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Comparative effect of Achillea and Butyric Acid on Performance, Carcass traits and serum composition of broiler chickens

Jafar Pish Jang

Department of Animal Science, İslamic Azad University, Maragheh Branch, Iran

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ABSTRACT

This study has investigated the effects of addition ofachillea and butyric acid on performance and serum composition of broiler chickens. In this study that starts 1 day following until 42 days there are four treatments, at first 225 day old broiler chicks were divided to 15 groups of 15 chicks each. Each 3 groups randomly assigned to one of the three treatments. Experimental groups included.G1, control group. G2,butyric acid glycerides (BaBy C4) containing 0.2%.G3,fed by basal diet plus 2 gr/Kg achillea. According to the results,the best result for FCR and weight gain was in G2 also the highest percent of liver and breast was observed in experimental group 3. But the highest level of food intake and the lowest level of abdominal fat were seen in the group 3. Also the serum total cholesterol,, total cholesterol (Chol), triglyceride (TG),HDL,LDL and Glucose were measured in blood samples of day 42.The amount of total Chol, TG and LDL in the serum did showed a significant differences in groups 2 and 3, but HDL and Glucose were not significantly different among groups.

Key words: Achillea, Cholesterol, Broiler, Butyric Acid, Breast.

INTRODUCTION

There are a lot of advantages in using medicinal plants such as easy usage, non side effects, no waste particulars in the target body and etc. Several compounds like, enzymes, organic acids, probiotics, and phytogenics are used to improve the performance [1-2]. Recently, aromatic plants, and their associated essential oils or extracts are being concerned as potentially growth promoters. At present the scientists are working to improve feed efficiency and growth rate of livestock using useful herbs [3].Organic acids and plant extracts areamong the candidates for AGP replacement.In poultry production, organic acids havebeen studied as a tool to reduce unwanted bacteria [4], and formic acid in particular has beenshown to be particularly effective against Escherichiacoli [5].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 and positive effects on digestive system. Butyric Acid Glycerides are considered as potential alternatives to antibiotic growth promoter [6-7].Butyric acid therefore appears to be both bactericidaland a stimulant of villi growth. As with any short-chainfatty acid, bactericidal activity of butyric acid is greatestwhen the acid is undissociated.Several researchers [8-10] have investigated the beneficial effects of feeding microbial culture on poultry as a possible alternative to antibiotics for growth promotion and improvement of feed efficiency.

The objective of this study was to investigate the interaction effects of supplementation of achillea and butyric acid on the performance, carcass traits and blood chemistry of broiler chickens under commercial conditions.

MATERIALS AND METHODS

In this study that starts 1 day following until 42 days there are four treatments, at first 225 day old broiler chicks were divided to 15 groups of 15 chicks each. Each 3 groups randomly assigned to one of the three treatments. Experimental groups included.G1,control group. G2,butyric acid glycerides (BaBy C4) containing 0.2%.G3,fed by basal diet plus 2 gr/Kg achillea.

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

Ingredients (g/kg)	1-28[1]	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[2]	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

[1] starter diet fed to birds from 0 to 21 days.[2]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.

Performance parameters

During days 0-42, unbound water and dietary was in poultries' access. Dietary and chick weigh were going on weekly. Feed consumed was recorded daily, the uneaten discarded, and feed conversion ratio (FCR) was calculated(total feed : total gain). At the end of experiment, some analyses was done via SAS[11] (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 penpen (from four birds of eachtreatment). Serum was isolated by centrifugation at 3,000×g for 10 min.The serum concentrations of total triglyceride, cholesterol, highdensity lipoprotein (HDL) cholesterol and low-density lipoprotein (LDL) ratio in serum samples were analyzedby an automatic biochemical analyzer (Clima, Ral. Co, Espain).

RESULTS AND DISCUSSION

According to the table 2, the best result for FCR and weight gain was in G2 andthe highest level of food intake was seen in the group 3. According to comparisons of this table it has been proven that two-way interaction between dietary treatments were observed for Weigh Improvement ($P<0.05$), Dietary ($P<0.01$) Average of feed conversionRatio(FCR)($P<0.01$) in the experiment.Free butyric acid is absorbed very quickly inthe upper digestive tract, and will likely be of limiteduse other than as a feed sanitizer. By inference, butyrateneeds to be stabilized, and hence the testing of butyrateglycerides used in this study.[12].Runho et al. [13] reported that the dietary addition of fumaric acid did not affectBWG of broilers but did improve FCR. Moreover,Herna´ndez et al. [14] failed to observe any effect on the performance of chickens whenformic acid (5,000 or 10,000 ppm) was addedto the feeds. Nevertheless, the experiment wasperformed under ideal conditions of experimentation,which could explain the lack of effectsobserved, because the growth-enhancing effectsof antimicrobial additives become apparentwhen chickens are subjected to suboptimal conditions,such as a less digestible diet or a lessclean environment. In addition, AGP exert nobenefits on the performance of germ-free animals,an aspect that clearly points to their effectas being one of antimicrobial activity rather thanbeing caused by direct interaction with the physiologyof the animal [15].

Table 3 shows the effect of achillea and butyric acid on carcass and it's parameters. The lowest percentage of abdominal fat was in G3 and the highest percent of breast and liver were in the 2group.Some advantages of using butyric acid can be mentioned such as its vital role as energy source for absorptive cells & its effect on growth regulation of poultries' gut lymphatic tissues[16]. Also, because of butyric acid's profitable effects on digestive systems of broiler chickens its consumption will improve their performances [17]. Van Immerseel et.al [18] had reported considerable decrease in salmonella antritidis 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 [19]. Because of volatility & quick adsorbent in crop, this acid cannot be added to dietary in free.

As compared the group fed butyric acid glycerides (BaBy C_4) with control group observably to give improve gain in all of 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 (BaBy C_4) (P<0/05). Result of this experiment corresponds with consequences reported from Antongiovanni et.al [20] and Leeson et.al [18]. Positive effects of powdery butyric acid glycerids 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 and also increasing pancreas enzymes secretion. Electrolyte balance of dietary and gut, increasing absorbent of calcium, phosphorus, magnesium, zinc and controlling pathogenic factors positive effect of organic acids on performance of broiler chickens [22].The mean values of serum constituents in broiler chicken fed different supplemented diets are shown in Table 4.The serum total cholesterol, total cholesterol (Chol), triglyceride (TG),HDL,LDL and Glucosewere measured in blood samples of day 42.The amount of total Chol, TG and LDL in the serum did showed a significant differences in groups 2 and 3, but HDL and Glucose were not significantly different among groups.

Table 2: Effects of treatments on performance of broilers.(1-42 day)

Treatment	Weight gain (gram/day)	Feed Intake (gram/day)	FCR
G1	38.23^{a}	78.01^{a}	1.89^{a}
G2	39.99^{ab}	79.89^{ab}	1.74^{ab}
G3	38.97^{a}	80.16^{ab}	1.82^{a}
SEM	1.3	2.7	0.65

a-bMeans with different subscripts in the same column differ significantly (P < 0.05)

Table 3. The effect of different levels of treatments on carcass traits of broilers

Parameters	G1	G2	G3	SEM
Abdominal Fat	3.88^{a}	3.84^{a}	3.55^{ab}	0.31
Gizzard	3.29^{a}	3.26^{a}	3.28^{a}	0.45
Breast	32.08^{a}	34.33^{ab}	33.12^{a}	0.26
Thigh	26.65^{a}	26.19	26.46^{a}	1.46
Liver	3.17^{a}	3.83^{ab}	3.20^{a}	0.30

a-bMeans with different subscripts in the same column differ significantly (P < 0.05)

Table 4. The effect of different levels of treatments on blood biochemical of broilers

	Treatments			
Blood Parameters	G1	G2	G3	SEM
Glucose (mg/dl)	171.36	171.15	171.35	4.34
Cholesterol (mg/dl)	135.65	131.10^{ab}	131.72^{ab}	3.09
Triglyceride (mg/dl)	41.12^{a}	38.13^{ab}	40.21^{a}	1.61
LDL	32.10^{a}	29.22^{ab}	30.42^{ab}	1.73
HDL	78.55	79.29	78.39	1.91

a-bMeans with different subscripts in the same column differ significantly (P < 0.05)

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