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Effect of Supplementing Different Levels of Chamomile Oil on Broiler Performance and Some Physiological Traits

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Abstract: This study was conducted at the poultry farm, Animal Resources Department, University of Baghdad, College of Agriculture, to study the effect of inclusion different levels of chamomile oil on broiler performance. Two hundred and twenty five day-old (cobb) broiler chickens were allocated randomly to five dietary treatments from 7-38 days of age, with three replicate pens (15 birds/pen/per treatment). The experimental diets were as follows: control (T1), 100mg chamomile oils/Kg diet (T2), 200mg chamomile oils/Kg diet (T3) 300 mg chamomile oils/Kg diets. (T4) and 400 mg chamomile oils/Kg diets (T5). Essential oil was dissolved in vegetable oil and then gently mixed with the standard diets. Results showed that final live body weight, weight gain and feed conversion were significantly ($p<0.05$) better for T5 than the control. It could be concluded from this study that supplementing broiler diets with essential oil have a beneficial effect on broiler performance and plasma cholesterol and glucose.

Key words: Chamomile oil, broiler performance, physiological traits

INTRODUCTION

Herbs, spice and their extract were already used thousands of years ago in Mesopotamia, Egypt, India, China and Greece, where they were appreciated for their specific aroma and various medicinal properties (Greathead *et al*., 2003). Herbs and spice can be added to feed as dried or parts of the plants and as extract or oils.

Chamomile (Matricaria recutita) is one of the most widely used as well documented medical plants in the world (Salamon, 1992). The use of Chamomile as a medical plant dates back to ancient Greece and Rome. The Egyptians considered the herb a sacred gift from the sun god and used it to alleviate fever and sun stroke. In Europe it is considered a (cure all) and in Germany it is referred to as the Zutraut, meaning “capable of anything” (Berry, 1995). The two most popular variety are Roman Chamomile (Anthemis nobilis) and German chamomile (Matricaria Yecutita); Both are from Compositae family. Chamomile is believed to posses anti-inflammatory, vulnerary, antimicrobial, carmative, sedative, antiseptic, spasmolytic, carminative, antiemetic, antispasmodic properties (Newall *et al*., 1996; Blumenthal, 1998).

Chamomile is used both internally and externally to treat on extensive list of conditions. It is used internally to treat anxiety, hysteria, nightmares, insomnia, convulsions (Martens, 1995). One of chamomile’s main roles is as a multipurpose digestive aid to treat gastrointestinal disturbances including indigestion, diarrhea, anorexia, Chamomile is thought to heal ulcers and act as liver stimulant (Mann, 1986). Blumenthal (1998) recommended chamomile to treat gastrointestinal spasms and inflammatory disease of the gastrointestinal tract. Potentially active chemical constituents of both German and Roman chamomile is quite similar, Both type of chamomile contain trepenoids (α-bisabolol, α-bisabolol oxide A and B, chamazulene) flavonoids (apigenin, luteolin and quercetin), Coumarins) and phenolic acid (Newall *et al*., 1996).

Up to 50% of essential oil of chamomile contains alpha-bisabolol (trepenoid) and is reported to have anti-inflammatory, antibacterial, antimycotic and ulcer-protective properties (Isaal and Thimer, 1975; Szelenyi *et al*., 1979; Issac, 1979 and Yarosh *et al*., 2006). Mckay and Blumberg (2006) reported that chamomile has shown moderate activities *in-vitro* and some of this activity maybe due to its apigenin content which exhibited anti-inflammatory properties (Patel *et al*., 2007). Masteikova *et al*. (2007) stated that the volatile oil has been documented to reduce the serum concentration of urea in rabbits. Flavonoids and coumarins are smooth muscle relaxant (Mann and Staba, 1986). Most of essential oils are recognized as safe (Indresh, 2007). From the literature I have not seen any work that related to chickens at least to my knowledge. Thus the study was conducted to study the effect of supplementing different levels of chamomile oil on broiler performance and some physiological traits.

MATERIALS AND METHODS

This study was conducted at the Poultry Farms, Animal Resources Department, University of Baghdad, College of Agriculture, from April 26th 2011 to may 16th 2011. To evaluate supplementing different levels of chamomile oil

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on broiler performance and some physiological traits. A total of 225 Cobb-500 day-old broiler chicks were assigned randomly to five dietary treatments from 7-35 days of age, with three replicate pens (15 birds/pen). The experimental diets were control (T1), 100mg chamomile oils/Kg diet (T2), 200mg chamomile oils/Kg diet (T3) 300 mg chamomile oils/Kg diets. (T4) and 400 mg chamomile oils/Kg diets (T5). The experimental diets formulated to isocaloric and isonitrogenic according to NRC (1994). Chamomile oil was dissolved in vegetable oil and then gently mixed with the standard diets. The diets were prepared freshly each week from 7-21 days (starter) and from 18-38 days of age were prepared twice a week. The ingredient and chemical composition of the experimental diets are presented in Table 1. Feed and water were provided ad libitum through out the experimental period. Birds were vaccinated against New Castel and Gumboro disease according to their age. Performance criteria includes weekly body weight, weekly body weight gain, feed consumption and feed conversion ratio were measured during the experimental period. At the end of the study, 2 birds whose body weights were close to the group average were selected from each replicate. Blood sample were collected from jagular vein for glucose (Asatoor and King, 1954) and cholesterol (Franey and Elias, 1968) determination. Data were subjected to analysis of variance (SAS, 2001) and significant treatment means were separated by Duncan's multiple range test (1995).

Table 1: Composition of experimental diets

Ingredient%	Starter 1 to 21 days	Grower 21 to 38 days
Yellow corn	50	45
Wheat	12	22
Soybean Meal (48%)	30	25
Protein conc.[1] (40%)	5	5
Sunflower oil	1	1
Dicalcium phosphate	1	1
$CaCo_3$(36%)	1	1
Calculated composition of the experimental diet according to NRC (1994)		
Crude Protein (%)	22	19.98
Metabolized energy (Kcal /Kg)	2906	3004.70
Calcium (%)	0.75	0.75
Available phosphorus (%)	0.42	0.42
Lysine (%)	1.05	1.02
Meth.+Cys. (%)	0.83	0.76
C/P	131.55	150.38

[1]Protein concentrate provide per Kg: 40% crude protein; 2800 Kcal. ME/Kg; 2.7 methionine + cystine; 3% calcium; 3% available phosphorus; 12% crud fat; 25% ash and vitamin and minerals which meet NRC (1994)

RESULTS AND DISCUSSION

Table 2 shows that body weight differ significantly ($p<0.05$) between treatments. Diet containing 400 mg (T5) chamomile oil/Kg had significantly ($p<0.05$) higher weekly body weight than those of the control (T1). Final body weight, birds receiving 400mg chamomile oil/Kg diet had the highest ($p<0.05$) body weight by 12.17% as compared with the control group. While, there were no significant differences between the control and other groups in final body weight.

There are no significant ($p<0.05$) differences in weekly and overall weight gain between the control (T1) and birds receiving 100, 200, 300 mg oil/Kg diet (T2, T3 and T4) (Table 3).

While, birds receiving 400 mg chamomile oil/Kg diets (T5) had significantly higher weekly gain than T1, T2 and T3. Final gain from 2-5 weeks of age indicated that bird receiving 400mg chamomile oil (T5) had significantly ($p<0.05$) higher gain than the other groups. On the average the birds receiving 400 mg chamomile oil/Kg diets (T5) were 12.36% heavier than the control group (T1).

From 2-5 weeks there were no significant difference between the control (T1) and other groups in weekly feed intake (Table 4). Feed consumption for T3 and T5 were numerically higher by 4.27 and 6.05% respectively as compared to the control. The effect of chamomile oil on feed conversion ratio (g. feed/g. gain) is presented in Table 5.

Feed conversion differ significantly ($p<0.05$) between treatments from 3-5 weeks of age. On the average supplementing 400mg chamomile oil/kg diet had better feed conversion ratio. The positive improvement in average live weight, weight gain and feed conversion ratio in treated groups may be related to the active compounds which influence the gastrointestinal ecosystem mostly through growth inhibion of pathogenic microorganisms in the digestive system, increasing production of digestive enzyme, improving utilization of digestion of digestive products and enhancing liver function (Cabuk *et al*., 2003; Hernandez *et al*., 2004; Yarosh *et al*., 2006; Patel *et al*., 2007 and Windisch *et al*., 2008).

The inclusion of chamomile oil at level of 400mg/kg diets resulted in a significant ($p<0.05$) decreased in plasma cholesterol (Table 6). These results were explained by Yassen *et al*., (2003) who illustrated that chamomile have an effect on acetylcholine esterase which is responsible for hepatic cholesterol synthesis in rat liver.

The inclusion of different levels of chamomile oil on plasma glucose was presented in Table 6. The data revealed that there was a significant ($P<0.05$) decrease in plasma glucose as inclusion rate of chamomile oil increased. Birds received 400 mg/kg diet had significantly ($p<0.05$) lower plasma glucose that T1, T2 and T3. This decrease in plasma glucose in T5 could be related to the action of the active compound in chamomile oil.

Table 2: Effect of supplementing different levels of chamomile oil on weekly body weight (g) of broiler chickens

	Control	Chamomile oil mg/kg diet				
Days	T1	T2	T3	T4	T5	Level of significance
14	327.00±9.8	328.88±2.93	317.77±9.09	315.53±2.23	306.85±6.8	N.S.
21	706.83±6.89^{a}	670.00±8.81^{ab}	639.99±13.33^{b}	664.6±7.69^{ab}	699.84±22.53^{a}	*
28	1175.21±41.49^{b}	1150.90±12.23^{b}	1140.00±21.42^{b}	1169.21±14.61^{b}	1283.98±51.60^{a}	*
38	1842.22±71.21^{b}	1928.89±53.93^{ab}	1860.03±73.28^{b}	1907.78±42.34^{ab}	2097.7±51.19^{a}	*

a,b Means in the same raw with different superscripts are significantly (p<0.05) different. N.S.: Non significant.
T1: control; T2: 100mg chamomile oil; T3: 200mg chamomile oil; T4: 300mg chamomile oil; T5: 400mgchamomile oil.

Table 3: Effect of supplementing different levels of chamomile oil on weekly weight gain (g) of broiler chickens from 14-38 days of age

	Control	Chamomile oil mg/kg diet				
Days	T1	T2	T3	T4	T5	Level of significance
14	196.78±11.26	192.72±3.7	191.1±9.09	182.54±2.08	261.0±49.7	N.S.
21	379.83±9.4^{a}	341.11±6.18^{b}	324.44±5.55^{b}	338.73±13.62^{b}	390.32±13.74	*
28	468.37±40.24^{b}	481.1±6.7^{b}	500.0±13.87^{b}	504.6±9.4^{b}	617.13±58.25^{a}	*
38	667.01±39.83	777.77±44.6	721.71±50.52	738.57±40.71	814.04±65.28	N.S.
1-38	1712.00±72.97^{b}	1793.05±51.51^{b}	1734.95±71.81^{b}	1774.45±42.34^{b}	1953.51±95.08^{a}	*

a,b Means in the same raw with different superscripts are significantly (p<0.05) different. N.S.: Non significant.
T1: control; T2: 100mg chamomile oil; T3: 200mg chamomile oil; T4: 300mg chamomile; T5: 400mg chamomile oil.

Table 4: Effect of supplementing different levels of chamomile oil on weekly feed intake (g) of broiler chickens

	Control	Chamomile oil mg/kg diet				
Days	T1	T2	T3	T4	T5	Level of significance
14	315.38±15.38(	380.0±0.00^{b}	313.33±0.00^{c}	389.45±6.12^{ab}	416.35±9.68^{a}	*
21	588.80±22.4	424.44±78.62	473.33±46.18	437.93±52.35	524.28±55.99	N.S.
28	681.11±48.16	808.89±48.89	724.44±24.74	791.11±18.73	705.66±49	N.S.
38	816.66±33.82^{b}	805.55±39.55^{b}	1102.73±31.58^{a}	796.9±9.89^{b}	910.37±56.44^{b}	*
1-38	2401.89±60.33	2418.89±89.9	2509.17±79.93	2415.41±60.09	2556.68±63.14	N.S.

a,b Means in the same raw with different superscripts are significantly (p<0.05) different. N.S.: Non significant.
T1: control; T2: 100mg chamomile oil; T3: 200mg chamomile oil; T4: 400mg chamomile oil; T5: 4oomg chamomile oil.

Table 5: Effect of supplementing different levels of chamomile oil on feed conversion (g feed/g gain) of broiler chickens from 14-38 days of age

	Control	Chamomile oil mg/kg diet				
Weeks	T1	T2	T3	T4	T5	Level of significance
14	1.62±0.17	1.94±0.02	1.82±0.17	2.14±0.06	1.74±0.38	N.S.
21	1.54±0.02	1.23±0.20	1.51±0.13	1.26±0.16	1.33±0.10	N.S.
28	1.45±0.05^{b}	1.68±0.07^{a}	1.45±0.02^{b}	1.56±0.06^{ab}	1.15±0.08^{c}	*
38	1.23±0.05^{ab}	1.03±0.03^{b}	1.41±0.14^{a}	1.51±0.07^{b}	1.12±0.02^{b}	*
1-38	1.46±0.05^{ab}	1.47±0.03^{ab}	1.55±0.03^{a}	1.51±0.06^{ab}	1.33±0.08^{b}	*

a,b Means in the same raw with different superscripts are significantly (p<0.05) different. N.S.: Non significant.
T1: Control; T2: 100mg chamomile oil; T3: 200mg chamomile oil; T4: 300mg chamomile oil; T5: 400mg chamomile oil.

Table 6: Effect of different levels of chamomile oil on plasma cholesterol and glucose of broiler chicks at 38 days of age

	Control	Chamomile oil mg/kg diet				
Parameter	T1	T2 [100]	T3 [200]	T4 [300]	T5 [400]	Level of significance
Cholesterol (mg/100ml plasma)	179±0.14^{a}	171±0.14^{a}	168±0.15^{a}	165±0.19^{ab}	160±0.11^{b}	*
Glucose (mg/100ml plasma)	180±0.13^{a}	178±0.14^{a}	177±0.11^{a}	173±0.13^{ab}	170±0.12^{b}	*

a,b Means in the same raw with different superscripts are significantly (p<0.05) different
T1: Control; T2: 100mg chamomile oil; T3: 200mg chamomile oil; T4: 300mg chamomile oil; T5: 400mg chamomile oil.

In conclusion, the inclusion of chamomile oil at level of 400 mg/kg diet improve broiler performance and plasma cholesterol and glucose.

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