

## IMPACT OF BLACK SEEDS *Nigella sativa* L. MEAL SUBSTITUTION INSTEAD OF SOYBEAN MEAL ON SOME GROWTH TRAITS OF LOCAL RABBIT MALES

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### ABSTRACT

The work carried out on a private local farm extended to eight weeks in Mosul city Iraq. Sixty local male rabbits, six to seven weeks aged, with an average initial bodyweight of  $552 \pm 15$  gm. Randomly divided into 4 treatments and 3 replications (5 rabbits each). Soybean meal replaced by black seeds (*Nigella sativa* L.) meals at levels 0, 33, 66, and 100% respectively in the diets as a crude protein source. The diets were nearly equal in the level of energy digests and the percentage of crude protein. Treatment 4 (100%) showed a significant effect ( $p \leq 0.05$ ) in increasing daily weight gain, daily consumption, total weight gain, hot and cold carcass weight. A higher mortality percentage was in T<sup>1</sup> (6.67). While our other results did not show any significant differences in all other studied traits. T<sup>4</sup> showed the highest profit in weight gain (Kg) / Iraqi Dinar) then T<sup>3</sup>, T<sup>2</sup> and T<sup>1</sup> respectively.

**Keywords:** rabbits, black seed meal, soybean meal

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### INTRODUCTION

Soybean meal is one of the protein sources that are widely used in rabbits' diet (El-Tohamy and El-Kady, 2007), it contains a high percentage of protein (NRC, 1994), and digestibility coefficient of crude protein 90% of rabbits (NRC, 1977). soybean meal is expensive being imported and this makes its price fluctuate as well as its availability in the local market, hence it aroused the need to search for other non-traditional protein sources of good quality and low cost. black seeds meal (*Nigella sativa*) is characterized by having a high percentage of crude protein that amount to more than 40% (Al-Azawy, 2012) and this crude protein is good quality (Abdullah and Al kahla, 2010). Additionally, its oil contains many active components such as Nigellimine, Nigellone (Ibrahim Al Khafaji, 2007). These components were proved to have an antibiotic, antifungal, and antioxidant effect, in addition, to increase the immunity of the body, reducing the harmful germs in the intestines, and reducing the thermal stress of the meat chickens (Ahmad *et al.*, 2008, Al Khafaji and Al Jaryan, 2009). Feeding represents the larger portion of the overall expenses of farm animals, fowls, and rabbits breeding. Crude protein sources constitute the most expensive part of the diet components. The needs of the growing post- weaning rabbits of raw protein do not exceed 16-18% of the diet (NRC, 1977 and US Grains Council, 2003), therefore the diet required a high crude protein source to reach the necessary crude protein level.

This study aims to know the impact of replacing the black seeds meal with soybean meal of local rabbits on some growth traits, productive performance, carcass characteristics, and economic feasibility. Possibility of replacing the soybean meal totally or partially by the black seeds meal (*Nigella sativa*) in the growth diet of the male rabbits, and its effects on some productive performance, carcass characteristics and the economic feasibility.

### MATERIALS AND METHODS

This study was carried out in a private farm which is one of the local breeders in Mosul city/ Iraq for 8 weeks in which 60 male local rabbits ( hybrid species) with( 6-7weeks aged), and approximately weights  $552 \pm 15$  g were bought from the local market of Mosul, and they were randomly divided in to 4 treatments with 3 replications each, contains 5 rabbits. Black seeds meal was used in percentages of 0, 33, 66, 100% as a source of protein instead of soybean meal, representing 0, 5, 10 and 15% for total diets research respectively. These diets were also approximately equal in the level of digested energy and the percentage of crude protein (Table 1). The concentrate ration and water were given to the growing rabbits *ad libitum* one week before starting the study, and this was adaptation period for the rabbits to get used to the new diets and environmental conditions, and continued throughout the whole period of the study. Rabbits were kept on a concrete floor in dimensions cages of 1x4m: each one has 5 rabbits and the hall was furnished with ventilators to keep the air fresh, get rid of the harmful gases and to keep the temperature between 22-25°. temperatures were measured by alcohol thermometer, whereas the relative humidity was between 60-80% and measured by a hygrometer with metal indicator (Al Jadir, 1994). Rabbits were labeled with metal numbers in the pinna of the right ear for follow up, then weighted after the preliminary period and considered the Initial weight. The rabbits were weighted weekly as well as the feed intake presented and the feed remained, to find the daily feed intake. Three rabbits out of each replicate were subjected to fasting at the end of study for 8 hours before slaughter. then they were weighed and was considered the afore- slaughter. Rabbits were slaughtered and features of the carcass were recorded and economic calculations were done for producing 1kg gain of weight. Data were subjected to Statistical Analysis using the procedure of (SAS,2002) according to the following model:  $Y_{ijk} = \mu + F_i + e_{ijK}$  according to the following model: Characteristics were expressed as standard errors. Differences among means were tested using Duncan (Steel and Torrie, 1984).

Table (1): Components of study rations and their calculated chemical analysis

Components of ration	T <sup>1</sup> 0%	T <sup>2</sup> 33%	T <sup>3</sup> 66%	T <sup>4</sup> 100%
Black seeds meal	0	5	10	15
Soybean meal	15	10	5	0
Wheat bran	20	24.52	29.04	33.56
Sunflower oil	0.15	0.43	0.71	0.99
Barley	20.60	15.80	11	6.20
Bread crumbs	18	18	18	18
Cane's hay	25	25	25	25
Caco <sub>3</sub>	0.50	0.50	0.50	0.50
Di calcium phosphate	0.25	0.25	0.25	0.25
Vitamins and minerals	0.25	0.25	0.25	0.25
Food salt	0.25	0.25	0.25	0.25
Total	100	100	100	100
Chemical analysis of diets				
digested energy Kcl kg	2707	2707	2706	2706
Crude protein (%)	16.20	16.19	16.16	16.14
Percentage of digested energy: Crude protein	167.1	167.2	167.5	167.7
Dry matter	91.20	91.34	91.47	91.62
Ether extract (%)	2.08	2.94	3.78	4.64
Crude fiber (%)	12.62	13.02	13.40	13.80
Ash (%)	6.70	6.73	6.77	6.80
Dissolved carbohydrates (%)	53.60	52.46	51.36	50.24
Organic matter (%)	84.50	84.61	84.70	84.82
Crude fiber ratio: dissolved carbohydrates	0.24	0.25	0.26	0.27
Crude fiber ratio: Crude protein	0.78	0.80	0.83	0.86
Crude protein content: dissolved carbohydrates	0.30	0.31	0.31	0.32
Lysine (%)	0.70	0.62	0.55	0.48
Methionine (%)	0.24	0.25	0.24	0.25
Calcium (%)	0.64	0.67	0.72	0.77
Available phosphorus (%)	0.20	0.21	0.21	0.21
Linoleic acid (%)	0.78	1.27	1.75	2.24

\*- Feed components of the black seed, soybean, wheat bran, barley, bread crumbs and canes' hay were estimated in the laboratory according to AOAC (1995).

\*- Amino acids, linoleic acid and minerals were calculated according to NRC (1994).

\*- Digested energy of all the feed components were calculated according to the following formula:

Digested energy (Kcl /kg dry matter) = 4253-32.6\* crude fibers- 144.4\*ash. (Feketeand Gippert, 1986).

## RESULTS AND DISCUSSION

Results showed in Table (2) the superior significantly ( $p \leq 0.05$ ) the final body gain (g/rabbit) and the daily body gain (g/ day) in 4th group (15% black seed meal) compared to the other treatments, whereas these differences ( $p \leq 0.05$ ) indicated the preeminence of the first group compared to all the other treatments in the percentage of mortalities(6.67). The reason of significant differences in the total weight gains and the daily weights gain which due to might be attributed to the good balance of amino acids in the black seeds meal in and due to this meal having many active components such as Nigellimine, Nigellone, Thymoquinone Damascenine and others, and these components have an antibiotic, antifungal and anti-oxidant effects, also it increasing in body immunity which in its turn lead to enhancing the efficiency of protein transformation and consequently gain of rabbits. These results are in conformity with Zeweil *et al.*, (2008), Shamsuldeen and Al Rawi (2011) and El- Nomeary *et al.*, (2016), where they obtained significant increase in total weights of the treatments which they used the black seed meal with variant percentages in their study compared to the control treatments. The results contradicted with Abdullahand Al Kalha (2010) and Mehrez *et al.*, (2011), where they did not find significant differences in the total gain of weight for the black seeds meal treatments compared to the control treatment. Results of daily weight gain were in conformity with El-Nattate and El-Kady (2007) and El-Nomeary *et al.*, (2016), where they obtained a significant increase in the averages of this trait, when they used the black seeds meal with variant percentages in their experiments, compared to other treatments., whereas, the reason of significant differences in mortalities percentage might be due to the existence of many active components in the oil of the black seed meal that increase the body immunity and consequently reduce the percentage of mortalities with increasing the percentage of substitution by the black seed meal. The substitution of soybean meal by the black seed meal had no significant effects on the final weight of the living body (g/rabbit). These results confirmed the work of El- Tohamy and El Kady (2007), Abdullahand Al Kalha (2010) and Mehrez *et al.*, (2011), where they didn't find significant differences in the characteristics of the living body in the treatments of black seed meal compared to other treatments. The results contradicted with El- Nattateand El-Kady (2007), Shamsuldeen and Al Rawi (2011) and El- Nomeary *et al.*, (2016) who obtained significant differences in the feature of the final body weight in treatments in which they used the black seed meal compared to the control treatments.

In Table (3) the results confirmed non-significant differences in all the studied features, overall feed intake (g \ rabbit), daily feed intake and the feed conversion ratio (g . feed: g .weight gain) and (g . feed: g . carcass) The results of overall and daily consumptions contradicted with Zeweil *et al.*, (2008), Shams and-Al Rawi (2011), El-Nattate and-El- Kady (2007) and El- Nomeary *et al.*, (2016) who noticed the superior of significant differences in the average of total and daily feed intake of the rabbits fed with the diets of black seed meal compared with control whereas, the results of daily feed intake were in conformity with El- Tohamy and Al Kady (2007) who did not find

Table (2): Effect of substituting soybean meal by different levels of black seeds meal on bodyweight, body gain, and mortality% of local rabbits

Studied features	T <sup>1</sup> 0%	T <sup>2</sup> 33%	T <sup>3</sup> 66%	T <sup>4</sup> 100%
Initial body weight (g/rabbit)	560.27 38.15 ±	560.43 40.27 ±	556.75 45.11 ±	558.91 41.86 ±
Final body weight (g/rabbit)	1085.45 82.53 ±	1088.73 91.34 ±	1121.18 100.05 ±	1193.15 111.42 ±
Average daily gain (g /day)	9.38B 0.87 ±	9.43B 0.89 ±	10.08B 0.84 ±	11.33A 0.95 ±
Total gain (g/ day /rabbit)	525.18B 37.30 ±	528.30B 35.27 ±	564.43B 50.57 ±	634.24A 40.60 ±
Mortality %	6.67A 0.52 ±	0B 0 ±	0B 0 ±	0B 0 ±

Values in the same column with different letters differ significantly ( $P \leq 0.05$ ).

any significant differences in the feature of daily feed intake in the treatments of the black seed meal compared to the other treatments. The results of the feed conversion-ratio (g of feed: g of weight gain) were similar to Zeweil *et al.*, (2008) who obtained a significant increase in the fodder transformation efficiency in the treatments of the black seeds meal compared to the control treatments, but our results contradicted with El- Nattate and El- Kady (2007), El- Tohamy and Al Kady (2007), Shamsuldeen and al Rawi (2011) and El- Nomeary *et al.*, (2016) who did not found a significant differences in feed conversion ratio in black seed meal treatments. when they used it in the feeding of rabbits, compared to the control.

Table (3): The effect of replacement of the soybean meal with different levels of the black seeds meal on feed consumption of local rabbits.

Studied features	T <sup>1</sup> 0%	T <sup>2</sup> 33%	T <sup>3</sup> 66%	T <sup>4</sup> 100%
Total Feed intake (g/rabbit)	2325.65 156.70 ±	2352 150.34 ±	2411.42 185.64 ±	2555.81 206.10 ±
Daily Feed intake (g/rabbit/day)	41.53 2.65 ±	42 3.22 ±	43.06 3.83 ±	45.64 4.47 ±
Feed conversion ratio (g ration / g weight gain)	4.39 0.21 ±	4.32 0.05 ±	4.27 0.18 ±	4.03 0.67 ±
Feed conversion ratio (g ration/ g carcass)	4.40 0.25 ±	4.51 0.31 ±	4.32 0.04 ±	4.22 0.15 ±

Different letters within the same row indicate the existence of significant differences at level of probability ( $p \leq 0.05$ )

Results indicated a significant difference ( $P \leq 0.05$ ) in hot and cold carcass weight in T4 (higher bodyweight of the living animal Before slaughtering g/rabbit) compared to other treatments Table (4) and this increased the dressing percentage. The differences were not significant in the carcass trait, which are the bodyweight before

slaughter (g/rabbit), the dressing percentage with or without the edible guts, and the percentage of edible guts (%).results of the cold and hot carcass weights were agree with Shamsuldeen and Al Rawi (2011), whereas, the weight of the hot carcass disagreed with Abdullah and Al Kalha (2010) and El- Nomeary *et al.*, (2016). The results of body weight before slaughter agreed with Abdullah and Al Kalha (2010) and El-Nomeary *et al.*, (2016), but not with Shamsuldeen and Al Rawi (2011). our dressing percentage results without the edible guts confirmed Bduallahand Al Kalha (2010), El- Nomeary *et al.*, (2016), El- Tohamy and Al Kady (2007) and Shamsuldeen and Al Rawi (2011) results. Also, with El-Tohamy and El-Kady (2007) and Sahmsuldeen and Al Rawi (2011) edible guts percentage.

Table (4): The effect of substituting soybean meal by variant levels of the black seeds meal on some features of the growing rabbit's carcass under study.

Studied features	T <sup>1</sup> 0%	T <sup>2</sup> 33%	T <sup>3</sup> 66%	T <sup>4</sup> 100%
Body weight (g/rabbit)	1071.66 50.19 ±	1074.03 52.94 ±	1104.60 97.65 ±	1180.86 112.42 ±
Hot carcass weight (g/rabbit)	535.08B 28.35 ±	528.47B 34.05 ±	563.97B 41.11 ±	612.23A 30.14 ±
Cold carcass weight (g/rabbit)	529.05C 40.21 ±	521.33C 25.40 ±	557.83B 27.10 ±	605.57A 35.45 ±
Dressing percentage without edible guts %	49.37 1.05 ±	48.54 1.22 ±	50.41 0.95 ±	51.28 2.67 ±
Dressing percentage with edible guts %	53.21 2.42 ±	52.43 2.75 ±	54.37 3.18 ±	55.39 4.25 ±
Percentage of edible guts %	3.84 0.17 ±	3.89 0.17 ±	3.96 0.25 ±	4.11 0.31 ±

Different letters within the same row indicate the existence of significant differences at probability ( $p \leq 0.05$ )

Table 5 demonstrated the results of economic calculations to produce 1kg weight gain for growing rabbits. The lowest feed costs (variable costs) were in treatment 4, which amounted to 1132 Iraqi dinars, where the highest cost of consumer feed was in treatment 1, amounting to 1638 Iraqi dinars. The reason is that the lowest price per kg of feed is 281 dinars, and it has a conscious increase in weight (consumed feed = price of a kg of feed \* average feed consumption /Kg total weight gain). Treatments 1, 2, and 3 had the lowest fixed costs 1850 Iraqi dinars / Kg total weight gain. Treatment 1 has the highest fixed costs of 1982 dinars due to a high death rate of 6.67% compared to the other treatments. Also, able 5 also indicated that the overall costs (the summation of variable and fixed costs) decreased with the increase in the percentage of substitution by the black seed meal. This makes treatment 4 the lowest with 2981 ID/kg weight gain and the treatment 1 the highest 3620 ID/kg weight gain. These results agree with Abdullah and Al Kalhas's (2010) result, were reported that the overall costs reduce with the increase of the black seed meal percentage. Total revenue was highest in treatment 4 (7159 ID/kg weight gain) and the least was treatment 1 (6513 ID/kg weight gain) (revenue = the price of 1kg live body weight \* average weight of rabbit) assuming that the sale price of 1kg live body weight is 6000 ID.

Treatment 4 has the highest profit with 4177 ID /kg weight gain, whereas the treatment 1 recorded 2893 ID /kg weight gain. thus, the treatment ranks according to the profit were 4, 3, 2, 1 respectively. The profit results were similar to those of Mehrez *et al.*, (2011), but, contradicted with El-Tohamyand El-Kady (2007). Finally, the Table showed the price of 1kg of feed for each treatment of the research which was (370, 341, 311, and 281) ID/ kg feed respectively.

Table (5): The effect of substituting soybean meal with variant levels of the black seeds meal on economic calculations to produce 1kg weight gain of a growing rabbit after 8 weeks from the beginning of the study

Economic calculations	T <sup>1</sup> 0%	T <sup>2</sup> 33%	T <sup>3</sup> 66%	T <sup>4</sup> 100%
Consumed fodder costs (ID/kg weight gain)	1638	1518	1329	1132
Other costs (ID/kg weight gain)	1982	1850	1850	1850
Overall cost (ID/kg weight gain)	3620	3368	3179	2982
Return (ID/kg weight gain)	6513	6532	6727	7159
Profit (ID/kg weight gain)	2893	3164	3548	4177
Profit rank	4	3	2	1
Cost of 1 kg diet (ID)	370	341	311	281

## CONCLUSIONS

It could be recommended to replace soybean meal by the black seeds meal 100% in local rabbits diets after weaning, as the results did not show significant differences in the final body weight, feed intake, feed conversion ratio (g feed: g weight gain) and (g feed: carcass weight) and in the dressing percentage with or without edible guts. The complete substitution was also significantly the best regarding the total weight gain and in cold and hot carcass weights (g/rabbit). Treatment 4 also had the best profitability (ID/kg body weight gain).

تأثير احلال كسبة الحبة السوداء *Nigella sativa* L. بنسب مختلفة محل كسبة فول الصويا في بعض صفات النمو لذكور الارانب المحلية

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### الخلاصة

اجريت هذه الدراسة لمدة 8 أسابيع في أحد مزارع المربين المحليين في مدينة الموصل. استخدم فيها 60 ذكرا من الأرانب المحلية بعمر 6-7 أسابيع وبأوزان متقاربة بحدود  $552 \pm 15$  غم، قسمت الأرانب عشوائيا إلى 4

معاملات في كل منها 3 مكررات في كل مكرر 5 أرناب، تم في هذه التجربة إحلال كسبة الحبة السوداء بنسب 0 ، 33 ، 66 و 100% بوصفها مصدرا بروتينيا بديلا عن كسبة فول الصويا في علائق نمو الارانب المحلية المستخدمة في الدراسة. وكانت العلائق متساوية تقريبا في مستوى الطاقة المهضومة ونسبة البروتين الخام. أظهرت نتائج هذه الدراسة وجود فروقات معنوية ( $0.05 \geq$  أ) لصالح المعاملة الرابعة في صفة الزيادة الوزنية الكلية والزيادة الوزنية اليومية ووزن الذبيحة الحارة والباردة كذلك اشارت النتائج ان اعلى نسبة هلاك كانت للمعاملة الأولى ( $0.05 \geq$  أ) حيث كانت 6,67% في حين لم تظهر النتائج أية فروقات معنوية في جميع الصفات المدروسة الاخرى. أما أفضل ربح (دينار عراقي/كغم زيادة وزنية) فكان للمعاملة الرابعة ثم الثالثة ثم الثانية فالأولى.

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