

DIETARY SUPPLEMENTATION OF TURMERIC OIL (*Curcuma longa*) AND GARLIC POWDER (*Allium sativum*) ON THE GROWTH PERFORMANCE COMMERCIAL BROILER

Ilaya Bharthi D, P Shamsudeen, D Kannan and M Anandhi
College of Poultry Production and Management, TANUVAS, Hosur

Abstract: The present study was aimed to investigate the dietary effect turmeric oil, garlic powder and its combination on the performance of commercial broiler chicken. Five experimental rations designated as T0-Basal diet without antibiotic, T1- basal diet with antibiotic(400g/ton), T2- Turmeric oil (0.5 lt/ton), T3 - garlic powder (400 g/ton) and T5- Turmeric oil with garlic powder were fed to 120 commercial broiler chicks, randomly distributed into all 5 treatments (3 replicates per treatment). Average weight gain, feed consumption, feed efficiency and survivability were used as criteria of response to feeding. Based on the results of the present study it maybe concluded that turmeric and garlic or their combination maybe safely used in broiler diet as a replacement for antibiotic growth promoters with no significant loss in body weight gain.

Keywords: Broilers, Turmeric oil, Garlic , Production performance.

INTRODUCTION

Antibiotic resistance remains a major threat in animal farming. One solution is to implement a ban on using antibiotics as antimicrobial growth promoters (AGP) for farm animals, which makes it imperative to find effective alternatives to antibiotics to sustain the efficiency of current production. Among the alternatives, essential oils have a great potential. The essential oils are generally considered natural, less toxic, and free from residues when compared with antibiotics (Gong et al., 2014).

Turmeric is a member of Zingiberaceae family and contains curcumin, demethoxycurcumin, bisdemethoxycurcumin and tetrahydrocurcuminoids as active constituents (Kiuchi *et al.*, 1993). Antioxidant, anti-inflammatory and nematocidal activities of turmeric and their relative constituents have been demonstrated (Kiuchi *et al.*, 1993). Studies have shown that supplementation of broiler diets with turmeric enhance their performance (Durrani *et al.*, 2006). Meat quality could be influenced via the dietary supplementation of essential oils by being integrated in meat to modify the fatty acid profile of meat or to change the oxidative stability of meat and meat products (Wenk, 2003), or by being directly applied to meat products.

Garlic (*Allium sativum* L) is bulbous vegetable, well known spice and medicinal plant, which belongs to the family *Liliaceae* and genus *Allium* (Simon and Jenderek, 2003). Garlic has a special place because of its broad spectrum of action and availability to poultry farmers (Fadlalla et al., 2010). These features are the result of the actions of bioactive compounds that are contained within (Suriya , 2012), the most important of which are organic sulphurous compounds aliin, allicin, ajoene and allylpropyl disulphide and diallyl trisulphide, sallylcysteine and others (Mansoub, 2011).

MATERIAL AND METHODS

Location of the study

The experiment was conducted at the College of Poultry Production and Management, Hosur, Tamilnadu – 635110 wherein a temperate climate prevails. The day-old chicks were reared at brooder house to adjust with the environmental condition up to 7 days.

Birds, diets and management

A total of 120 newly-hatched straight run broiler chicks were purchased from a renowned commercial hatchery and randomly allocated into 5 treatments of 24 each so as to have 3 replicates per treatment and 8 chicks per replicate. Five experimental rations designated as: T0-Basal diet without antibiotic, T1- basal diet with antibiotic (400g/ton), T2- Turmeric oil(0.5 lt/ton), T3 - garlic powder (400 g/ton) and T5- Turmeric oil with garlic powder. All chicks were fed a corn-soybean based diet (Table 1) daily for 35 days of experimental period in three phases viz. Prestarter (0-7 days), Starter (8-21 days) and Finisher (22-35 days). Feed and water were provided *ad lib* and chicks had access to light according to a 23L/1D program. All chicks were vaccinated against Newcastle disease at seven and 21 days, Infectious Bursal disease on 14th day by eye-drop method.

Table 1. Composition of the experimental diets fed to broilers

Feed ingredients	Amount (kg/100kg feed)		
	Pre starter	Starter	Finisher
Maize	50	57	60
Soyabean meal	43	35.00	30.00
Salt	0.35	0.60	0.20
DCP	0.8	1.50	2.00
Calcite	1.8	1.70	1.20
Vegetable oil	3.5	4.00	7.00
Lysine	0.22	0.28	0.25
Methionine	0.33	0.50	0.25

Parameters studied

During the experimental period (5-weeks), growth performance, body weight, live weight, feed efficiency of the birds was evaluated. Feed conversion ratio (FCR) was calculated as the total feed consumption divided by weight gain in each replicate. Survivability percentage was calculated as the total broilers survived divided by the number of starting birds multiplied by 100.

Data analysis

Data on different variables were subjected to analysis of variance (ANOVA) in a Completely Randomized Design (CRD), (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Body weight

Body weight of day-old broiler chicks fed on different dietary treatment was similar (Table 2). High body weight were recorded in groups feed with antibiotic (T1) throughout the rearing period though the recorded body weight does not show any significant differences statistically. These findings are in concurrence with the results of Namagirilakshmi (2005), who stated that broiler fed on turmeric either at 0.25, 0.50, 0.75 or 1% level did not significantly affect body weight gain. The results of the study showed reduced body weight by the end of the study period which maybe due to exclusion of growth supplements and additives throughout the rearing period.

Table 2. Performance of the broiler chickens fed the experimental diets

	o day	1 week	2 week	3 week	4 week	5 week
		112.73 ^a	270.87 ^{ab}	511.20 ^a	1001.47 ^a	1299.40 ^a
T0	47.87 ^a ±1.19	±3.24	±11.44	±26.42	±66.35	±101.25
	47.83 ^a	113.13 ^a		522.20 ^{ab}	1142.47 ^b	1468.80 ^b
T1	±1.45	±4.60	255.80 ^a ±7.99	±24.50	±52.61	±63.11
	48.13 ^a	108.40 ^a		489.27 ^a	984.87 ^a	1382.07 ^c
T2	±1.60	±4.18	216.33 ^b ±11.20	±22.35	±58.00	±69.94
	48.20 ^a	109.13 ^a	246.13 ^a	461.40 ^a	979.60 ^a	1267.27 ^a
T3	±1.02	±3.77	±10.59	±22.62	±57.66	±72.91
	43.93 ^a	117.93 ^a	244.80 ^a	410.07 ^b	921.67 ^a	1224.47 ^a
T4	±1.17	±3.38	±14.07	±19.68	±46.64	±69.20

Means bearing same superscripts are statistically similar

Feed Intake and feed Conversion

The feed intake indicates that T2 had the least feed consumption (2188.80 kg per bird) and conversion (1.58) which were statistically significantly ($P < 0.05$) with all the other treatment groups (Table 3). Though the recorded body weight in the treatment group T3, T4, T5 does not show significant variation among the other treatment group the feed intake and feed conversion were statistically different ($P < 0.05$). Best FCR was recorded in T3 with supplementation of Turmeric oil followed by T2 (1.70), T3 (1.82) and T4 (1.85). The significant increase in feed conversion in turmeric oil group may be due to antioxidant activity of turmeric and also better absorption due to increased gut enzyme secretion. The results was in agreement with the findings of Durrani et al., 2006, Raghdad and Al-Jaleel, 2012 and Samarasinghe et al., 2003. Liveability of broilers on different dietary treatments was good during the study period.

Table 2. Weekly feed consumption and feed conversion and of the broiler chickens fed the experimental diets

	Feed consumption / bird/ week					Total feed Consumed	FCR	Liveability%
	1 week	2 week	3 week	4 week	5 week			
T0	107.76	305.28	542.17	742.00	732.00	2429.21 ^a	1.87 ^a	92.00
T1	112.20	346.04	553.64	622.00	856.00	2489.88 ^a	1.70 ^a	100.00
T2	102.00	295.00	525.40	540.40	726.00	2188.80 ^b	1.58 ^b	96.00
T3	106.00	317.00	548.04	600.00	735.60	2306.64 ^c	1.82 ^{ac}	96.00
T4	111.00	331.00	539.88	560.40	724.00	2266.28 ^d	1.85 ^{ac}	96.00

Means bearing same superscripts are statistically similar

Based on the results of the present study it maybe concluded that turmeric and garlic or their combination maybe safely used in broiler diet as a replacement for antibiotic growth promotes with no significant loss in body weight gain. Further turmeric and garlic or their combination improved feed conversion ratio in the broilers thereby increasing the profitability of broiler farming.

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