

## 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 sterol esters (Menounos *et al.*, 1986). In addition, it contains lipase, phytosterols and sitosterol (Duke, 1992). The volatile oils are carvone, 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 Agriculture, 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 3200 kcal 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			
	0	1	3	6	0	1	3	6
BCS (%)								
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±0.72	149.99±0.73	146.13±0.70
6	103.66±0.77	103.80±0.71	104.83±0.66	103.12±0.75
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 ( $P \geq 0.05$ ). 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 (%)				Sig.
	0	1	3	6	
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 ( $p \leq 0.05$ ). 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 ( $p \leq 0.05$ ). There were no significant differences in heart weights between treatments ( $p \geq 0.05$ ). 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 whole tract 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.

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

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 اللحم. 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% و 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 والكبد سجلت أعلى قراءات عند استخدام الكمون الأسود بنسبة 3%. وفقا لذلك، يمكن اعتبار إضافة 3% من بذور الكمون الأسود إلى الوجبات الغذائية، مضاف طبيعي محفز لنمو الدواجن.