantly different ($p>0.05$). T1 – Control (basal diet); T2 – basal diet + antibiotics ; T3 – basal diet + 0.2% butyric acid ; T4-basal diet+ 0.4% .FCR=Feed Conversion ratio. SEM – Standard Error of Means

The results of this study showed that the inclusion of butyric acid to the corn-soya based diets did not positively affect the final weight and weight gain of birds at the end of the 28 days of the feeding trial. This agrees with the work of Adil *et al* (2011) who reported no significant body weight gain difference between the control diet and butyric acid (2 and 3 %) supplemented diets in broiler chickens. The result of this experiment is however, contrary to the findings of Panda *et al* (2009) and Taherpour *et al* (2009). Panda *et al* (2009) reported that butyric acid inclusion at 0.4 and 0.6% produced significant increase in body weight gain when compared to the control and 0.2 butyric acid inclusion level while Taherpour *et al* (2009) reported that a supplementation with butyrate acid glycerides showed an increase in final body weight (42 days) of broiler chickens when compared to those on the basal diet. However, the authors also reported a lower feed intake and feed conversion ratio for birds on the butyric acid supplemented diet when compared to those on supplement-free diet. Agboola *et al* (2015) reported an improved weight gain at 21 days when 0.4 % organic acid (formic and propionic acids) were added to the feed of broiler chicken.

**Conclusion and recommendation**

The result obtained from this study showed that butyric acid at the inclusion level up to 0.4 % had no detrimental effects on growth performance of turkey poults (5-8 weeks) however, further research is needed to better ascertain the best inclusion level in turkey nutrition for optimal productivity. Also, varying levels of butyric acid may be explored and further work can be carried out to finisher phase.

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