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Effect of Feeding Cumin (*Cuminum cyminum*) on the Performance and Some Blood Traits of Broiler Chicks

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Abstract: This study was conducted to identify the effect of using cumin (*Cuminum cyminum*) on the performance and some blood traits of broilers. Two hundred one day-old unsexed broiler chicks (Arbor-Acres) were divided into four groups of 50 birds each and assigned to four feeding treatments. Group 1 is considered as a control group where there was no addition of *Cuminum cyminum*. Group 2, 3 and 4 involved the addition of 0.5, 1 and 1.5% of *Cuminum cyminum* respectively. The results showed that group 2 and group 3 performed significantly higher ($p<0.05$) in the average live weight, weekly weight gain, feed consumption, mortality rate and feed conversion ratio. Results showed that chicks in treatment 3 developed a significant decrease in the level of cholesterol in blood serum compared to other treatments.

Key words: *Cuminum cyminum*, performance, blood traits

INTRODUCTION

The huge development in poultry industry that interests researchers and rears to find different methods and means to maintain the development and continuity of this industry, to the increase in productive capacity of poultry projects and then increasing the concentration on nutritional and hygienic aspects of birds. This in turn increase birds resistance against different outbreaks which of mortality causes a high economic losses (Siegel, 1995).

One of the methods is to introduce medical plants to poultry through their diets as a nutritional and medical sources for different purposes. Cumin plant is considered as one of these sources because of its nutritional and medical properties. Scientific information from American Ministry of Agriculture has shown that cumin contains most dietary nutrients such as carbohydrates, fat of both saturated and unsaturated fatty acids, proteins. Moreover minerals, vitamins and water. Jazani *et al.* (2008) have indicated the potential use of cumin essential oil for the control of some diseases caused by *Pseudomonas aeruginosa* infections. An antimicrobial activity of cumin ethanol extract that inhibits growth of *lactobacillus, LP plantarum* was detected by Jonas *et al.* (2007). Sema *et al.* (2007); Friedman *et al.* (2004); Dorman and Deans (2000) were able to identify the antimicrobial activity against *E. coli* infections. Ahmed *et al.* (2004) concluded that the addition of animal manure to soil can enhance the essential oils production and improve chemical structure of cumin oil. Many experiments indicated moderate effects of cumin essential oils on inhibiting microbial activity, mainly, G-positive especially from seeds. *Cuminum cyminum* .It has seen that analytical contents are moisture 11.9; protein 18.7; ether extraction 15.0; carbohydrates 36.6; mineral matter 5.8; calcium 1.08; phosphorus 0.49%; iron 31.0 mg/100 g; carotene calculated as vitamin A 870 I.U./100 gm and vitamin C 3.0 mg/100 g.

The seeds on distillation yield a volatile oil (2.0-4.0%) having an unpleasant characteristic odor, spicy and somewhat bitter taste. The oil is colorless or yellow when fresh, turning to dark where it is stored.

Nutritionally, inclusion the broiler diets with cumin seed meal induces an increase in the relative weight of the crop. An improvements in the absorption process as a result of increasing diet fibers was also noticed (Mansoori *et al.*, 2006).

Other researchers proved an increase in body weight , feed conversion ratio; with decreasing in Hematological values (Hb, PCV, RBC) when using 2% of cumin in broiler diets (Ibrahim *et al.*, 2007).

As mentioned above it has become very clear that there is a quite bite of benefits of cumin as a medical and nutritional resource to be used for poultry. This study therefore had came out from the understanding that this medical plant can improve the performance of broiler chicks under our environmental conditions. However the literature is not rich dealing with the subject and we think that further studies are required to quantify and characterize the parameters that involved this field. This study is a trial along this direction.

MATERIALS AND METHODS

A total of two hundred one day old unsexed broiler chicks (Arbor Acres) were divided into 4 groups of 50 birds each and assigned to 4 treatment diets. The experiment was carried out in 42 days. Each treatment group was further more sub- divided into 2 replicates and fed on a starter and finisher diets. Cumin seeds were purchased from local market, grounded separately to a fine powder and then mixed with the basal diet Table 1. Feed and water were provided *ad libitum* during the experiment. In

Table 1: Composition of the basal diets in different periods of the experiment

	Starter	Finisher
Ingredients (%)	1-28 day	29-42 day
Yellow corn	58.0	64.0
Soybean meal (45% protein)	38.0	32.0
*Premix	3.0	3.0
Oil	0.5	0.5
Salt	0.3	0.3
Methionine	0.1	0.1
Lysine	0.1	0.1
Total	100	100
Calculated chemical analysis of the diet		
ME (Kcal/kg)	2850	2900
Crude protein (%)	22.4	20.2
Calcium (%)	0.13	0.23
Avail. Pho. (%)	0.17	0.16
Methionine + Cystine	0.80	0.75
Lysine	1.22	1.15

Premix: (1%) provided the following (per kg of complete diets), 1400IU Vit. A, 3000 IU Vit. D3, 50 mg Vit. E, 4 mg Vit. K, 3 mg Vit. B6, 6 mg Vit. B12, 60 mg niacin, 20 mg pantothenic acid, 0.2 mg folic acid, 150 mg choline, 4.8 mg Ca, 3.18 mg P, 100 mg Mn, 50 mg Fe, 80 mg Zn, 10 mg Cu, 0.25 mg Co, 1.5 mg Iodine

control group the birds were fed the basal diet with no added cumin (T_1). The other three groups(T_2, T_3 and T_4) were given cumin in diets at levels of 0.5, 1 and 1.5% respectively.

Standard management practice (lighting, ventilation and spaces) of commercial broiler production was applied. Chicks were vaccinated against New-castel and infectious Bronchitis diseases.

Average body weights, body weight gains and feed conversion ratios (kg feed/kg gain) for each group were recorded weekly. A number of 4 birds from each group were slaughtered at the end of the experiment. Blood samples was collected from each bird for hematology and serum analysis. Hemoglobin (Hb) concentration, Packed Cell Volume (PCV), Red Blood Cell (RBC) counts, were measured by standard methods (Schalm *et al*., 1975). Cholesterol and uric acid were measured according to the methods of Ellefson and Garaway (1967).

Data were analyzed by using the General, Linear Model procedure of SAS (2002). Duncans multiple ranges test was used to detect the differences at level of ($p<0.05$) among different means (Steel and Torrie, 1980).

Cumin powder is added to this basal at levels of 0.5, 1 and 1.5% in the treatments T_2, T_3 and T_4 respectively.

All nutrients are provided to chicks according to their requirements as shown in NRC (1994).

RESULTS AND DISCUSSION

Body weight changes: Data of broiler chicks body weight, body weight gain and feed conversion ratio are presented in Table 2. Chicks fed diet supplemented with 1% *Cuminum cyminum* had significantly ($p<0.05$) higher weight and body weight gains compared to other treatment groups, followed by group 2 that received a diet with 0.5%, *Cuminum cyminum*. This improvement may be attributed to the biological functions of cumin that are essential for growth (Cowieson *et al*., 2003; Ghazalah *et al*., 2005). Also that may be due to its role as a stimulant, carminative, digestion, anti-microbial properties and the prevention of gastric toxicity (Jones *et al*., 1997; El-Husseiny *et al*., 2002).

The case of depression in the growth which appeared for group 4 when high level of *Cuminum cyminum* (1.5%) was used could be explained as due to the damage to the intestine, liver and kidneys, due to mechanisms by which the plant constituents may cause a damage to body tissues (Ibrahim *et al*., 2007).

Scientific evidence demonstrated that many of these herbs and spices do have medicinal properties that alleviate symptoms and may prevent diseases (Srivastava, 1989; Jalali-Heravi *et al*., 2007). Also the high intake of herbal plant may cause poising due to its strong bitter test.

Cumin is one of the popular spices that regularly used as a flavoring agent and an alternative antimicrobial agent that is safe for human applications (Janahmadi *et al*., 2006).

Finally this improvement in body weight leads to an improvement in feed conversion in treatment 2 and 3 in Table 2, in spite of the low consumption compared with other groups, the fact that this herb plant may provide some compounds that enhance digestion and absorption of some nutrients in the diet.

Table 3 showed the hematological and serobiochemical changes in chicks fed *Cuminum cyminum*, These parameters indicate that the low values are related to the high level of cumin in which a significant decrease is resulted when compared with the control group or low levels of cumin supplementation. In treatment 4 a severe decrease ($p<0.05$) in the above parameters may be due to the high level of cumin used that leads to the damage of the intestines, liver and kidneys. These results suggest that these plants may contain materials involved in the derangement of the haemopoietic process of the body (Ibrahim *et al*., 2007).

The decrease in the level of cholesterol in treatment 3 compared with other groups is expected to be due to the active compound that found in cumin which acts as inhibitors to the active enzyme hepatic 3- hydroxyl-3 methyglutaryl coenzyme A (HMG-CoA) that synthesized the cholesterol (Crowell, 1999). Furthermore this reduction in blood cholesterol could be contributed in some cases to the reduction in some hormones secreted by the cortex of the adrenal glands, which in turn causes the reduction in the secretion of fatty acids from the adipose tissues or the reduction of fat oxidation, which leads to the reduction of the level of fatty acids including blood cholesterol (Ganong, 2005).

Table 2: The effect of added cumin (*Cuminum cyminum*) to the diet on broiler performance for 6 weeks

	Diets			
Parameters	1 Control	2 (0.5%) cumin	3 (1%) cumin	4 (1.5%) cumin
Average body weight (g)	2321.7±41.3[c]	2456.3±38.9[ab]	2560.7±42.5[a]	2410.9±35.4[b]
Average body weight gain(g)	2280.0±40.9[c]	2414.5±39.6[ab]	2518.8±40.6[a]	2369.3±36.3[b]
total feed consumption (g/bird/day)	4491.5±0.91[b]	4321.8±0.86[b]	4382.7±1.02[b]	4833.4±1.42[a]
Feed conversion ratio g.feed/g.gain	1.94±0.03[a]	1.79±0.02[b]	1.74±0.02[b]	2.04±0.01[a]
Mortality rate (%)	7.8[b]	4.1[c]	3.4[c]	10.5[a]
Dressing percent (%) with out edible parts	68.9±2.5[b]	75.6±1.9[a]	77.4±1.3[a]	70.3±1.8[b]

Values are mean±SE. Means within row with no common on letter are significantly different ($p<0.05$)

Table 3: Hematological and Serobiochemical changes in chicks fed *Cuminum cyminum* for 6 weeks

	Diets			
Parameters	1 Control	2 (0.5%) cumin	3 (1%) cumin	4 (1.5%) cumin
Haematological				
Hb (g/dL)	10.2±0.31[a]	9.8±0.38[a]	9.6±0.27[a]	7.62±0.08[b]
RBC (10^6/mm^3)	3.6±0.32[a]	3.5±0.03[a]	2.9±0.2[b]	2.3±0.07[c]
PCV (%)	35.7±0.47[a]	32.6±0.31[b]	31.8±0.41[bc]	29.9±0.35[c]
WBC	23.8±0.15[a]	22.2±0. 2[a]	20.3±0.3[b]	19.6±0.04[b]
H/L ratio	0.29±0.01[a]	0.28±0.02[ab]	0.27±0.03[b]	0.27±0.04[b]
Serobiochemical				
Cholesterol (mg /dL)	149.0±3.5[a]	147.3±4.2[a]	145.6±3.8[b]	148.3±4.1[a]
Uric acid (mg /dL)	4.2±0.3[a]	4.3±0.2[a]	3.9±0.3[a]	5.3±0.7[b]

Values are mean±SE. Means within row with no common on letter are significantly different ($p<0.05$)

This could be explained by the fact that these herbal plants can act as an antioxidant agents for chick diets.

REFERENCES

Ahmed, A., A. ghanbari and M. Gelavi., 2004. Effect of animal manure on quantitative and qualitative yield and chemical composition of essential oil in cumin (*Cuminum cyminum*). J. Iran. Field Crop Res., Vol. 1385.

Cowieson, A.J., T. Acamovic and M.R. Berford, 2003. Supplementation of diets containing pea meal with exogenous enzymes: Effect on weight gain, feed conversion, nutrient digestibility and gross morphology of the gastrointestinal tract of growing broiler chicks. Br. Poult. Sci., 44: 427-437.

Crowell, P.L., 1999. Prevention and therapy of cancer by dietary monoterpenes. J. Nutr., 129: 775s-778s.

Dorman, H.J.D. and S.G. Deans, 2000. Antimicrobial agents from plants: Antibacterial activity of plant volatile oils. J. Applied Microbial., 88: 308-316.

El-Husseiny, O., S.M. Shalash and H.M. Azouz, 2002. Response of broiler performance to diets containing hot pepper and/or fenugreek at different metabolizable energy *leve*/s. Egypt Poult. Sci., 22: 387-406.

Ellefson, R.D. and W.T. Garaway, 1967. Lipds and lipoproteins In: Fundamentals of clinical chemistry, Tietz, N.W. (Ed) Saunders, W.B. Company. Philadelphia, pp: 512-514.

Friedman, M., R. Buick and C.T. Elliotl, 2004. Antibacterial activities of naturally occurring compounds against antibiotic-resistant *Bacillus cereus* vegetative cells and spores *Escherichia coli*, and *staphyloccus aureus*. J. Food Prot., 67: 1774-1778.

Ganong, W.F., 2005. Review of Medical physiology. 16th Edn., Alange Medical Book, pp: 336-338.

Ghazalah, A.A., A.H. Abd El-Gawad, M.S. Soliman and W. Amany Youssef, 2005. Effect of enzyme preparation on performance of broilers fed corn-soybean meal based diets. Egypt Poult. Sci., 25: 295-316.

Ibrahim, I.A., S.M.A. ElB adwi, A.O. Bakhiet, W.S. Abdel Gadir and S.E.I. Adam, 2007. A_9-week Feeding Study of *Cuminum cyminum*. J. Pharmacol. Toxicol., 2: 666-671.

Jalali-Heravi, M., B. Zekavat and H. Sereshti, 2007. Use of gas chromatography-mass spectrometry combined with resolution methods to characterize the essential oil components of Iranian cumin and caraway. J. Chromatogr. A., 1143: 215-226.

Janahmadi, M., F. Niazi, S. Danyali and M. Kamalinejad, 2006. Effects of the fruit essential oil of *Cuminum cyminum* Linn (Apiaceae) on pentyleneterazol - induced epileptiform activity in FI neurons of helix a spersa. J. Ethnopharmacol., 104: 278-282.

Jazani, N.H., M. Zartoshti and S. Shahabi, 2008. Antibacterial Effects of Iranian *Cuminum cyminum* Essential Oil on Burn of *Pseudomonas aeruginosa*. Int. J. Pharmacology.

Jonas, D., M. Skemaite, G. Kirkilaite, R. Vinauskiene, and P.R. Venskutonis, 2007. Antioxidant and Antimicrobial properties of caraway (*Carum carvi L.*) and cumin (*Cuminum cyminm*) extracts. Veterinarija IR Zootechnika T., Vol. 40.

Jones, N.L., S. Shabib and P.M. Sherman, 1997. Capsaicin as an inhibitor of the growth of the gastric pathogen. Helicobacter pylori. FEMS Microbial Lett., 146: 223-227.

Mansoori, B., M. Mehrdad and K.S. Mohammad-Mehdi, 2006. Cumin seed meal with enzyme and polyethelen glycol as an alternative to wheat bran in broiler diets. J. Sci. Food Agric., 86: 2621-2627.

National Research Council (NRC), 1994. Nutrient Requirements of Poultry. 9th Edn., National Academy Press, Washington, DC. of Alletch s 10th Annual Symposium. Nottingham University Press, Notingham, UK.

SAS, 2002. SAS/SATA Users Guide for Personal Computer Release 618 SAS Institute, Inc. Carry, NC., USA.

Schalm, O.W., N.C. Jain and G.H. Carroll, 1975. Veterinary Hematology. 3rd Edn., Lea and Febiger Philadelphia.

Sema, A., N. Dostbil and S. Alemdar, 2007. Antimicrobial Activity of Some Spices Used In The Meat Industry. Bull Vet. Inst. Pulawy, 51: 53-57.

Siegel, H.S., 1995. Stress strain and resistance. Br. Poult. Sci., 36: 3-22.

Srivastava, K.C., 1989. Extracts from tow frequently consumed spices-cumin (*Cuminum cyminum*) and turmeric (*Curcuma longa*) inhibit platelet aggregation and alter eicosanoid biosynthesis in human blood platelets. Prostaglandins leukot Essential Fatty Acids, 37: 57-64.

Steel, R.G.D. and J.H. Torrie, 1980. Principle and Procedure of Statistic 2nd Edn., Mc Grow-Hill book. Co. Inc. New York.