SHORT NOTE

Effect of black cumin seeds (*Nigella sativa* L.) supplementation on broilers performance

Magda Elmahdi Elbushra Ahmed

Department of Animal Production, Faculty of Agriculture, University of Sinnar, Abunaama, Sudan.

Many feed additives including antibiotics are widely used in poultry production and there is increasing concern about antibiotic residues and disease resistance. The use of antibiotics as feed additives is risky due to cross-resistance amongst pathogens and residues in tissues and most antibiotic growth promoters are banned in many countries. This made alternative natural growth promoters and aromatic plants and their essential oils more important due to their antimicrobial effects. Black cumin (BC) (*Nigella sativa* L.) is used to promote health,especially in the Middle East and Southeast Asia, and widely used in traditional medicine .It is a digestive and appetite stimulant (Gilani *et al.*, 2004), antidiarrheal, anthelmintic (Chowdhury *et al.*, 1998), antibacterial (El-Kamali *et al.*, 1998), anti-inflammatory (Al-Ghamdi, 2001), and has antioxidants properties (Mansour *et al.*, 2002). The seeds proximate analysis was 92% DM, 9.2% CP and 73.3% EE. It contains volatile oils (0.5% -1.6%), fixed oils (35.6% - 41.6%) and amino acids (Al-Gaby, 1998). It also contains ascorbic acid, thiamine, niacin, pyridoxine, folic acid (Takruri and Dameh, 1998), esters of fatty acids, free sterols and sternly esters (Menounos *et al.*, 1986). In addition, it contains lipase, phytosterols and sitosterol (Duke, 1992). The volatile oils are carvene, an unsaturated ketone, terpene or dlimonene, (Kapoor, 1990). Pharmacologically active constituents of the volatile oil are thymoquinone, dithymoquinone, thymohydroquinone and thymol (Ghosheh *et al.*, 1999).

This study was carried out at the Department of Animal Production, Faculty of Agriculure, Sinnar University, Abu Naama, Sinnar State, Sudan (2011), to determine the effects of different levels of black cumin on poultry performance to replace antibiotics. The experiment was laid out using a completely randomized design. A total of 160 unsexed one-day-old Ross chicks were used in this study. They were divided randomly into four groups, each with 40 chicks in four replicates (10 chicks/replicate at equal body weight).The first group (the control) was fed basal diets (Table 1),and the other groups received the basal diets supplemented with BC at 1%, 3% and 6% of the diet. They were fed till they were 6 weeks old with starter and finishing periods and the diets contain 23% and 18% CP and 3100 and 3200kcal ME/kg for the starter and finisher, respectively. The diets were formulated according to the nutrient requirements of the broiler chicks. Feed and water were supplied *ad libitum*. The chicks were grown in brooders with raised wire floors and 24 hrs of light.

Table 1. The ingredients of the diets fed to broilers in Abu Naama,Sinnar State,Sudan.

Period	Starter period				Finisher period			
BCS (%)	0	1	3	6	0	1	3	6
Ingredients%								
Sorghum	66.5	66.0	66.0	66.0	67.0	66.5	66.0	66.0
Wheat bran	15.8	15.3	10.3	13.3	15.0	14.5	13.0	10.0
Sesame cake	05.0	05.0	05.0	05.0	07.0	07.0	07.0	07.0
Fish meal	09.0	09.0	09.0	09 .0	06.5	06.5	06.5	06.5
Lysine	00.6	00.6	00.6	00.6	00.1	00.1	00.1	00.1
Methionine	00.1	00.1	00.1	00.1	00.0	00.0	00.0	00.0
Sesame oil	02.2	02.2	02.2	02.2	03.1	03.1	03.1	03.1
Lime stone	00.4	00.4	00.4	00.4	00.9	00.9	00.9	00.9
BCS	00.0	01.0	03.0	06.0	00.0	01.0	03.0	06.0
Salt	00.4	00.4	00.4	00.4	00.4	00.4	00.4	00.4

BCS: Black cumin seed.

Individual body weight was recorded at one day, two, four and six weeks of age. Live weight, body weight gain, feed consumption, feed conversion ratio and protein efficiency ratio were recorded.

The effects of BC on broilers performance is shown in Table 2.

Table 2. Effect of dietary black cumin seeds (BCS) on broiler feed consumption, feed conversion ratio and body weight gain in Abunaama, Sinnar State, Sudan.

Age(week)	a. Feed consumption (g) BCS%			
	0	1	3	6
2	62.47±0.70	59.37±0.72	59.68±0.70	60.10 ±0.71
4	144.86±0.80	146.23±o.72	149.99±0.73	146.13±0.70
6	103.66±0.77	103.80±0.71	104.83±0.66	103.12±o.75
Age(week)	b. Feed conversion ratio BCS%			
	0	1	3	6
2	1.52±0.73	1.48±0.65	1.47±0.70	1.49±0.72
4	2.00±0.66	2.02±0.79	1.86±0.71	2.0±0.70
6	1.82±0.76	1.84±0.73	1.73±0.68	1.84±0.70
Age(week)	c. Daily body weight gain (g) BCS%			
	0	1	3	6
2	41.14±0.67	40.17±0.66	40.59±0.70	40.26±0.74
4	72.54±0.68	72.37 ±0.72	80.61±0.68	71.65±0.71
6	56.84±0.71	56.27±0.70	60.60±0.72	55.96±0.65

Daily feed consumption showed non-significant differences (P≥0.05). Feed conversion ratios were significantly improved by 1% BCS. There were no significant differences between 1%, 3%, 6% BC groups and the control in weight gain.

The effects of black cumin on carcass characteristics are presented in Table 3.

Table 3. The effect of black cumin seeds on carcass characteristic of broilers up to 42 days in Abunaama, Sinnar State, Sudan.

	Black cumin seeds (%)				
	0	1	3	6	Sig.
Live weight	2.41	2.42	2.57	2.38	*
Carcass	738·00	114.65	1.87	1.70	*
Heart	14.68	743·00	14.88	14.82	NS
Liver	49.25	54.18	48.30	48.58	*
Abdominal fat	36.32	36.73	35.93	34.83	*
Thigh	715.83	718.75	775.63	701.75	*
Breast	707.75	710.18	753.83	688.27	*
Wing	182.52	184.60	192.87	179.72	*
Neck	132.28	133.72	148.87	130.62	*

The highest cold carcass weight were obtained in 3% black cumin treatment (p≤0.05). The supplementation of the diets with 3% black cumin seed improved cold carcass weight compared to the control treatment. Similarly, the highest liver, abdominal fat, thigh, breast, wing and neck weights were shown by the 3% black cumin treatment (p≤0.05). There were no significant differences in heart weights between treatments (p≥0.05). Similar feed intake may be due to the birds being kept in a clean environment and fed well-balanced diets.

Denli *et al*. (2004) reported that supplementation with black cumin seed extract did not significantly affect feed intake of quail. Antibiotics are used as growth promoters in poultry for a long time and increased live weight gain, feed conversion ratio and carcass yield (Owens *et al.*, 2004).The positive effects of 3% BC on the performance of broilers may be due to antimicrobial (Gilani *et al.*, 2004), and anthelmintic effects (Chowdhury *et al.*, 1998)). Furthermore, BCS oil has a high antioxidant activity (Badary *et al.*, 2000). Hernandez *et al.*, (2004) reported that the supplementation of essential oils improved apparent wholetract and ileal digestibility of the nutrients. Similar positive effects are reported by Jamroz and Kamel (2002). The positive effects of dietary BC on weight gain and feed conversion ratio could be due to increased efficiency of feed utilization and/or altered carcass composition. Similar studies showed that essential oils blocked the effect of pathogen in the digestive system, improved feed intake, feed conversion ratio and carcass yield (Tucker, 2002). The reason for the lower performance of 2% and 3% BCS groups compared with the 1% BC may be due to negative effects of alkaloids, saponin, volatile oils and other anti- nutritional factors contained in BC tannins. The toxic effects of BC were also emphasized by Zaoui *et al.* (2002). Unfortunately, reports on the value of black cumin seeds in poultry production are limited.

In conclusion, supplementation at 3% BCS in broiler diets significantly improved body weight, feed conversion ratio and carcass yield of broilers after a growing period of 6 weeks and could be used as a natural growth promoter to replace antibiotics in broiler diets.

REFERENCES

Alcicek, A., M. Bozkurt and M. Çabuk. 2003. The effect of essential oil combination derived from selected herbs growing wild in Turkey on broiler performance. South Africa.Journal of Animal Science. 33:89-94.

Al-Gaby, A.M.1998.Amino acid composition and biological effects of supplementing broad bean and corn proteins with *Nigella sativa* (black cumin) cake protein. Nahrung 42:290- 294.

Al-Ghamdi, M.S. 2001. The anti-inflammatory analgesic and antipyretic activity of *Nigella sativa.* Journal of Ethnopharmacology 76:45-48.

Badary, O.A., A.B. Abdel-Naim, M.H.Abdel-Wahab and F.M. Hamada.2000. The influence of thymoquinone on doxorubicin-induced hyperlipidemic nephropathy in rats. Toxicol 143: 219-226.

Chowdhury, A.K.A., A. Islam, A. Rashid and A. Ferdous. 1998. Therapeutic potential of the volatile oil of *Nigella sativa* seeds in monkey model with experimental shigellosis. Phytotherapy Researh 12:361-363.

Denli, M., F. Okan and A.N. Uluocak. 2004. Effect of dietary black seed (*Nigella sativa* L.) extract supplementation on laying performance and egg quality of quail (*Coturnix coturnix japonica*). Journal of Applied Animal Research 26:73-76.

Duke, J.A.1992. Handbook of Phytochemical Constituents of Grass Herbs and other economic Plants. CRC Press, Inc. Florida, USA.

El-Kamali, H.H., A.H. Ahmad, A.S. Mohammad, A.A. M.Yahia, I. El-Tayeb and A. A. Ali. 1998. Antibacterial properties of essential oils from *Nigella sativa seed*. Fitoterapia 69: 77-78.

Gilani, A.H., Q. Jabeen and M. A.U.Khan.2004.Areview of medicinal uses and pharmacological activities of *Nigella sativa*. Pakistan Journal of Biological Science 7: 441-451.

Ghosheh, O.A., A.A. Houdi and P.A. Crooks. 1999. High performance liquid chromatography analysis of the pharmacologically active quinines and related compounds in the oil of the black seed (*Nigella sativa*). Journal of Pharmacological Biomedicine Analysis 19:757-762.

Hernandez, F., J. Madrid, V. Garcia, J. Orengo and M.D. Megias. 2004. Influence of two plant extract on broiler performance, digestibility, and digestive organ size. Poultry Science 83:169-174.

Jamroz, D. and C. Kamel. 2002. Plant extracts enhance broiler performance. In non ruminant nutrition: Antimicrobial agents and plant extracts on immunity, health and performance. Journal of Animal Science 80 (1):41-45.

Kapoor, L.D. 1990. Handbook of Ayurvedic Medicinal Plants.CRC Press, Inc. Boca Raton, Florida, USA.

Mansour, M.A., M.N. Nagi, A.S. El-Khatib and A.M. Al-Bekairi.2002.Effects of thymoquinone on antioxidant enzyme activities, lipid per oxidation and DT-diaphoreses in different tissues of mice: a possible mechanism of action. Cell Biochemistry Function 20:143-151.

Menounos, P., K. Staphylakis and D. Gegiou. 1986. The sterols of *Nigella sativa* seed oil. Phytochemistry 25:761-763.

Owens, B., M.A. Collins and K.J. McCracken. 2004. The effects of different growth promoters and combinations of growth promoters, on the performance and gut histology of broiler chickens. Poultry Science 1:62-63.

Takruri, H.R.H. and M.A.F. Dameh. 1998. Study of the nutritional value of black cumin seeds (*Nigella sativa).* Journal of Science and Food Agriculture 76:404-410.

Zaoui, A., Y. Cherrah, N. Mahassine, K. Alaoui, H. Amarouch and M. Hasar. 2002. Acute and chronic toxicity of *Nigella sativa* fixed oil Phytomedicine 9:69-74.

أثر إضافة بذور الكمون الأسود(*Nigella sativa* L.) على أداء الدجاج اللاحم

ماجدة المهدي البشرى أحمد

قسم الانتاج الحيواني، كلية الزراعة، جامعة سنار، أبونعامة، السودان.

الخلاصة

أجريت الدراسة لتقييم أثر بذور الكمون الأسود كمضاف طبيعي في أعلاف الدجاج اللاحم. أستخدم عدد 160 كتكوت غير مجنس من سلالة روسي عمريوم واحد لفترة 6 أسابيع من العمر. تم تقسيم الكتاكيت عشوائيا إلى أربع مجموعات تجريبية. وشملت كل مجموعة تجريبية 40 كتكوت. المجموعة التجريبية الأولى تمثل الشاهد و تلقت المجموعات من 2-4 العلائق التي تحتوي على مستويات مختلفة من الكمون (1% 3% و 6%) على التوالي. كانت المجموعات التجريبية متساوية تقريبا في وزن الجسم الحي في بداية التجربة. ويمكن تلخيص النتائج كما يلي: لا توجد فروق معنوية في استهلاك العلف اليومي ولكن كانت فروقات معنوية في الزيادة اليومية للوزن بين المعاملات. تغذية الطيور على العليقة التي تحتوي على بذور 1% الكمون الأسود كانت أعلى، تليها الوجبات الأخرى. تم تحسين معدل التحويل بشكل كبير مع 1% بذور الكمون الأسود مقارنة مع الشاهد. وقد لوحظ أن أوزان الذبيحة، الفخذ والصدر، الجناح،والرقبة و الكبد سجلت أعلى قراءات عند إستخدام الكمون الأسود بنسبة 3%. وفقا لذلك، يمكن اعتبارإضافة 3% من بذور الكمون الأسود إلى الوجبات الغذائية، مضاف طبيعي محفز لنمو الدواجن.