

## Effect of Different Level of Butyric Acid Glycerides on Performance and Serum Composition of Broiler Chickens

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**Abstract:** An experiment was conducted to evaluate the effects of various levels and forms of butyric acid glycerides (BaBy C<sub>4</sub>) on performance and serum composition of broiler chickens. In this study which was carried out for 42 days there are five treatments, at first 350 day old broiler chicks were divided to 25 groups of 14 chicks each. Each 5 groups randomly assigned to one of the 5 treatments. Experimental groups included (T1), control group, (T2), Using powder form C<sub>4</sub> containing 0.2%, 0.3% respectively days 1-7, 7-21 (3), Using oily form C<sub>4</sub> containing 0.2%, 0.3%, respectively days 1-7, 7-21 (4), Using powder form C<sub>4</sub> containing 0.2% days 1-28 (5), Using oily form C<sub>4</sub> containing 0.2% days 1-28. Using powder form of C<sub>4</sub> (groups of 2 and 4) as compared to control group and groups fed oily from C<sub>4</sub> observably to give improve gain in all of the experimental (P<0.05). Chicks fed diet containing 0.3% oily form of C<sub>4</sub> had the lowest daily feed intake (P<0.05). Average of FCR, carcass yield, percentage of abdominal fat and bursa weight ratio body weight were not significant between all groups. According to the results feeding diets containing and 0.2% powdery form of C<sub>4</sub> from days 1-28 of rearing period can improve performance in broiler chicks. Total cholesterol (Chol), triglyceride (TG), HDL, LDL and VLDL were measured in blood samples of day 42. The amount of total Chol and LDL in the serum did showed a significant differences, but TG, HDL and VLDL were not significantly different among groups.

**Key words:** Broiler Chickens • Butyric Acid Glycerides • Performance • Serum cholestol

### INTRODUCTION

Organic acids and their salts are generally regarded as safe (GRAS) and have been approved. EU to be used as the feed additives in animal production. The use of organic acids has been reported to by most member states of protect the young chicks by competitive exclusion. Probiotic, oligosakarids, vegetable products and organic acids are identified of such replacements. From among different organic acids, short chain organic ones such as butyric acids are of high importance in the order to their antibiotic & positive effects on digestive system. Butyric Acid Glycerides are considered as potential alternatives to antibiotic growth promoter [1-4].

Some advantages of using butyric acid can be mentioned such as its vital role as energy source for absorptive cells and its effect on growth regulation of poultries' gut lymphatic tissues [5]. Also, because of

butyric acid's profitable effects on digestive systems of broiler chickens its consumption will improve their performances [2]. Van Immerseel *et al.* [6] had reported considerable decrease in salmonella antritis level in broiler chickens via feeding butyric acid. On the other hand it is proven only 0.5% of total free butyric acids in poultry dietary is absorbed in gut in the case that major part of it quickly disappears in crop & cannot put its efficacy into use [7]. Because of volatility & quick adsorbent in crop, this acid cannot be added to dietary in free form. Utilizing resistant butyric acid along glycerides causes butyric acids to reach follower parts and exercise there [6]. Reports show that adding 0.2% glycerides of butyric acid in dietary of broiler chicks till 21 days old shows 57 grams improvement in their weigh at the end of rearing period [8]. Leeson declared that adding this 0.2% acid leads to significant gaining of metabolic energy in days 9-12, carcass improvement and increase of breast

productivity. Also improve the digestibility of proteins, calcium and other composition and serve as substrates intermediary metabolism [6] in the In addition, when chicks are contaminated with coccidia of butyric acid's glycerides, they will show great resistance [2, 9]. This research compares supplementation of various levels & forms (powdery & oily) of butyric acid glycerides in dietary according to the performance and serum composition in broiler chicks.

## MATERIALS AND METHODS

In this experiment which was carried out for 42 days that there are five treatments, at first 350 day old broiler chicks were divided to 25 groups of 14 chicks each. Each 5 groups randomly assigned to one of the 5 treatments. Thus, amounts forementioned to basal diet was formulated according to table 1. Experimental groups included, 1. Control group 2. Using powder form C4

Table 1: Ingredients and chemical analyses composition of the starter and grower diets

Ingredients (g/kg)	1-28	29-42
Maize	557	300
Wheat	--	330
Soybean meal	370	300
Soybean oil	30	40
Fish meal	20	--
Limestone	10	--
Oyster shell	--	12
Dicalcium phosphate	5	15
Vitamin-mineral mix <sup>2</sup>	5	5
dl-methionine	1	1
Sodium chloride	2	2
Vitamin E (mg/kg)	--	100
Zn	--	50
Analyzed chemical composition (g/kg)		
Dry matter	892.2	893.5
Crude protein	222.3	200.7
Fat	62.4	62.9
Fiber	36.1	35.6
Ash	61.7	57.0
Calcium	8.22	8.15
Phosphorus	5.48	5.57
Selenium (mg/kg)	0.53	0.58
ME by calculation (MJ/kg)	12.78	12.91

<sup>1</sup> starter diet fed to birds from 0 to 21 days. <sup>2</sup>Provides per kilogram of diet: vitamin A, 9,000 IU; vitamin D3, 2,000, IU; vitamin E, 18 IU; vitamin B1, 1.8 mg; vitamin B2, 6.6 mg B2; vitamin B3, 10 mg; vitamin B5, 30 mg; vitamin B6, 3.0 mg; vitamin B9, 1 mg; vitamin B12, 1.5 mg; vitamin K3, 2 mg; vitamin H2, 0.01 mg; folic acid, 0.21 mg; nicotinic acid, 0.65 mg; biotin, 0.14 mg; choline chloride, 500 mg; Fe, 50 mg; Mn, 100 mg; Cu, 10 mg; Zn, 85 mg; I, 1 mg; Se, 0.2 mg.

containing 0.2%, 0.3% respectively days 1-7, 7-21 3. Using oily form C4 containing 0.2%, 0.3% respectively days 1-7, 7-21 4. Using powder form C4 containing 0.2% days 1-28 5. Using oily form C4 containing 0.2% days 1-28.

**Performance Parameters:** During days 0-42, unbound water and dietary was in poultries' access. Dietary and chick weigh were going on weekly. At the end of experiment, some analyses was done via SAS[10] (Statistical Analyses Software) in the statistical level of 5% according to data gathered from dietary, weight improvement, average of FCR, weight of rearing period and carcass yield.

**Measurement of Serum Indices:** On 42 day of experimental period, 3 ml of blood was collected from brachial vein from one bird of each pen (from four birds of each treatment). Serum was isolated by centrifugation at 3,000×g for 10 min. The serum concentrations of total triglyceride, cholesterol, high density lipoprotein (HDL) cholesterol and low density lipoprotein (LDL) ratio in serum samples were analyzed by an automatic biochemical analyzer (Clima, Ral. Co, Spain). VLDL cholesterol was calculated from triglycerides by divided the factor 5 [11].

## RESULTS AND DISCUSSIONS

Table 2 shows the effect of different dietary levels and forms of butyric acid glycerids (BaBy C<sub>4</sub>) on performance of boiler chickens. According to comparisons of this table it has been proven that using powder form of C4 (groups of 2 and 4) as compared to control group observably to give improve gain in all of

Table 2: The effect of different dietary levels & forms of butyric acid glycerides on the performance of broiler chicks during days 0-42

Experiment Treatments <sup>1</sup>	Weigh Improvement	Dietary (G)	Average of FCR	Average of Weight
T1	41.7 <sup>ab</sup>	87.5 <sup>ab</sup>	1.83	1990.2 <sup>ab</sup>
T2	43.2 <sup>a</sup>	86.7 <sup>ab</sup>	1.92	2061.3 <sup>a</sup>
T3	37.9 <sup>c</sup>	78.1 <sup>c</sup>	1.88	1810.5 <sup>c</sup>
T4	42.7 <sup>a</sup>	89.7 <sup>a</sup>	1.81	2026.1 <sup>a</sup>
T5	38.6 <sup>bc</sup>	82.4 <sup>bc</sup>	1.93	1869.8 <sup>bc</sup>
SE	0.64	.98	0.04	39.7

Experiment Treatments include: 1. Control group 2. Using powder form C4 containing 0.2%, 0.3% respectively days 1-7, 7-21 3. Using oily form C4 containing 0.2%, 0.3% respectively days 1-7, 7-21 4. Using powder form C4 containing 0.2% days 1-28 5. Using oily form C4 containing 0.2% days 1-28. a-c Means with in columns with different superscript differ significantly

Table 3: The effect of different dietary levels & forms of butyric acid glycerides (BaBy C<sub>4</sub>) on carcass yield of broiler chickens at 42 days old

Experiment Treatment <sup>1</sup>	Carcass Yield	Abdominal Fat	Bourse
T1	68.61	1.92	0.08
T2	67.72	1.96	0.08
T3	67.83	2.13	0.09
T4	67.63	1.79	0.07
T5	69.15	1.85	0.09
SE	0.074	0.045	0.005

Experiment Treatments include: 1. Control group 2. Using powder form C<sub>4</sub> containing 0.2%, 0.3% respectively days 1-7, 7-21 3. Using oily form C<sub>4</sub> containing 0.2%, 0.3% respectively days 1-7, 7-21 4. Using powder form C<sub>4</sub> containing 0.2% days 1-28 5. Using oily form C<sub>4</sub> containing 0.2% days 1-28.

a-c Means with in columns with different superscript differ significantly

Table 4: Effect of Butyric Acid supplementation on serum constituents of broiler chicken

Experiment	Total				
Treatments <sup>1</sup>	cholesterol	HDL	LDL	VLDL	Triglycerides
T1	172.5a	57.23	78.12 <sup>a</sup>	36.11	154.71
T2	131ab	60.12	34.22 <sup>ab</sup>	28.12	132.56
T3	115c	65.65	20.12 <sup>c</sup>	26.12	124.85
T4	138ab	62.43	38.64 <sup>ab</sup>	29.65	135.26
T5	121c	64.19	22.02 <sup>c</sup>	24.81	129.26
SE	5.30	3.21	5.01	2.44	14.06

Experiment Treatments include: 1. Control group 2. Using powder form C<sub>4</sub> containing 0.2%, 0.3% respectively days 1-7, 7-21 3. Using oily form C<sub>4</sub> containing 0.2%, 0.3% respectively days 1-7, 7-21 4. Using powder form C<sub>4</sub> containing 0.2% days 1-28 5. Using oily form C<sub>4</sub> containing 0.2% days 1-28. a-c Means with in columns with different superscript differ significantly

the experimental (0-42 days) and body weight in the end of the experimental. Moreover average daily weight gain during days 0- 42 and live body weight at day 42 for chicks fed powdery form of C<sub>4</sub> (groups 2 and 4) had better than control group and significantly ( $P<0/05$ ) higher than groups fed oily form of C<sub>4</sub> (groups 3 and 5). Chicks fed diet containing 0.3% oily form of C<sub>4</sub> had the lowest daily feed intake ( $P<0/05$ ). Average of FCR, carcass yield, percentage of abdominal fat and bursa weight ratio body weight were not significant between all groups. Result of this experiment corresponds with consequences reported from Antongiovanni et.al [8] and Leeson *et al.* [2].

The mean values of serum constituents in broiler chicken fed butyric acid supplemented diets are shown in table 4. The serum total cholesterol and LDL concentration were significantly reduce by dietary

treatment compared to the control group also between groups dieted with oily and powdery form of C<sub>4</sub> ( $P<0/05$ ). Supplementation of butyric acid showed no significant difference in the concentration of serum HDL, VLDL and Triglycerides among all the treatment groups including the control group confirming the earlier findings [12,13]. Positive effects of powdery butyric acid glycerides on the performance of chicks return possibly to improvement of digestion and adsorbent of nutrient such as protein. Furthermore, some organic acids can increase digestion and absorbent of nutrient along decreasing pH of digestive system, creating suitable bacterial fluorine & also increasing pancreas enzymes secretion. Electrolyte balance of dietary & gut, increasing absorbent of calcium, phosphorus, magnesium, zinc and controlling pathogenic factors positive effect of organic acids on performance of broiler chickens [5]. In conclusion, dietary organic acids may be exploited as growth promoters in the broiler chicken as in the present study they had positive outcome on the performance, irrespective of the type and level of acid used, possibly because of their beneficial antimicrobial effect apart from positive impact on serum composition.

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