

Study of the effect of black seed and vitamin C on the performance of the growing rabbits

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ABSTRACT

Thirty-six growing V-line rabbits of both sexes, 5 weeks old, with initial weights of 776.66 ± 22.11 g were used for the study. The rabbits were randomly allocated to four treatments groups of 9 rabbits each. Group one fed Basel diet free of feed additives and served as a control group. Group 2 and 3 fed Basel diet with 200 and 400 mg *Black seed* crushed/ kg diet, respectively. Group 4 received control diet, but drinking water supplemented with 200 mg *vitamin C* /L. Results showed that at 13 weeks of age the supplementation of 200 mg *vitamin C* 200 and 400 mg *Black seed*/kg diet brought a significant ($P \leq 0.01$) improvements in final body weight by the value of 5.4, 7.7 and 9.3 %, weight gain by 8.6, 12.3 and 14.7 %, feed conversion ratio by 10.9, 15.1 and 17.9 %, performance index by 16.6, 25.0 and 31.3 % and significantly ($P \leq 0.01$) decreased feed intake by 1.3, 2.7 and 4.3 %, respectively. In conclusion the results showed that addition of black seed or vitamin C in rabbit diets had improved the performance of the growing rabbits

Key words: Rabbits, Black seed, vitamin c , performance.

الملخص العربي

أجريت التجربة لتقدير تأثير إضافة مسحوق حبة البركة وحمض الاسكوريك كمنشطات نمو طبيعية على معدل أداء النمو، على الأرانب V- line النامية. أستخدم 36 أرنب نامى من كلا الجنسين عمر 5 أسابيع ومتوسط وزن ابتدائي 776.67 ± 22.11 جرام تم توزيعها عشوائيا على اربعة معاملات وبكل معاملة 9 أرانب مقسمة الى 3 مكررات كل مكرر 3 ارانب , أستمرت التجربة حتى عمر 13 أسبوع . المجموعة الأولى تناولت عليقة أساسية خالية من الإضافات الغذائية وأستخدمت كمجموعة مقارنة. المجموعتان الثانية والثالثة تناولت عليقة أساسية مضاف إليها بذور حبة البركة المطحونه بمعدل 200 , 400 ملجرام/كيلوجرام على التوالي, المجموعة الرابعة تناولت العليقة الاساسية مع إضافة 200 ملجرام/لتر من فيتامين ج لمياه الشرب . كانت جميع العلائق التجريبية متساوية فى البروتين والطاقة. أوضحت نتائج التجربة أن الإضافات المختلفة لعلائق الأرانب حسنت معنويا من وزن الجسم النهائى ، معدل الزيادة فى وزن الجسم ، أستهلاك العليقة ، الكفاءة التحويلية ومعدل أداء الأرانب مقارنة بمجموعة الضابطة على النحو الاتي 5.4, 7.7, 9.3 % للوزن النهائي وبنسبة 8.6, 12.3, 14.7 % لزيادة الوزنية , ومعدل تحويل العلف 10.9 , 15.1 , 17.9 % و كفاءة الأداء بنسبة 16.6, 25.00, 31.2 % على التوالي وانخفض معنويا معدل استهلاك العلف 1.3, 2.7, 4.3 %, على التوالي عند مستوى معنوية ($P > 0.05$) , وانخفض معنويا معدل استهلاك العلف. أظهرت النتائج إن إضافة حبة البركة أو حمض الاسكوريك في غذاء الأرانب قد حسنت الأداء الإنتاجي للأرانب النامية.

الكلمات المفتاحية: الأرناب ، الحبة السوداء ، فيتامين ج ، الأداء.

INTRODUCTION

Antibiotics and several feed additives have been used in the livestock and poultry industry in a large scale for a long time. Nowadays, many people have been cautious about possible antibiotic residues and disease resistance in use of antibiotics in the animal and poultry industry besides in medical science **Kocyigit et al., (2009)**. As a result of the ban of using antibiotics as feed additives, using alternative feed additives has accelerated and led to more investigations in animal production **Dhama et al., (2014)**. These additives could be medicinal/herbal and aromatic plants and/or extracts from these plants. Several herbs and plants were used for this purpose like *Zingiber officinale*, *Allium sativum*, *Rosmarinus officinalis*, *Thymus vulgaris*, *Crocus sativus*, onion ceba, and others (**Alagawany and Abd El-Hack, 2015; Zewail et al., 2015 and 2016**). Also, one of these alternatives is Black seed/oil **Sener et al., (1985)**. Black seed belonging to family Ranunculaceae, possesses a wide range of pharmacological activities, including, carminative, antidiabetic, stimulant, analgesic, anti-pyretic and anti-inflammatory, antidiarrheal and antibacterial activity, antioxidant actions and protective effect against liver damage (**Lutterodt et al., (2010)**). It has nigellon, thymoquinone and thymohydroquinone, which are known to possess anti-microbial effect and enhance production of interleukin- 3 and 2 beta by lymphocytes and having an effect on macrophages **Haq et al., (1995)**. Some researchers demonstrated that Black seed has immuno-stimulant effects, thus maintaining good animal health (**Al-Beitawi**

and **El-Ghousein, 2008**). The seed of Black seed has over 100 different chemical components, including mucilage, crude fiber, reducing sugars, resins, alkaloids, flavonoids, organic acids, sterols, tannins and saponins, in addition to the high content of unsaturated fatty acids, especially linoleic acid (18:1 ω-6) (and oleic acid (18:1 ω-9) and proteins. It also has yellowish volatile (essential) oil (**Gilani et al., (2004)**). It is known that the biological activity of nigella sativa seeds is attributed to its essential oil components **Hajhashemi et al., (2004)**. It is one of the most effective antioxidants and free radical scavengers, inhibiting lipid peroxidation induced by peroxy radicals (**El-Demerdash et al., (2005)**). It may also be essential for maintenance of other antioxidants such as Vitamin C ameliorated oxidative stress associated with a wide variety of toxicants such as lead, cadmium and arsenic **Shalan et al., (2005)**. The present study was aimed to shed some light on the effects of supplemental Black seed and compare their effects with vitamin C on the growth performance of growing rabbits.

MATERIALS AND METHODS

Thirty-six growing V-line rabbits of both sexes, 5 weeks old, with initial weights of 776.66 ± 22.11 g were used for the study. The rabbits were randomly allocated to four treatments groups of 9 rabbits each. Each treatment was further sub-divided into 3 replicate of 3 rabbits. Rabbits were housed in wire floor batteries of 45 x 36 x 36 cm and were offered diets for duration of the feeding trial until reaching 13 weeks of age. All animals were kept under similar hygienic conditions. Rabbits were housed in well

ventilated block building. Fresh air circulated in the house using exhaust fans. The rabbits were kept within a cycle of 16 h light and 8 h dark. Four pelleted diets were prepared. Group one fed control diet free of feed additives and served as a control group. Group 2 and 3 fed basal diet with 200 and 400 mg *Black seed* crushed / kg diet, respectively, Group 4 received control diet, but drinking water supplemented with 200 mg *vitamin C* /L. Fresh water was automatically available at all times through stainless steel nipples for each cage. The experimental diets were offered to rabbits *ad libitum*. The formula of basal experimental diet is presented in Table (1) that formulated to cover the requirements of rabbits

according to **National Research Council (NRC) (1977)** specific for rabbits. Individual body weight and feed consumption were recorded weekly. Body weight gain and feed conversion ratio were also calculated. The incidence of dangerous diseases was largely avoided and rabbits have never been treated with any kind of systematic vaccination or medication. The results were expressed as the mean $\pm$ SEM. All data were analyzed using one way analysis of variance (ANOVA) using (**SPSS, 2001**) statistical software. Significant differences between means were detected using new Duncan multiple range test (**Duncan, 1955**).

Table1.Composition and chemical analysis of the basal experimental diet

Ingredients	Basal diet (%)
Corn yellow	19.00
Wheat bran	11.00
Barley	17.20
Berseem hay	33.00
Soybean meal 44%	15.00
Molasses	3.00
Di-Calcium phosphate	1.00
Lysine	0.10
Methionine	0.10
Vitamins and mineral premix ¹	0.30
Salt	0.30
Total	100
Chemical analysis (%)	
Dry matter	92.96
Organic matter	84.83
Crude protein	17.29
Crude fiber	13.50
Ether Extract	2.80

Ash	8.12
NFE*	51.24
NDF	37.79
DE**kcal/kg	2504.50

Digestible energy (DE) of the experimental diets was calculated according to the equation described by **Cheeke et al., (1987) as follows:

$$DE \text{ (Kcal/kg)} = 4.36 - 0.0491 \times \text{NDF\%}, \text{NDF} = 28.924 + 0.657 \times \text{CF\%}.$$

RESULTS AND DISCUSSION

In the present study the experimental rabbits looked apparently healthy and no mortality was recorded. The effect of *Black seed* and *Vitamin C* on the performance of growing rabbits is presented in Table 2. The results showed that the supplementation of 200 mg ascorbic acid, 200 and 400 mg *Black seed*/kg diet brought a significant ($P \leq 0.01$) improvements in final body weight by the value of 5.1, 7.7 and 9.3 %, weight gain by 8.6, 12.3 and 14.7 %, feed conversion ratio by 10.9, 15.1 and 17.9 %, performance index by 16.6, 25.0 and 31.3 % and significantly ($P \leq 0.01$) decreased feed intake by 1.3, 2.7 and 4.3 %, respectively, in comparison with control. A part of the improvement in growth of rabbits obtained herein during the hot climate period could be attributed to the positive impact of *Black seed* on body weight gain and feed conversion ratio due to its antioxidant properties and phenolic compounds. **Yasser et al. (2015)** demonstrated that daily body weight gain and feed conversion ratio of rabbits fed *black seed* were significantly improved in compared to the control diet. **Mehrez et al. (2011)** reported that the highest values of body weight ,body weight gain, and economical efficiency were observed for

group of rabbits fed *Black seed* (0.4 %) at the end of the experiment in comparison with control group. **Zeweil et al. (2008)** showed that rabbits fed 12% *Black seed* had significantly the best values of total weight gain, being higher by 7.7% than control. **AbuAl-Basal (2011)** reported that the active substances Nigellone and Melation had a diversifying power and acted synergistically to improve nutrient utilization and help eliminating and cleansing actions. In addition, Nigellone had both anti-spasmodic and bronchodilating properties which can improve the health of the respiratory tract, a major problem under hot climate conditions. Thymoquinone, however, helps the body to get rid of toxins due to its anti-inflammatory, analgesic, antioxidant and cleaning properties **Paarakh (2010)**. Also, **Al-Douri et al. (2010)** reported that *Black seed* had an antimicrobial effect that may help rabbits to withstand hot climate condition. Also, *Black seed* contain fat soluble unidentified factors and mixture of essential fatty acids including linoleic, linolenic and arachidonic acids, which have been essential factors for growth **Murray et al., (1991)** and/or due to that *Black seed* contained macro-elements like Ca, P and Mg, which are needed for the optimal bone formation and growth throughout the growing period. Also, *Black seed* contained a lot of essential microelements, which has been known as a growth elements and has an important role in this phenomenon such as Cu, Zn and Fe **William (1999)** and essential vitamins

(thiamine, riboflavin, pyridoxine, niacin and folacin) which had roles in improving growth through their effects on fat, protein, nucleic acid (folic acid), vitamins (B6) and minerals metabolism **McDowell (1989)**. A stimulating effect of *Black seed* on digestive system were reported by **Jamroz and Kamel (2002)**, this effect resulting in better absorption and consequently better performance. Because the addition of *Black seed* in feed increases the flow rate of bile, this effect results in increased emulsification which activates the pancreatic lipases and then help in fat digestion and absorption of fat-soluble vitamins. Also, **Al-Shanti (2003)** showed that ascorbic acid (1 g/Liter water) significantly improved final body weight and numerically decreased feed intake when compared with the control. **Selim et al. (2004)** cleared that rabbits had access to extra levels of ascorbic acid beyond recommendation level achieved better

performance in weight gain and feed conversion ratio compared to the control group. In addition, **Selim et al. (2008)** cleared that the treated growing rabbits with 200 ppm of *vitamin C* recorded significantly the best feed conversion ratio (2.68 vs. 3.68 in control group). On the other hand, **Skrivanova and Marounek (1997)** reported that growth of Hayla 2000 rabbits supplied with *vitamin C* 30 mg/kg body weight and feed intake twice a week were not significantly affected. Also, **Zeweil et al. (2016)** indicated that the treatment with *vitamin C* (200 mg/kg) resulted in no significant increase in body weight, body weight gain and feed intake of rabbits. In conclusion the results showed that addition of *Black seed* and *Vitamin C* in rabbit diets had improved the productive performance, 400 mg/kg *Black seed* was more effective than 200 mg/kg *Black seed* or 200 mg/L *vitamin C*.

Table 2: Effect of vitamin C and black seeds on productive performance of growing rabbits

Items	Dietary treatments				P. value
	Control	<i>Black seed</i> 200mg/kg	<i>Black seed</i> 400mg/kg	<i>Vit. C</i> 200mg/l	
Initial weight (g)	777.78±12.50	776.67±25.72	776.67±24.77	775.56±25.46	1.000
Final weight (g)	2119.40 ^b ±41.90	2282.80 ^a ±12.13	2315.60 ^a ±19.65	2232.80 ^a ±30.58	0.001
Total weight gain (g)	1341.70 ^b ±45.30	1506.10 ^a ±24.70	1538.90 ^a ±14.23	1457.20 ^a ±10.00	0.001
Daily gain (g)	23.95 ^b ±0.80	26.89 ^a ±0.44	27.48 ^a ±0.25	26.02 ^a ±0.17	0.001
Weekly feed intake (g)	91.42 ^a ±0.48	88.97 ^b ±0.28	87.49 ^c ±0.28	90.22 ^{ab} ±0.62	0.001
Feed conversion ratio	3.85 ^a ±0.14	3.27 ^{bc} ±0.05	3.16 ^c ±0.02	3.43 ^b ±0.01	0.001
Performance index(%)	55.86 ^c ±2.97	69.84 ^{ab} ±1.38	73.32 ^a ±0.92	65.14 ^b ±1.18	0.001

a, b, : Values in the same row with different superscripts differ significantly ($P \leq 0.05$).

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