INFLUENCE OF USING PLANT FEED ADDITIVES AS GROWTH PROMOTERS ON PRODUCTIVE PERFORMANCE OF GROWING RABBITS

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SUMMARY

The present study aimed to investigate the effect of dietary supplementation with rocket (Eruca Sativa) seeds, carrot (Daucus Carota L.) seeds or bay laurel leaves (Laurus Nobilis L.) and their mixtures on productive performance of growing rabbits. Ninety six male growing New Zealand White (NZW) rabbits (five weeks old) with an average live body weight of 512 g were chosen and randomly divided into 8 equal groups. The Control group (T1) was fed free basal diet. The other experimental groups received the basal diet and over top were fed on 1.0% rocket seed (T2), 1.0% carrot seed (T3), 1.0% bay laurel leaves (T4), 0.5% rocket seed+0.5% carrot seed (T5), 0.5% carrot seed+0.5% bay laurel leaves (T6),0.5% rocket seed+0.5% bay laurel leaves (T7) and 0.33% rocket seed+0.33% carrot seed+0.33% bay laurel leaves in diet (T8), respectively. The growth trial lasted for 8 weeks. The results showed that only at 9 week of age, rabbits of T2, T5, T6 and T7 followed by T8 tested diets gave significant (p=0.0026) higher live body weight compared with T1 which disappeared at 13 weeks of age. Total body weight gain significantly (p=0.0035) improved for tested groups at 5-9 weeks of age, however, the total growth (5-13 weeks) rabbits received 0.33% rocket seed+0.33% carrot seed+0.33% bay laurel leaves (T8) gave significantly (p=0.0395) the highest total body weight gain compared to control group. At 5-13 week, the control group had the highest feed consumption (p=0.0517) compared to all tested groups. Feed conversion ratio was significantly affected by dietary treatments during experimental intervals. The control group recorded the worst FCR during 5-13 weeks of age (p=0.0124).Digestibility coefficients of crude protein (P=0.05) and crude fiber (p=0.004) were significantly improved as a response to feeding tested materials except in case of 1% carrot seeds compared to the control. Further improvements in digestibility coefficients of EE (P=0.0001) and NFE (p=0.01) for all tested diets against the control were recorded. Nutritive values of the experimental diets in terms of TDN (p=0.04) and ME (p=0.05) were significantly influenced, while DCP was not affected. At the same time, T8 appeared to the highest TDN value (57.81%), while T7 tended to the highest ME value (2406.8cal/kg) compared to the others. N balance was significantly greater (p=0.05) in rabbits fed rocket seeds or carrot seeds or bay laurel leaves supplemental diets than those fed control. The highest value (2.30) was recorded with group feeding T8 diet. Rabbits fed diets contain feed additives as rocket seed, carrot seed or bay laurel leaves recorded significantly decreased (P=0.004) values of glucose concentration for all supplemented groups except for T8 compared with control group. Total lipids (p=0.0001), total cholesterol (p=0.001) and triglycerides (p=0.05), LDL cholesterol (p=0.05) and VLDL cholesterol (p=0.05) were significantly affected by dietary treatments. Regarding antioxidant activities, there were significant increases in TAC (p=0.05) and a decrease in lipid peroxidation upon feeding the tested groups in contrast to the control. Favorably, dressing % for group received T8 diet significantly (P=0.001) increased (69.10%) followed by the other tested diets compared to the control. On contrarily, NH3-N concentration was significantly (p=0.01) decreased while VFA'S concentrations significantly (p=0.05) increased in all groups of rocket seeds or carrot seeds or bay laurel leaves supplemental diets compared with control. The experimental groups recorded lower feed cost/rabbit values than control group. So, the experimental groups had higher values of economic efficiency and relative economic efficiency compared control. T8 diet achieved the highest values of economic efficiency and relative economic efficiency being 1.129 and 138%, respectively.

Keywords: *Rocket seeds, carrot seeds, bay laurel leaves, productive performance, digestibility, blood parameters, antioxidant, growing rabbits.*

INTRODUCTION

Cost of feeding is the most significant expensive item in animal production and reaches 60-70% of the total cost in rabbit's production. To reduce the rabbit production cost, it is necessary to improve the feed efficiency and increase the growth rate (Abedel-Azeem *et al*., 2012). Feed additives are important materials that can improve the efficiency of feed utilization, animal performance and enhance immune response. The possibility of using new natural additives instead of antibiotics and hormones in animals' diets is being recently used. Herbal feed additives comprise of a wide variety of herbs, spices and essential oils have been aspects as alternatives by some researchers (Ceylan *et al*., 2003). Some of the important aspects associated with herbal additives are the prevention of digestive disturbances improve feed conversion ratio, increase carcass quality, decrease the market age of animal and reduced their rearing cost (Javed *et al*., 2009 and Krieg *et al* 2009). Rocket, carrot and laurel are rich sources of vitamin A. Vitamin A is considered the most important vitamin in the body for normal growth, protective mucous membranes, reproduction, immune functions and sight. Vitamin A is found in variety of dark green leaves and deep orange color seeds (F.A.S.B, 1995). In latest years, Rocket plant (Eruca sativa) has gotten more value as a vegetable and spice around the world, further it is considered to be an important chemoprotective plant. The rocket belongs to the family Brassicaceae which is consists of Eruca sativa mill, Bunias and orientalis Diplotaxis. The beneficial and positive usefulness of the phytochemicals existing in rocket on health have been notified by a numeral of scientific research studies. These advantageous effects have been linked to the variety of phytochemicals they consist of, such as vitamins C and A glucosinolates and flavonoids, all of which are found in large quantities in Brassicaceae crops (Jin *et al*., 2009 and Bell and Wagstaff 2014).The rocket is believed to be an extremely good resource of antioxidants, as it includes phenolic compounds, glucosinolates carotenoids and degradation products like isothiocyanates (Villatoro, *et al*., 2012). Moreover, Eruca sativa Mill has cytoprotective, anti-inflammatory, anti-ulcer and anti-secretory action. Heimler *et al*., (2007), Alqasoumi *et al*.,(2009) and Khan and Khan (2014). Glucosinolates were found to have several biological activities including anticarcinogenic, antifungal and antibacterial plus their antioxidant action (Kim *et al*., 2004).The major glucosinolate in seeds of rocket which is potentially capable of protecting cells against oxidative stress. In addition, rocket contains Zn, Cu, Fe, Mg, Mn and other elements (Abdo and Zeinab, 2003) which increase immune response. Rabbits are unique in that they can convert 100% of dietary beta-carotene into retinol (Frater, 2001). Rocket (Eurica Sativa) seeds locally know as jarjeer, it is a good source of beta- carotene (Rinzler, 1990). Rocket contains a number of health promoting agents including carotenoides, vitamin C, fibers, gluocoerucin and flavonoids (Barilliari *et al*., 2005).The major constituent of Eurica Sativa volatile oil was isothiocyanates which has antioxidant, antimicrobial, antifungal and anticarcinogen activity (Badee *et al* ., 2003, Haristory *et al*., 2005 and Barilliari *et al*., 2005).Rocket contain flavonoids such as appin and luteolin, volatile oils like myristicin, apiole and B- phellandrene, fat as the furocoumarin bergapten, polynes protein, sugars and vitamin A&C (Bradley, 1992 and Leung and Foster, 1996). Flavonoids have antiviral activity (Hertog *et al*., 1993). Carotenoides can protect phagocytic cells from antioxidative damage enhance T&B lymphocyte proliferative responses and increase the production of certain interleukins (Bendich, 1989).Also, they increase plasma IgG concentration (Chew, *et al*.,2000). It is known as diuretic, anti-inflammatory and affects blood circulation. Eurica seeds have high oil protein gluocosinolate and Eurica acid contents and commonly used an animal feed in Asia particularly in India and Pasiskan (Kim and Ishil, 2006). El-Nomeary *et al* (2016) who found that growth performance was improved significantly when rabbits fed on diet supplemented with black cumin (Nigella sativa), mustard (Sinapis alba), sesame (Sesamum indicum) and rocket (Eruca sativa) seeds meals as feed additives for 68 days. In carrot (Daucus Carota L) seeds the benefit predominant fatty acids are oleic, linoleie and palmitic fighting infection. Vitamin A keeps cell membranes healthy, making them stronger against disease causing by microorganisms (Prasad, *et al*., 1987). Carotol is the strongest antifungal activity constituent of carrot seeds oil (Jasicka *et al*., 2004). Glycosides in carrot may be responsible for the blood pressure lowering effect of

the hypertension and exerts anti hyperglyceremic effects (Gilani *et al*., 2000 and Suzuki *et al*., 2005). One hundred gram dried leaves of bay laurel leaves (Laurus nobillis L.) provides 10715 I.U of vitamin A (Rinzler, 1990). Laurus nobillis leaves are considered as natural antioxidants (Gomez *et al*., 2004). The primary constituents of laueus oil eugenol, elemicin, spathulenol, and beta- eudesmol (Rinzler, 1990 and Diaz *et al*., 2002). Carvacrol, 1-8- cineole, fenchone, trans- antethole,phenols and linalool were the predominant constituents in bay laurel essential oils (Dadioghlu and Evrendilek 2004 and Kilic *et al* ., 2004). The leaf essential oil of Laurel has anti-flammatory activities and anticancer therapy in mice and rats (Sayyah *et al*., 2003 and Huang *et al*., 2004). Laurus nobillis oil showed inhibition against all the microorganisms tested (Baratta *et al*., 1998).Ibrahim (2005) reported that 1 % rocket, 1% bay laurel leaves or 0.5% rocket respectively can be individually used as natural feed additives which can improve the growth performance, digestion coefficient, biochemical blood parameters and economic efficiency in growing rabbits. Therefore, this study aimed to compare more correctly the single effects on performance, digestibility, carcass characteristics, some blood parameters and economic efficiency of growing rabbits, as well as, antioxidant activities during experimental period of commercially available natural feed additives as Rocket (Eruca Sativa) seeds and carrot (Daucus Carota L) seeds or bay laurel leaves (Laurus nobillis L.) and their mixed between them under the same conditions.

MATERIALS AND METHODS

The present study was carried out at Noubria Experimental Station, belonging to Animal Production Research Institute, Agriculture Research Center, Ministry of Agriculture, Egypt. Ninety six male growing New Zealand White (NZW) rabbits at five weeks old, with an average live body weight of 512 g were chosen and randomly divided into eight groups (twelve rabbits each). Each group was divided into three replicates, (four rabbits each) provided with feeders automatic drinkers. All rabbits were fed on a basal pelleted ration formulated to meet rabbit's requirements according to NRC (1977) Table (1). Rocket and carrot seeds or bay laurel leaves were used on air dried basis. The experimental period lasted for 60 days and the experimental groups were classified as follow:T1: Rabbits received a basal diet.T2: Rabbits received supplemented basal diet with 1.0 % of rocket seeds.T3: Rabbits received supplemented basal diet with 1.0 % of carrot seeds.T4: Rabbits received supplemented basal diet with 1.0 % of bay laurel leaves.T5: Rabbits received supplemented basal diet with 0.5 % of rocket seeds+0.5% of carrot seeds.T6: Rabbits received supplemented basal diet with 0.5 % of carrot seeds+0.5 % of bay laurel leaves. T7: Rabbits received supplemented basal diet with of 0.5 % rocket seeds+0.5% of bay laurel leaves.T8: Rabbits received supplemented basal diet with mixture (0.33 % of rocket seeds + 0.33% carrot seeds + 0.33% bay laurel leaves). All the experimental diets were formulated to be isonitrogenous and isoenergetic containing approximately 17.18% CP and 2539.6 DE kcal/ kg (Table 2).

All animals were kept under the same environmental and management conditions. The rations were offered ad labium. The samples of pelleted rations were analyzed for crude protein (CP), crude fiber (CF), ether extract (EE) and ash according to A.O.A.C. (2000), while organic matter and nitrogen free extract (NFE) were calculated. Feed intake, body weight, body weight gain and feed conversion ratio were recorded weekly. At 13 weeks of age, twenty four rabbits were randomly taken after the termination of the fattening period to conduct the digestibility trails. Rabbits within each treatment were randomly housed individually in metabolic cages (n=3) that allowed the separation of feces and urine to determine the digestibility coefficients of the nutrients. Representative samples of feed offered and feces of each rabbits were chemically analyzed for determine of dry matter (DM), crude protein (CP), crude fiber (CF), ether extract (EE), nitrogen free extract (NFE) and ash according to A.O.A.C. (2000) organic matter and nitrogen free extract (NFE) were calculated, Total digestible nutrient (TDN) was calculated according to Cheeke (1987).

Table (1): Ingredients composition of the experimental diets.

Ingredient	T1	T2	T3	T4	T5	T6	T7	T8
Berseem hay	30.20	30.20	30.20	29.20	30.20	30.20	29.20	29.21
Barley	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Rocket seed	00.00	1.00	00.00	00.00	0.50	00.00	0.50	0.33
Carrot seed	00.00	00.00	1.00	00.00	0.50	0.50	00.00	0.33
Bay laurel leaves	00.00	00.00	00.00	1.00	00.00	0.50	0.50	0.33
Yellow corn	14.80	13.80	13.80	14.80	13.80	13.80	14.80	14.80
Wheat bran	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Soybean meal 44%	19.60	19.60	19.60	19.60	19.60	19.60	19.60	19.60
Molasses	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
Limestone	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Di-Calcium phosphate	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
Salt	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Vit-min premix*	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
Lysine	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Methionine	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

** Provided per kilogram diet: vitamin A, 6000 IU; vitamin D3, 450 IU; vitamin E, 40 mg; vitamin K3, 1 mg; vitamin B1, 1 mg; vitamin B2, 3 mg; niacin, 180 mg; vitamin B6, 39 mg; vitamin B12, 2.5 mg; pantothenic acid, 10 mg; biotin, 10 mg; folic acid, 2.5 mg; choline chloride, 1200 mg; manganese, 15 mg; zinc, 35 mg; iron, 38 mg; copper, 5 mg; selenium, 0.1 mg; iodine, 0.2 mg; selenium, 0.05 mg.*

T 1: Control, .T 2: Control + 1.0% Rocket seed. T 3: Control + 1.0% Carrot seed. T 4: Control + 1.0% Bay laurel leaves. T 5: Control + 0.5% Rocket seed+0.5% Carrot seed. T 6: Control + 0.5% Carrot seed+0.5% Bay laurel leaves. T 7: Control + 0.5% Rocket seed+0.50% Bay laurel leaves T 8: Control + 0.33% Rocket seed+0.33% Carrot seed+0.33% Bay laurel leaves.

Table (2): Chemical analyses of the experimental diets.

Chemical analysis (%)	Experimental diets of different treatments							
	T1	T2	T3	T4	T5	T6	T7	T8
Dry matter	89.19	89.11	89.21	88.47	89.13	89.12	89.16	89.13
Organic matter	81.56	81.41	81.54	82.00	81.36	81.43	81.48	81.38
Crude protein	17.20	17.18	17.17	17.23	17.11	17.17	17.16	17.19
Crude fiber	12.34	12.39	12.41	12.30	12.51	12.40	12.80	12.11
Ether Extract	2.60	2.82	2.82	2.61	2.83	2.81	2.75	2.73
Ash	7.63	7.70	7.67	6.47	7.77	7.69	7.68	7.75
NFE*	49.42	49.02	49.14	49.86	48.91	49.05	48.77	49.35
NDF	36.37	36.41	36.42	37.01	36.49	36.41	36.68	36.88
DE**kcal/kg	2541.8	2540.2	2539.5	2543.1	2536.3	2539.8	2526.9	2549.2

**NFE = OM- (Crude protein+ Crude fiber+ Ether Extract)*

***Digestible energy (DE) of the experimental diets was calculated according to the equation described by Cheeke (1987) as follows: DE (K/cal) = 4.36-0.0491×NDF%, NDF= 8.924+0.657× CF%.*

T 1: Control, .T 2: Control + 1.0% Rocket seed. T 3: Control + 1.0% Carrot seed. T 4: Control + 1.0% Bay laurel leaves. T 5: Control + 0.5% Rocket seed+0.5% Carrot seed. T 6: Control + 0.5% Carrot seed+0.5% Bay laurel leaves. T 7: Control + 0.5% Rocket seed+0.50% Bay laurel leaves T 8: Control + 0.33% Rocket seed+0.33% Carrot seed+0.33% Bay laurel leaves.

At the end of experiment, blood samples were taken from ear vein of three rabbits from each group, allowed to flow into heparinzed tubes, immediately centrifuged at 4000 rpm for 20 minutes to separate the plasma, which stored at -20 $^{\circ}$C for subsequent analysis. Blood plasma was analyzed using special kits to determinate total protein as described by the Buiret method according to Henry and Todd (1974), albumin

determined according to Doumas *et al*. (1971), globulin calculated as the difference between total protein and albumin. Creatinine determined using the method of Henry *et al*., (1974), urea (Fawcett and Soctt, 1961), glucose (Tinder, 1969) and Cholesterol (Allian *et al*., 1974).Total lipids and triglycerides were measured according to Zollner and Kirch (1962) & (Schalim *et al*., 1975), respectively. High density lipoprotein (HDL) and low density lipoprotein (LDL) were determined according to the method of Warnick *et al*., (1983) and Bergmenyer (1983), respectively. Very low density lipoprotein (VLDL) was calculated by dividing the values of triglycerides by factor of 5.Uric acid determined according to the method of Bhargava *et al*., (1999), Total antioxidant capacity (TAC) was determined according to Diamond Biodiagnostic, Egypt. Lipid peroxides was determined according to Yagi, (1984). For slaughter trial, at the end of 13 weeks of age rabbits, 3 males of each treatment were randomly chosen for slaughter test, and carcass weights were calculated as percentage of live body weight. Dressing percentage was calculated according to Steven *et al*., (1981).Cecum characteristics (total volatile fatty acids were determined according to Eadie *et al*., (1967) and ammonia was determined by applying Conway method (1958).

Statistical Analyses:

Data were analyzed by Completely Randomized Design according to Snedecor and Cochran (1982) using the General Linear Models of SAS (2001) as following statistical model: $Y_{ij} = \mu + T_i + \varepsilon_{ij}$ .Where, Y_{ij} is the value measured, μ is the overall mean effect, T_i is the i_{th} diet effect and ε_{ij} is the random error associated with the j_{th} rabbits assigned to the i_{th} diet. Significant differences of $P<0.05$ among means were determined using Duncan's Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Rabbits Performance:

Data of body weight, feed consumption and feed conversion of growing New Zealand rabbits during the different experimental period are presented in Table (3). At 9 week, the rabbits received the experimental diets showed significant ($p=0.0026$) increment in body weight T2, T5, T6 and T7 followed by T8 compared with T1. At 13 week, all experimental groups fed supplemental diets recoded insignificant increased values of final body weight compared with control. T8 had highest value (1622 g) of final body weight compared with the other experimental groups. Total body weight gain had significant ($p=0.0395$) increment by (14.37, 8.52 and 11.49%) for T8 at different experimental periods, compared with control group. The other experimental groups fed supplemental diets recorded insignificant increased values of total body weight gain compared with control one. At 5-13 week, T1 had significant increased ($p=0.0517$) value of feed consumption. There were no significant differences among the other experimental groups. All experimental groups recorded significantly lower ($p=0.0124$) value of feed conversion during different periods except for T5 at 9-13 weeks, it could be observed that the fed conversion value recorded the highest value (5.42) compared with others. T8 had the best one (lowest value). Ibrahim (2005) showed that the performance of growing rabbits that fed diets including 0.5% and 1% rocket seed or 1% bay laurel leaves appeared to significantly ($P<0.05$) increase in comparison with control group. These improvements may be attributed to the properties of these materials that act not only as antibacterial, antiprotozoal and antifungal but also as antioxidant (Bradley, 1992; Leung and Foster, 1996 and Zeweil *et al* 2008). El-Tohamy and El-Kady (2007) found that the replacement of rocket meal to 50% crude protein level of soybean meal showed significant augmentation in the performance of rabbits. El-Nomeary *et al*. (2015) who found that growth performance was improved significantly when growing rabbits fed on diet supplemented with 3% rocket seeds meal for 68 days.

Table (3): Growth performance of the experimental groups.

Item	Experimental diets									P value
	T1	T2	T3	T4	T5	T6	T7	T8	SEM	
No of rabbits	12	12	12	12	12	12	12	12		
Body weight, g										
At 5 week	538	517	508	514	506	500	514	506	11.75	0.5180
At 9 week	1046^{c}	1108^{ab}	1056^{c}	1069^{bc}	1140^{a}	1119^{ab}	1134^{a}	1087^{b}	17.70	0.0026
At 13 week	1539	1557	1593	1581	1578	1597	1592	1622	27.20	0.7049
Live body weight gain, g										
5 – 9 week	508^{c}	591^{ab}	548^{b}	555^{b}	634^{a}	619^{ab}	620^{ab}	581^{ab}	21.75	0.0035
9 – 13 week	493^{b}	449^{b}	537^{a}	512^{ab}	438^{b}	478^{b}	458^{b}	535^{a}	29.09	0.05
5 – 13 week	1001^{b}	1040^{ab}	1085^{ab}	1067^{ab}	1072^{ab}	1097^{ab}	1078^{ab}	1116^{a}	31.00	0.0395
Feed consumption, g										
5 – 9 week	1692^{a}	1601^{b}	1545^{bc}	1547^{bc}	1483^{c}	1535^{bc}	1492^{c}	1547^{bc}	25.16	0.0001
9 – 13 week	2327^{b}	2232^{c}	2325^{b}	2256^{c}	2375^{a}	2270^{c}	2230^{c}	2379^{a}	35.57	0.0397
5 – 13 week	4019^{a}	3834^{b}	3870^{ab}	3803^{b}	3858^{ab}	3805^{b}	3722^{b}	3783^{b}	55.86	0.0517
Feed conversion ratio										
5 – 9 week	3.33^{a}	2.71^{b}	2.82^{b}	2.79^{b}	2.33^{c}	2.48^{c}	2.41^{c}	2.68^{bc}	0.12	0.0001
9 – 13 week	4.72^{b}	4.97^{ab}	4.33^{b}	4.41^{b}	5.42^{a}	4.75^{b}	4.87^{b}	4.40^{c}	0.28	0.051
5 – 13 week	4.01^{a}	3.69^{b}	3.56^{b}	3.57^{b}	3.60^{b}	3.47^{b}	3.45^{b}	3.39^{b}	0.10	0.0124

$^{a-d}$ means in the same row having different superscripts differ significantly .
T 1: Control, .T 2: Control + 1.0% Rocket seed. T 3: Control + 1.0% Carrot seed. T 4: Control + 1.0% Bay laurel leaves. T 5: Control + 0.5% Rocket seed+0.5% Carrot seed. T 6: Control + 0.5% Carrot seed+0.5% Bay laurel leaves. T 7: Control + 0.5% Rocket seed+0.50% Bay laurel leaves T 8: Control + 0.33% Rocket seed+0.33% Carrot seed+0.33% Bay laurel leaves.

Digestion coefficient:

The data presented in Table (4) observed that the digestion coefficients of both CP and CF with diets T2, T4, T5, T6, T7 and T8 showed significant (P=0.05 and 0.004) higher values compared with control group. There is no significant difference between T3 and control group. Ibrahim (2005) showed that crude fiber digestion for rabbits received diets supplemented with either rocket or carrot at the rate of 1% was significantly increased compared control group. Also, it may be due to the effect of fiber and associated antioxidants as observed in rat by Nicolle *et al*., (2003). Ibrahim (2005) observed that in rocket treatment the significant increase in crude fiber digestibility may be due to the effect of flavonoids essential oils which possesses beneficial effect for stimulation and activity of digestive system. Close results are observed in rat by Namur *et al*., 1988 and Bradley, (1992) who postulated that carrot seeds rich in beta-carotene thus improved metabolism of caecal microorganisms on fiber digestion in rabbit. Gronowska *et al*., (1986) found that the chemical composition of fiber in diet significantly affects the process of beta- carotene absorption and conversion in the digestive tract of the rat. Digestibility coefficients of EE and NFE for all experimental groups had significantly (P=0.0001 and 0.01) increased than control one, respectively. The nutritive values of the experimental treatments (T2, T4, T5, T6, T7 and T8) recorded a significant (P=0.04 and 0.05) values of TDN and ME. These improvements tend to that rocket seed and carrot seed or laurus leaf micro components to stimulate and activate the digestive system by improving the diet palatability and enhancing appetite. Basyony and Azoz (2017) conducted that rocket seed and carrot seed or bay laurel leaves in rabbit diets caused an improvement in production performance, However, T3 had insignificant value of TDN compared with control group. On the meantime, there was no significant difference among the experimental groups for DCP value. N balance was significantly greater (p=0.05) in rabbits fed all experimental diets than those fed control. N balance as % of nitrogen intake was significantly (p=0.01) affected by tested diets, the

highest value was shown with T8 diet and the lowest was with the control diet. Ibrahim (2005) showed that supplemented diets with 0.5% and 1% rocket seed or 1% bay laurel leaves for growing rabbits tended to significantly (P<0.05) increase of growth performance. Basyony and Azoz (2017) conducted that rocket seed and carrot seed or bay laurel leaves in rabbit diets caused an improvement in production performance.

Table (4): Digestibility coefficients, nutritive values and nitrogen balance of the experimental diets.

Item	Experimental diets								SEM	P value
	T1	T2	T3	T4	T5	T6	T7	T8		
Digestion coefficients (%)										
DM	66.74	64.13	65.72	65.72	64.03	64.03	64.05	66.02	5.27	0.423
OM	65.38	67.71	65.94	65.49	65.68	66.70	66.81	65.64	5.46	0.667
CP	76.63^{b}	77.95^{a}	76.35^{b}	77.16^{a}	77.82^{a}	77.81^{a}	77.23^{a}	78.01^{a}	2.89	0.05
CF	40.83^{b}	48.11^{a}	42.76^{b}	48.95^{a}	49.57^{a}	47.96^{a}	49.00^{a}	48.91^{a}	2.11	0.004
EE	56.03^{c}	67.98^{a}	64.98^{b}	66.98^{b}	66.58^{b}	67.83^{a}	67.92^{a}	67.81^{a}	3.76	0.0001
NFE	70.84^{c}	75.97^{a}	72.27^{b}	73.85^{ab}	73.96^{ab}	73.94^{ab}	73.19^{ab}	75.20^{a}	4.89	0.01
Nutritive value (%)										
TDN	53.80^{b}	57.04^{a}	54.12^{b}	55.98^{ab}	55.55^{ab}	56.04^{ab}	57.51^{a}	57.81^{a}	2.01	0.04
DCP	13.18	13.39	13.11	13.29	13.32	13.36	13.25	13.41	1.19	0.576
ME	2251.5^{b}	2387.1^{a}	2264.9^{b}	2342.8^{ab}	2324.8^{ab}	2345.3^{ab}	2406.8^{a}	2393.8^{a}	25.36	0.05
Nitrogen balance										
N- intake (g/d)	3.03	3.1	3.11	3.13	3.19	3.14	3.14	3.20	0.11	0.123
Faecal– N (g/d)	0.977	0.991	0.897	0.988	0.899	0.901	0.994	0.898	0.09	0.461
Urinary–N (g/d)	0.703^{a}	0.641^{b}	0.701^{a}	0.712^{a}	0.689^{ab}	0.701^{a}	0.711^{a}	0.692^{ab}	0.01	0.05
N – absorbed (g/d)	2.05^{c}	2.11^{b}	2.21^{ab}	2.14^{b}	2.29^{a}	2.24^{ab}	2.15^{b}	2.30^{a}	0.14	0.05
N–balance (NB; g/d)	1.35^{c}	1.47^{b}	1.51^{ab}	1.43^{b}	1.60^{a}	1.54^{ab}	1.44^{b}	1.61^{a}	0.075	0.05
NB as % of N-intake	44.55^{b}	47.42^{ab}	48.55^{ab}	45.69^{b}	50.16^{a}	49.04^{ab}	45.86^{b}	50.31^{a}	1.66	0.01

$^{a-c}$ means in the same row having different superscripts differ significantly .

T DN :Total digestible nutrients.

DCP: Digestible crude protein

ME: Metabolisable energy ME was calculated according to Forbs (1985). ME = TDN × 41.85.

T 1: Control, .T 2: Control + 1.0% Rocket seed. T 3: Control + 1.0% Carrot seed. T 4: Control + 1.0% Bay laurel leaves. T 5: Control + 0.5% Rocket seed+0.5% Carrot seed. T 6: Control + 0.5% Carrot seed+0.5% Bay laurel leaves. T 7: Control + 0.5% Rocket seed+0.50% Bay laurel leaves T 8: Control + 0.33% Rocket seed+0.33% Carrot seed+0.33% Bay laurel leaves.

Blood plasma constituents:

The effect of experimental rations on some blood plasma parameters are presented in Table (5). Results indicate that no significant differences observed among the experimental treatments concerning total protein, albumin and globulin concentrations compared to the control group. Results obtained in this study are in match with findings of Melby and Altman (1974) who found that the normal range values of some blood components in rabbits such as total protein (g/dl) from 4.49 to 7.20, Albumin, (g/dl) from 3.3 to 5.1 and globulin, (g/dl) from 1.85 to 2.7 or 1.9 to 3.6. Similar results were obtained by Ibrahim (2005) who showed that rabbits fed diets contain feed additives; rocket seed, carrot seed or laurus leaf had no significant effect on blood total protein, albumin and globulin. Abdel- Azeem *et al*., (2012) reported that rabbits group received

diets supplemented with 7.5 or 15 g of rocket seeds (Eruca Sativa) or harmala seeds /Kg diet or mixture of two herbs in diet recorded insignificant values of plasma concentrations total protein, albumin, globulin and creatinine compared with control group. The same trend was noticed for urea, uric acid and creatinine concentrations, this result disagreed with Ibrahim (2005) who observes that rabbits fed diets contain feed additives: rocket seed, carrot seed or laurus leaf recorded significant ($P<0.05$) decreased in values of urea and creatinine concentrations compared to the control group. He mentioned that diet supplemented with rocket seeds reduced significantly urea and creatinine concentrations as this may be due to the effective role of rocket isothiocyanates volatile oil as diuretics. Gilani *et al*., (2000) reported that carrot seeds possess glycosides that acting through blockade of calcium channels and this effect may be responsible for the blood pressure lowering effects of the hypertension. In this study, rabbits fed diets contain feed additives as rocket seed and carrot seed or bay laurel leaves recorded significantly decreased ($P=0.004$) values of glucose concentration for all supplemented groups except for T8 compared control group. Abdel- Azeem *et al*., (2012) showed that the same blood parameters were not significantly affected when rabbits fed diets contained rocket seeds (Eruca Sativa) and harmala seeds or mixture of two herbs in diet by different levels (7.5 or 15 g). Khalil *et al*., (2015) showed that rocket seeds are rich source of vitamin A which is considered the most important vitamin in the body for normal growth, protective mucous membranes, reproduction and immune functions (Kim *et al*., 2004). Also, results are in agreement with Salem (2012) who concluded that RSM improved blood parameters in Nile tilapia may be due to increase of immunity and reduce the negative effect of aflatoxin B_1 on fish.

Blood plasma lipid profile and antioxidants' activities:

Blood plasma lipid profile and antioxidants' activities of rabbits are presented in Table (6). Total lipids, total cholesterol and triglycerides levels for rabbits groups received different feed additives (rocket seed, carrot seed or bay laurel leaves) supplementation showed significant ($P=0.0001$, 0.001 and 0.05) decreased compared to the control group, respectively. T8 recorded the lower values compared with the other experimental groups. LDL cholesterol ($p=0.05$) and VLDL cholesterol ($p=0.05$) had the similar trend. Kucuk *et al*., (2003) showed that the significant decrease in values of total lipids, cholesterol and triglycerides which may be due to the high diversity of vitamins A in the daily diets which allows a sufficient nutrient intake and an important approach for health promotion. Nicolle *et al*., (2003) found that carrot consumption modifies cholesterol absorption and bile acids excretion as well as increases antioxidant status and these effects could be interesting for cardiovascular protection. El-Gengaihi *et al*., (2004) found decreased values in total lipids, cholesterol and triglycerides of hyperlipemic rats receiving the rocket oil as compared with control, in carrot; it may be due to its ability on modifying cholesterol absorption. Similar results obtained by Ibrahim (2005) who showed that total lipids, cholesterol and triglycerides levels for rabbits groups received rocket and carrot at the levels of 0.5 and 1% and bay laurel leaves at the level of 1% were significant ($P<0.05$) decreased compared with control group. Khalil *et al*., (2015) indicated that total cholesterol was significantly decreased by increasing the levels of rocket (Eruca Sativa) seeds or leaves. In the present study, an opposite effect was noticed regarding TAC (Total antioxidant capacity) where the values were significantly ($P=0.05$) increased with supplementation different feed additives levels during the experimental period in comparison with the control group but the highest value concerning T8 compared with the other supplemented groups. These results confirm that the antioxidant activity of phenolic compounds in feed additives (rocket seed and carrot seed or bay laurel leaves) is mainly due to their reduction−oxidation (redox) reactions and chemical structure (Hanafi *et al*., 2010; Da Silva Dias 2014 and Chahal *et al*., 2017). Also, Dhar, (1990) observed that carrot seeds may have benefit predominant fatty acids oleic, linoleie and palmitic in boosting immunity, similar result in human (especially among older people). De *et al*., (2004) reported that in laurel, it may be due to flavonoids in bay laurel leaves which are antiviral activity, or may be due to the antioxidant effect that can prevent oxidation of harmful LDL cholesterol as well as preventing the build-up of atherosclerotic plaque as reported by Hertog *et al*., (1993). There was no significant difference between the experimental groups for HDL value. Lipid peroxides values significantly ($P=0.01$) decreased for all dietary supplemented groups especially T8 which had lowered one compared to the control group. Ibrahim (2005) observed that

laurel had the essential oil eugenol that inhibits accumulation of lipid peroxidation products and maintains the activities of antioxidant enzyme. Eruca sativa leaves and seeds have a strong free radical scavenging antioxidants and protected from damage caused by oxidation through maintaining or rising the levels of antioxidant molecules and antioxidant enzymes.

Table (5): Blood biochemical metabolites of the experimental diets.

Item	Experimental diets								SEM	P value
	T1	T2	T3	T4	T5	T6	T7	T8		
Total Protein, (g/dl)	6.39	6.20	6.54	6.16	6.01	6.06	6.54	6.41	0.24	0.732
Albumin, (g/dl)	3.67	3.36	3.81	3.50	3.26	3.10	3.85	3.54	0.20	0.123
Globulin, (g/dl)	2.72	2.84	2.73	2.66	2.75	2.96	2.69	2.87	0.18	0.832
Glucose, (mg/dl)	95.77[a]	87.1[b]	88.06[b]	88.01[b]	87.48[b]	87.49[b]	86.53[b]	94.98[a]	3.19	0.004
Kidney function										
Urea nitrogen, (mg/dl)	62.22	63.94	64.63	61.01	62.26	63.67	62.31	62.98	3.76	0.345
Uric acid, (mg/dl)	0.48	0.53	0.58	0.52	0.47	0.46	0.45	0.47	0.04	0.821
Creatinine, (mg/dl)	0.61	0.57	0.62	0.59	0.59	0.54	0.53	0.60	0.11	0.440

[a-b] means in the same row having different superscripts differ significantly(p<0.05) .
T 1: Control, .T 2: Control + 1.0% Rocket seed. T 3: Control + 1.0% Carrot seed. T 4: Control + 1.0% Bay laurel leaves. T 5: Control + 0.5% Rocket seed+0.5% Carrot seed. T 6: Control + 0.5% Carrot seed+0.5% Bay laurel leaves. T 7: Control + 0.5% Rocket seed+0.50% Bay laurel leaves T 8: Control + 0.33% Rocket seed+0.33% Carrot seed+0.33% Bay laurel leaves.

Carcass characteristics:

Carcass characteristics and chemical composition of meat of rabbits as affected by dietary treatments are shown in Table (7). Dressing % for group received T8 significantly (P=0.001) increased by 19.51% followed by 9.84, 9.02, 9.01, 8.06,5.83 and 5.43 for T3, T2, T7, T6 ,T4 and T5 respectively compared with control group. Ibrahim (2005) found that dressing percentage of rabbits fed different levels of rocket seeds, carrot seeds or bay laurel leaves recorded significantly (P<0.05) higher values than control one. Nicolle *et al*., (2003) and Ibrahim (2005) reported that, in carrot significantly increased of dressing % may due to the ability of carrot as a professional diet as modifies cholesterol absorption and bile acids excretion and increases antioxidant status , The same trends were observed for total edible parts percentage (p=0.01) and Empty carcass with head (g) (p= 0.05). For edible giblets percentage there were no significant (p= 0.379) differences among the experimental groups compared with control one. The experimental groups fed rocket seeds or carrot seeds or bay laurel leaves supplemental diets had significantly (P=0.05) lower values of total non edible parts % compared control. Chemical composition of rabbit's meat is shown in Table (7). The rabbits fed rocket seeds, carrot seeds or bay laurel leaves supplemental diets had no significant content of moisture, crude protein, ether extract or ash compared control group. The same results obtained by Ibrahim (2005).Abdel- Azeem *et al*., (2012) showed that the dressing percentage and hot carcass percentage were improved but not significantly by adding rocket seeds (Eruca Sativa) and harmala seeds or mixture of two herbs in diet by different levels (7.5 or 15 g) into rabbits diets. El-Nomeary *et al*., (2015) found that growth performance was improved significantly when growing rabbits fed diet supplemented with 3% rocket seeds meal for 68 days.

Table (6): Blood lipid profile and antioxidants activities in rabbits fed different feed additives.

Item	Experimental diets								SEM	P-value
	T1	T2	T3	T4	T5	T6	T7	T8		
Lipid profile										
Total lipids, (mg/l)	**399.25^{a}**	**388.75^{b}**	**374.75^{b}**	**345.50^{b}**	**335.00^{c}**	**334.00^{c}**	**340.00^{c}**	**329.39^{c}**	**10.72**	**0.0001**
Triglycerides, (mg/dl)	**57.26^{a}**	**40.19^{b}**	**44.08^{b}**	**39.30^{c}**	**40.01^{b}**	**39.18^{b}**	**37.61^{bc}**	**35.03^{bc}**	**2.40**	**0.05**
Total Cholesterol, (mg/dl)	**85.33^{a}**	**76.40^{b}**	**77.01^{b}**	**77.40^{b}**	**77.11^{b}**	**78.14^{b}**	**76.45^{b}**	**75.11^{b}**	**4.22**	**0.001**
HDL, (mg/dl)	**45.87**	**46.41**	**45.68**	**47.41**	**46.58**	**47.62**	**44.32**	**45.6**	**0.09**	**0.461**
LDL, (mg/dl)	**36.21^{a}**	**22.95^{b}**	**17.514^{b}**	**20.13^{b}**	**19.14^{b}**	**15.284^{c}**	**16.124^{c}**	**13.62^{c}**	**0.34**	**0.05**
VLDL, (mg/dl)	**11.45^{a}**	**8.04^{b}**	**8.82^{b}**	**7.86^{b}**	**8.00^{b}**	**7.84**	**7.52^{b}**	**7.01^{b}**	**0.14**	**0.05**
TAC, (mmol/l)	**1.137^{c}**	**1.740^{a}**	**1.583^{b}**	**1.557^{b}**	**1.730^{a}**	**1.701^{a}**	**1.705^{a}**	**1.801^{a}**	**0.075**	**0.05**
Lipid peroxides, (mmol/ml)	**2.356^{a}**	**1.886^{b}**	**1.786^{b}**	**1.451^{c}**	**1.429^{c}**	**1.446^{c}**	**1.455^{c}**	**1.397^{c}**	**0.36**	**0.01**

$^{a-c}$means in the same row having different superscripts differ significantly .
T 1: Control, .T 2: Control + 1.0% Rocket seed. T 3: Control + 1.0% Carrot seed. T 4: Control + 1.0% Bay laurel leaves. T 5: Control + 0.5% Rocket seed+0.5% Carrot seed. T 6: Control + 0.5% Carrot seed+0.5% Bay laurel leaves. T 7: Control + 0.5% Rocket seed+0.50% Bay laurel leaves T 8: Control + 0.33% Rocket seed+0.33% Carrot seed+0.33% Bay laurel leaves.

Table (7): Carcass characteristics and chemical composition of meat rabbits.

Item	Experimental diet								SEM	P value
	T1	T2	T3	T4	T5	T6	T7	T8		
Pre-slaughter weight (g)	1590	1585	1575	1610	1600	1595	1580	1600	33.6	0.697
Empty carcass with head (g)	919.3^{c}	999.11^{b}	1000.3^{b}	985.1^{b}	975.3^{bc}	996.5^{b}	995.8^{b}	1105^{a}	25.7	0.05
Dressing%	57.82^{c}	63.04^{ab}	63.51^{ab}	61.19^{b}	60.96^{b}	62.48^{b}	63.03^{ab}	69.10^{a}	13.9	0.001
Edible Giblets %	3.24	3.20	3.61	3.25	3.57	3.20	3.24	3.22	1.96	0.379
Total edible parts %	61.06^{c}	66.24^{b}	67.12^{b}	64.44^{b}	64.53^{3b}	65.68^{b}	66.27^{b}	72.32^{a}	3.67	0.01
Total Non edible parts %	38.94^{a}	33.76^{b}	32.88^{b}	35.56^{ab}	35.47^{ab}	34.32^{ab}	33.73^{b}	27.68^{c}	1.19	0.05
Chemical composition (%)										
Moisture	74.95	75.01	74.69	74.98	75.20	74.31	740.24	75.01	1.88	0.0879
Crude protein	23.56	23.01	23.14	22.97	22.70	23.50	23.47	23.70	1.81	0.106
Ether extract	3.94	3.80	3.56	3.50	3.41	3.87	3.26	3.47	2.79	0.289
Ash	1.59	1.68	1.78	1.60	1.89	1.90	1.68	1.61	0.91	0.316

$^{a-c}$ means in the same row having different superscripts differ significantly .
T 1: Control, .T 2: Control + 1.0% Rocket seed. T 3: Control + 1.0% Carrot seed. T 4: Control + 1.0% Bay laurel leaves. T 5: Control + 0.5% Rocket seed+0.5% Carrot seed. T 6: Control + 0.5% Carrot seed+0.5% Bay laurel leaves. T 7: Control + 0.5% Rocket seed+0.50% Bay laurel leaves T 8: Control + 0.33% Rocket seed+0.33% Carrot seed+0.33% Bay laurel leaves.

Caecum characteristics:

Results of Caecum activity including the Caecum weight, Caecum length, pH values, ammonia nitrogen (NH3-N) and total volatile fatty acids (VFA'S) concentration of caecal contents are presented in Table (8). The experimental groups recorded significantly (P=0.004) higher values of Caecum length

compared with control groups. No significant differences were observed in Caecum weight, caecal pH values among the feeding groups. Results were agreement with those of Youssef *et al* (1998), Allam *et al*., (1999) and Ali *et al*., (2005) who reported that value of rumen liquor was not significantly affected by medicinal plants supplementation. On the contrarily, NH3-N concentration was significantly decreased (p=0.01) while VFA's concentrations showed significantly increased (p=0.05) with all experimental groups compared to control. These results were in accordance with those reported by Allam *et al*., (1999) with goats, Mohamed. and. Ibrahem (2003) with sheep, Maged (2004) and Ali *et al*., (2005) who revealed that VFA's concentrations was significantly increased while NH3-N concentration reduced in rumen fluid of sheep fed diets supplemented with medical plants as chamomile compared with control group. Lower NH3-N concentrations might be attributed to the action of medicinal herbs (Chamomile, Nigella sativa and Fenugreek) as buffers or regulators in absorbing and releasing NH3-N in the rumen (Zeid, 1998) and Ali *et al*., (2005). These advantages may give a favorable condition in the caecum for useful microorganisms' activity for best utilization of caecal ammonia to be converted into microbial protein for rabbits in the tested diets. Also, improvement of VFA's obtained in supplemental groups might indicated action in a stimulating caecum micro-flora activity which agrees with Ali *et al*., (2005), who found that VFA's concentration increased (P<0.05) in sheep fed diets supplemented with medical plants as chamomile compared with control group.

Table (8): Cecal morphological, ammonia and volatile fatty acids activity.

Item	Treatment								SEM	P-value
	T1	T2	T3	T4	T5	T6	T7	T8		
Caecum weight, g	158.27	160.73	161.43	164.20	163.80	164.89	163.12	164.32	33.35	0.847
Caecum length, cm	12.38^{b}	13.22^{a}	13.46^{a}	13.16^{a}	13.27^{a}	13.18^{a}	13.20^{a}	13.60^{a}	1.16	0.004
Caecum pH	6.14	6.11	6.17	6.13	6.15	6.22	6.31	6.15	1.33	0.372
NH3-N (mg\100 dL)	33.91^{a}	30.12^{b}	30.21^{b}	31.01^{b}	29.78^{b}	29.77^{b}	30.14^{b}	30.44^{b}	2.35	0.01
TVFA ml eq./100ml	5.18^{b}	6.10^{a}	6.09^{a}	6.15^{a}	6.11^{a}	6.12^{a}	6.08^{a}	6.17^{a}	0.91	0.05

$^{a\ and\ b}$ means in the same row having different superscripts differ significantly .
T 1: Control, .T 2: Control + 1.0% Rocket seed. T 3: Control + 1.0% Carrot seed. T 4: Control + 1.0% Bay laurel leaves. T 5: Control + 0.5% Rocket seed+0.5% Carrot seed. T 6: Control + 0.5% Carrot seed+0.5% Bay laurel leaves. T 7: Control + 0.5% Rocket seed+0.50% Bay laurel leaves T 8: Control + 0.33% Rocket seed+0.33% Carrot seed+0.33% Bay laurel leaves.

Economic efficiency:

Data presented in Table (9) showed that the experimental groups recorded lower feed cost/rabbit values than control group. They were decreased by (3.8, 2.7, 4.9, 3.0, 4.7, 6.8 and 4.9%) for T2, T3, T4, T5, T6, T7 and T8 respectively, compared by T1. The experimental groups had higher values of economic efficiency and relative economic efficiency compared control one, Leung and Foster, (1996) found that, in broiler chicks the rocket cakes is cheep untraditional source of protein. It could be noticed that, T8 (0.33% rocket seed+0.33% carrot seed+0.33% bay laurel leaves) tended to higher economic efficiency and relative economic efficiency with rate of 1.129 and 138% respectively, followed by T7 (0.5% rocket seed+0.50% bay laurel leaves) and T6 (0.5% carrot seed+0.5% bay laurel leaves) 1.098 and 1.089 for economic efficiency and 135% and 133% for relative economic efficiency respectively. Generally, It can be noticed that, the findings of this study demonstrated that dietary supplementation of feed additives such as rocket (Eruca Sativa) seeds, carrot (Daucus Carota L) seeds or bay laurel leaves (Laurus Nobilis L.) at different levels had the best economic return over the control group. This improvement based on the higher body weight and better feed conversion ratio. The result of performance index (PI) indicated that the experimental

groups received diets containing feed additives such as rocket (Eruca Sativa) seeds, carrot (Daucus Carota L) seeds or bay laurel leaves (Laurus Nobilis L.) at different levels gave better values especially for T8 which had the highest one. Ibrahim (2005), found that the growing rabbits received either rocket or bay laurel leaves at the level of 0.5 and 1 %, achieved good economical efficiency compared to the control group and El-Nomeary *et al* (2016) found that growth performance was improved significantly when rabbits fed on diet supplemented with black cumin (Nigella sativa), mustard (Sinapis alba), sesame (Sesamum indicum) and rocket (Eruca sativa) seeds meals as feed additives for 68 days.

Table (9): Economic efficiency of growing rabbits fed the experimental rations.

Item	T1	T2	T3	T4	T5	T6	T7	T8
Total average weight gain (g)	1001	1040	1086	1067	1072	1097	1078	1116
Price of 1kg body weight	35	35	35	35	35	35	35	35
Selling price/rabbit (LE) (A)	35.04	36.40	38.01	37.35	37.52	38.40	37.73	39.06
Total feed intake (g)	4019	3834	3870	3803	3858	3805	3722	3783
Price/kg feed(LE)	4.80	4.84	4.85	4.82	4.85	4.83	4.83	4.85
Total feed cost/ rabbit (LE) (B)	19.29	18.56	18.77	18.33	18.71	18.38	17.98	18.35
Net revenue(LE).1	15.75	17.84	19.24	19.02	18.81	20.02	19.75	20.71
Economic efficiency.2	0.816	0.961	1.025	1.038	1.005	1.089	1.098	1.129
Relative Economic efficiency.3	100	118	126	127	123	133	135	138
Performance index.4	38.38	42.20	44.75	44.29	43.83	46.02	46.15	47.85

(1) Net revenue = A – B
(2) Economic efficiency = (A-B/B).
(3) Relative Economic Efficiency= Economic efficiency of treatments other than the control/ Economic efficiency of the control group
*(4) Growth performance index (P1) = Live body weight (kg)/feed conversion *100.*
T 1: Control, .T 2: Control + 1.0% Rocket seed. T 3: Control + 1.0% Carrot seed. T 4: Control + 1.0% Bay laurel leaves. T 5: Control + 0.5% Rocket seed+0.5% Carrot seed. T 6: Control + 0.5% Carrot seed+0.5% Bay laurel leaves. T 7: Control + 0.5% Rocket seed+0.50% Bay laurel leaves T 8: Control + 0.33% Rocket seed+0.33% Carrot seed+0.33% Bay laurel leaves.

CONCLUSION

Generally, it can be noticed that, the findings of this study demonstrated that using dietary supplementation with some of feed additives such as rocket seeds, carrot seeds or bay laurel leaves individually or in combinations as natural growth promoters improved productive performance of growing rabbits. These improvements based on the higher body weight and better feed conversion ratio, performance index, digestion coefficient, biochemical blood parameters and the economic efficiency. Supplementation of feed additives rocket (Eruca Sativa) seeds and carrot (Daucus Carota L) seeds or bay laurel leaves (Laurus Nobilis L.) at different levels had the best economic return over the control group, Moreover, feed additives have a high antioxidant capacity or are good antioxidant properties.

In the present study, the best results were obtained with supplementing 0.33% rocket seed+0.33% carrot seed+0.33% bay laurel leaves in diet of growing rabbits.

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تأثير استخدام بعض الاضافات الغذائية الطبيعية كمنشطات نمو على الأداء الانتاجى للأرانب النامية

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اجريت هذه الدراسة لمعرفة مدى تأثير استخدام بعض الاضافات الغذائية مثل كلا من بذور الجرجير, بذور الجزر او وررق اللورى كمنشطات نمو طبيعية فى علائق الارانب النامية على ادؤاها الانتاجى , حيث تم استخدام 96 أرنب عمر 5 أسابيع متوسط وزنها حوالى 512 جرام مقسمة الى ثمانية مجموعات متساوية بكل مجموعة 12 ارنب مقسمة الى 3 مكررات بكل مكرر 4 أرانب , تمت التغذية على عليقة متوازنة واختلفت المجموعات باختلاف الاضافات حيث غذيت المجموعة الاولى بالعليقة الاساسية (كنترول) أما المجموعات من الثانية حتى الرابعة فغذيت باضافة بذور كل من الجرجير و الجزر و ورق اللورى بنسبة 1% على الترتيب الى العليقة الاساسية واما المجموعات من الخامسة الى السابعة فغذيت باضافة 0.5% بذورالجرجير+0.5% بذورالجزر) و 0.5 % بذورالجزر+0.5% ورق اللورى و 0.5% بذورالجرجير+0.5% ورق اللورى على الترتيب الى العليقة الاساسية اما العليقة الثامنة فهى عبارة عن اضافة كل من 0.33% بذور الجرجير+0.33% بذورالجزر +0.33% ورق اللورى الى العليقة الاساسية و استمرت التجربة لمدة 8 اسابيع و تم الحصول على النتائج التالية:

- عند الاسبوع التاسع من عمر الحيوان سجلت المجموعات التجريبة الثانية و الخامسة و السادسة و السابعة و تليهم المجموعة الثامنة زيادة معنوية فى الوزن الحى النهائى مقارنا بالكنترول و اما عند الاسبوع الثالث عشر من عمر الحيوان قد سجلت اعلى قيمة للوزن الحى النهائى بواسطة المجموعة الثامنة (1622جرام)
- لوحظ تحسن معنوى بالنسبة لمعدل الزيادة الكلية فى وزن الحيوان مقارنا بالكنترول بالنسبة للمجاميع التجربة فى الفترة من الاسبوع الخامس الى الاسبوع التاسع من عمر الحيولن. اما الفترة من الاسبوع التاسع الى الاسبوع الثالث عشر من عمر الحيون سجلت المجموعة الثامنة اعلى معدل الزيادة الكلية فى وزن الحيوان مقارنا بالكنترول . ينسبة (37و14 , 52و8 , 49و11 %) على مدار فترة التجربة. بالنسبة لباقى المجموعات التجريبية سجلت زيادة غير معنوية بالنسبة لمعدل الزيادة الكلية فى وزن الحيوان مقارنا بالكنترول. سجلت المجموعة التى تتغذى على العليقة الاساسية (الكنترول) قيمة اعلى للماكول اليومى من باقى المجموعات التجربية بنيما تفوقت المجموعات التجربية عن الكنترول حيث انهم سجلوا افضل قيمة لمعامل التحويل الغذائى و افضلهم المجموعة الثامنة . سجلت جميع المجاميع التجربية زيادة معنوية بالنسبة لمعاملات هضم لكلا من البروتين و الالياف و المركبات الكلية المهضومة فيما عدا المجموعة الثالثة سجلت قيم بدون فروق معنوية مع الكنترول. سجلت المجموعة االثامنة اعلى قيمة بالنسبة للمركبات الكلية المهضومة بين المجموعات التجربية بالنسبة لمعامل هضم كلا من المستخلص الايثيرى والمستخلص الخالى من الاوزت سجلت جميع المجاميع زيادة معنوية مقارنة بمجموعة الكنترول. لا توجد اى فروق معنوية بين المجموعات التجربية و مجموعة الكنترول بالنسبة لقيمة معامل هضم البروتين المهضوم بينما تفوقت المجاميع التجربية على الكنترول بانسبة لميزان الاوزت و كان افضلهم كلا المجموعة الثامنة و المجموعة الخامسة. سجلت مجاميع التجربة انحافض معنوى فى بانسبة لتركيز الجلوكوز فيما عدا المجموعة الثامنة مقارنة بالكنترول . لوحظ انحافض معنوى فى تركيز كلامن الدهون الكلية و الدهون الثلاثية والكوليسترول الكلى والكوليسترول الضار و بيروكسيدات الدهن مقارنا بالكنترول. سجلت المجموعات التجربية زيادة معنوية فى قيمة الكثافة الكلية لمضادات الاكسدة . سجلت ارانب المجموعة الثامنة المغذاه على العليقة تحتوى على 0.33% بذور الجرجير+0.33% بذورالجزر +0.33% ورق اللورى الى العليقة الاساسية اعلى قيم لنسبة التصافى تلتها المجموعات التجربية الاخرى من مجموعة الكنترول. سجلت المجموعات التجربية زيادة فى تركيز الاحماض الدهنية الطيلرة الكلية وانخافض فى تركيز الامونيا بالاخص المجموعة الثامنة التى حققت اقل قيمة للتكلفة الغذائية واعلى كفاءة اقتصادية ومؤشر نمو الاداء, تليها المجموعات التجربية الاخرى مقارنة بمجموعة الكنترول . نستخلص من ذلك ان استخدام الاضافات الغذائية مثل بذور كلا من الجرجير و الجزر و ورق اللورى منفردة بنسبة او خليط مزدوج فيما بينهم فى علائق الارانب كمحفزات للنمو بالاخص العليقة التى تحتوى على 0.33% بذور الجرجير+0.33% بذورالجزر +0.33% ورق اللورى الى العليقة الاساسية كان له تأثير جيد فى تحسين من الاداء الانتاجى للارانب و واقل قيمة للتكلفة الغذائية وتحقيق اعلى قيمة لكفاءة الاقتصادية. هذا بالاضافة الى ان هذه الاضافات الطبيعية لها فعل التاثير الوقائى لما تحتوية من مركبات طبيعية مضادة للاكسدة فى رفع كفاءة اداء الارانب.