

THE EFFECTS OF BUTYRIC ACID SUPPLEMENTED DIETS AS AN ALTERNATIVE TO ANTIBIOTICS GROWTH PROMOTERS IN TURKEY POULTS.

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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. Treatment 1 was the basal diet with no supplements while treatments 2, 3, and 4 were supplemented with antibiotics, 0.2% butyric acid and 0.4% butyric acid respectively. 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 first 28 days of the feeding trial.

Keywords: Butyric acid, Growth performance, Turkey poults

INTRODUCTION

The continued indiscriminate use of antibiotics in both man and birds posed 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 and in Nigeria recently. 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.

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 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. The birds were reared in a well ventilated and illuminated standard poultry house. Experimental diets and water were provided ad libitum in a feeding trial that lasted for 4 weeks.

Experimental Design

The experimental design used for the study was a Completely Randomised Design (CRD).

Experimental Diets

The experimental diet consists 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/100g 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.

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

INGREDIENTS g/kg	Starter 1 (0-4) weeks
Corn	410.0
Soyabean meal	480.0
Fish meal	40.0
Wheat Offal	6.0
Dicalcium phosphate	20.0
Premixes	2.5
Limestone	10.0
DL-methionine	2.5
L-lysine	3.5
Salt	2.5
Butyric acid	0.0
Antibiotics	0.0
Soya oil	23.0
TOTAL	1000.0
Calculated Nutrients	
ME Kcal/kg	2811.23
Fat g/kg	35.264
Crude fibre g/kg	43.41
Calcium g/kg	11.6283
Total phosphorus g/kg	8.9417
Non-phytate P, g/kg	5.0627
Ca:NPP	2.298083

Composition of premix per kg of diet: Vitamin A, 12500 I.U; vitamin D3, 255000 I.U; vitamin K3, 2mg; vitamin B1, 3mg; vitamin B2, 5.5mg; calcium pantothenate, 11.5mg; vitamin B12, 0.025mg; choline, chloride, 500mg; folic acid, 1mg; biotin, 0.08mg; manganese, 120mg; iron, 100mg, zinc, 80mg; copper, 8.5mg; iodine, 1.15mg; cobalt, 0.3mg; selenium, 0.12mg; anti-oxidant, 120mg. Over the top inclusion of 0.2, 2 and 4 were added for antibiotics, 0.2% butyric acid and 0.4% butyric acid respectively.

Parameters to Be 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 Weight

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.

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

RESULTS

The result on the influence of butyric acid supplementation on the performance of turkey poult as shown in Table 1, Initial weight of birds on antibiotic supplemented diet was ($p < 0.05$) significantly higher than the control, 0.2 and 0.4% butyric acid supplemented diets. Final weight and weight gain of birds on the control and antibiotic supplemented diet were similar ($p < 0.05$) and significantly higher

than those on 0.2 and 0.4% butyric acid supplemented diets. Birds on the control, antibiotic supplemented and 0.2% butyric acid supplemented diet consumed more feed than those on 0.4% butyric acid supplemented diet

Table 1: Effect of Butyric Acid Supplementation on Performance and Cost Analysis of Turkey Poults (1 – 28 days)

Parameters	T1	T2	T3	T4	SEM
Initial weight(g/bird)	43.48 ^b	44.97 ^a	43.89 ^b	43.06 ^b	0.44
Final weight(g/bird)	350.27 ^a	360.07 ^a	315.41 ^b	309.71 ^b	11.19
Weight gain(g/bird)	306.79 ^a	315.09 ^a	271.52 ^b	266.65 ^b	11.12
Feed intake(g/bird)	734.58 ^a	746.07 ^a	694.76 ^a	629.64 ^b	31.25
FCR	2.40	2.37	2.56	2.36	0.15

Means within the same row with the same superscript are not significantly different ($p>0.05$). T1 – Control (basal diet); T2 – basal diet + antibiotics fed for 21 days; T3 – basal diet + 0.2% butyric acid fed for 21 days; T4-basal diet+ 0.4% FCR=Feed Conversion ratio. SEM – Standard Error of Mean

The results of this present 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.

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 gut integrity of turkey poults.

Following the trend of this study, further research is needed to better ascertain the best inclusion level in turkey nutrition for optimal productivity. Also, further work can be carried out to finisher phase.

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