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EFFECT OF ADDITIVE GARLIC, BLACK SEEDS AND LETTUCE LEAVES IN DIET OF LOCAL LAYERS HEN ON PERFORMANCE, CARCASS QUALITIES CHARACTERISTIC AND CHEMICAL COMPOSITION

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Abstract

The present study evaluated the effects of adding black seed, garlic and lettuce leave in dietary of Kurdish local hen on fertility, hatchability and blood physiological characteristics. A total of 64 local layers hen and four Cocks, 35 wks old, were randomly divided into four treatment groups. Each treatment group included 16 hens and one cock. Chickens in T1 group were fed on commercial layer diet without any additive and used as control group. Chickens in T2 were fed on diet supplemented with 5% of *Nigella sativa* seed. Chickens in T3 and T4 were fed on diet supplemented with 5% of garlic and grinding Lettuce leave respectively. Result observed the best value was in T4 for live body weight, weight access and F.C.R. respectively for performance characterizes same for main parts of carcass performance and chemical compassion proprieties, for secondary parts of carcass proprieties best treatment was in T1.
Keywords: black seed, garlic, lettuce leave and Kurdish laying hen

Introduction

As an aromatic plant, black cumin (*Nigella sativa*) is widely grown in different parts of the world and the seeds of black cumin have been used to promote health for countries especially in the Middle East and Southeast Asia. Black cumin seeds have been widely used in traditional medicine as diuretic and antihypertensive (Zaoui *et al*., 2000), digestive and appetite stimulant (Gilani *et al*., 2004), antidiarrheal (Gilani *et al*., 2001), analgesic (Khanna 1993; Khan *et al*., 1999), anthelmintic (Agarwal *et al*., 1979a; Chowdhury *et al*., 1998) and antibacterial agents (Ferdous *et al*., 1992; El-Kamali *et al*., 1998). Additionally, recent studies have shown black cumin to be antidiabetic (Meral *et al*., 2001), anticancer (Abuharfeil *et al*., 2001). The seeds of *Nigella sativa* contain a volatile oil (0.5- 1.6%), a fixed oil (35.6-41.6%), proteins (22.7%) and amino acids (Al-Gaby, 1998). The seeds have also been found to contain fats, crude fiber, minerals; e.g. Fe, Na, Cu, Zn, P, Ca and vitamins like ascorbic acid, thiamine, niacin, pyridoxine and folic acid (Takruri *et al*., 1998). Nigella sativa seeds yield esters of fatty acids, free sterols and steryl esters (Menounos *et al*., 1986). The seeds also contain lipase, phytosterols and ·-sitosterol (Duke, 1992). The active constituents of the seeds include the volatile oil consisting of carbon, an unsaturated ketone, terpene or d-limonene also called carvene, ·-pinene and p-cymene (Kapoor, 1990). Pharmacologically active constituents of volatile oil are thymoquinone, dithymoquinone, thymohydroquinone and thymol (Ghosheh *et al*., 1999).

The lettuce content of some vitamins varies depending on its type and form, and is generally considered an excellent source of vitamin K (97% of the recommended daily ration) and vitamin A (21% of the daily ration), and also contains high concentrations of beta-carotene, especially in dark green lettuce Rounded shape. With the exception of spherical lettuce, lettuce is a good source (10-19% of the daily ration) of folic acid and iron.

Increasing demand and consumption of eggs has necessitated intensive poultry production, particularly in developing countries, including South Africa. This in turn has presented major disease challenges in the laying flock, some of which are transmissible to humans (Braden, 2006; Maruta, 2007). For the past 4 decades, antibiotics have routinely been included in layer diets to prevent disease and enhance performance, with resultant production of safe and good quality eggs (Steiner, 2006). This is justified by the need to preserve the industry's efficiency and consumer confidence. However, the industry currently faces a strong controversy and even a ban in some countries on subtherapeutic use of antibiotics in poultry feed because of potential harmful effects on consumer's health, indicated by increased resistance to such antibiotics in humans (Casewell *et al*., 2003; Barug *et al*., 2006). Although the ban on antibiotics has not yet been instituted in South Africa, concerns exist about the range and extent of antibiotic use in animal production (SADA, 2008). This constitutes a major challenge to the egg industry because healthy flocks must be maintained for effective production. Thus various alternative feeding strategies are being incorporated into laying hen diets to improve gut health of the birds, enhance productive performance, and improve egg quality. Studies have demonstrated that aromatic plant extracts such as thyme and eucalyptus are effective alternatives to synthetic antibiotics in improving layer performance (Bölükbaşi and Erhan, 2007; Abd El-Motaal *et al*., 2008). Garlic was also reported to enhance performance of laying hens and improve egg quality when supplemented in diet (Lim *et al*., 2006; Yalcin *et al*., 2006; Khan *et al*., 2007). However, the reports on garlic influence on hen performance and egg quality are inconsistent (Yalcin *et al*., 2006; Khan *et al*., 2007) and its effects on gut bacterial load of laying birds have not been evaluated. Thus, the objective of this study was to evaluate the potential of dietary garlic powder (GP) in improving production efficiency.

Material and Methods

A total of 64 local layers' hen and four Cocks, 35 wks old, were randomly divided into four treatment groups .Each treatment group included 16 hens and one cock. Chickens in T1 group were fed on commercial layer diet without any additive and used as control group. Chickens in T2 were fed on diet supplemented with 5% of *Nigella sativa* seed.

Chickens in T3 were fed on diet supplemented with 5% of garlic and T4 grinding Lettuce leave respectively. Chemical composition of feed ingredients (dry matter, crude protein, ash and ether extract) as dried samples were analyzed using AOAC (1990) procedures; crude fiber was determined by the methods of Crampton and Maynard (1983).

The design of the experiment shown below:

T1 :Control, standard diet
T2: 5% *Nigella sativa* seed
T3:5% Garlic Quantity
T4:5%Grinding Lettuce leave

The layer's reared in hall of one rental house in Shaqlawa-Erbil city which divided to four blocks each of block included (16) replicate layers and four cock for fertility. The experiment started on 2/12/2019 and at the end of experiment on 2/4/2020. Fertility, hatchability profiles, total RBC, Hb, MCV, MCH and MCHC parameters, Thrombocyte, and Leukocyte profiles, Serum protein profile and Lipid profile: were calculated. Data collected were subjected to analyses of variance, and where significant differences were observed, means were further subjected to Duncan's multiple range test by using (SAS, 2005).

Table 1: Ingredient (Ingredients (kg/1,000 kg)) and chemical composition of the experimental

Ingredients	C	T1	T2	T3
Maize	603.1	596.1	593.7	607.1
Soybean meal (45 CP)	305.5	305.5	301.4	306.5
Vegetable oil	46.0	43.0	39.5	50.0
Fish meal	-	-	-	-
Salt	2.5	2.5	2.5	2.5
DL-methionine	2.0	2.0	2.0	2.0
L-lysine hydrochloride	0.4	0.4	0.4	0.4
Vitamin premix*	2.5	2.5	2.5	2.5
Mineral premix**	2.5	2.5	2.5	2.5
Dicalcium phosphate	16.0	16.0	16.0	16.0
Ground limestone	9.5	9.5	9.5	9.5
Black cumin seeds	0	5%	0	0
garlic	0	0	5%	0
grinding Lettuce leave	0	0	0	5%
Calculated analysis (%)				
Dry matter	89.10	89.10	89.10	89.10
Crude protein (CP)	19.00	19.10	19.10	18.80
Crude fiber	3.50	3.50	3.50	3.50
Ether Extract	6.69	6.75	6.78	6.70
Ca	0.79	0.79	0.79	0.79
P	0.66	0.65	0.65	0.66
Methionine+cystine	0.81	0.80	0.80	0.81
Lysine	1.01	1.01	1.00	1.01
Linoleic acid	3.90	3.80	3.70	4.00
ME (MJ/kg)	13.34	13.35	13.36	13.35

According to NRC. 1994

Table 2 : The chemical analysis of *Nigella sativa* seed, Garlic and grinding Lettuce leave.

Parameters	*Nigella sativa* seed(%)	Garlic Quantity(%)	Grinding Lettuce leave (%)
Moisture	14	64.58	73.7
Crude protein	20	7.87	5.3
Crude fat	40	0.52	0.6
Crude fiber	1.2	2.3	1.2
Ash	2.8	2.46	1.5
NFE	22	22.27	11

According to AOAC. 2006. Official Methods of Analysis of Association of Official Analytical Chemists International. In: Horwitz, W. (Ed.), 18th ed. AOAC Press, Arlington, VA, USA.

At the end of experiment on 2/2/2020 the live body weight, weight gain, feed consumption, feed conversation ratio (F.C.R) was calculated, after slaughtering four layer from each groups the weight of carcass, carcass yield, Dressing percentage with and without edible giblets all internal parts edible and non-edible were weighted, Percentages of visceral organs**,** Small intestine length (%). Small intestine relative weight (g), also calculated percentage of mortilaty. (Naji *and Hamdy* 1989).

Result and Discussion

As shown in table 3 insignificant (P≥0.05) for live body weight at starter experiment this results refers to successful start of experiment that the results after adding of black seed or garlic and lettuce leaves observed on balance effect of them.

The live body weight at the end of experiment pointed to is insignificant among all treatment expect T4 is higher compared with other treatments, this related to rise of

moisture in lettuce leaves and rise of weight access further on feed efficiency conversation as clear in table 3, and also related with rise of appetite also related with content of some vitamins varies depending on its type and form, this results agree with explanation of (McDonald, 1978;N.R.C). The equations have been developed to predict the energy required by chickens during egg production These equations use the expected energy requirements of hens as related to body weight, daily egg mass, change in body weight, and ambient temperature to predict a total daily energy requirement. In table (2) noticed that the chemical lettuce leaves compassion is higher of protein compared to black seed and garlic, this encourage with best feed conversation ratio to supervise of live body weight.

Table 3 : Effect of adding 5% garlic, black seed and lettuce leave in layer diet on performance

Treatments	Live body weight at starter experiment/kg	Live body weight at End experimen	Weight access	Feed consuming	F.C.R
T1	1.55±0.13*	1.663±0.09[a]	0.113±0.06[a]	0.227±0.11*	2.00±0.18[c]
T2	1.388±0.10	1.648±0.02[a]	0.260±0.12[ab]	0.402±0.17	1.575±0.17[b]
T3	1.435±0.20	1.633±0.09[a]	0.198±0.133[ab]	0.475±0.32	2.425±0.126[d]
T4	1.485±0.25	1.893±0.03[b]	0.408±0.22[b]	0.511±0.27	1.283±0.88[a]

[a, b, c, d] Mean values within the same row were significantly different (P<0.05) increased from a to d

As indicated in table (4) refers the relationship between the results of live body weight in table 3 harmonic reflected on results of all main parts and carcasses weight. This is also can be explained as confirmed by Al-Kassie. (2009), which are considered as digestion stimulating factors and improved of live body weight.

Table 4 : Effect of adding 5% garlic, black seed and lettuce leave in layer diet on main parts of carcass proprieties:

Treatments	Carcass weight/g	Thigh weight/g	Leg weight/g	Breast weight/g	Yield weight of breast/g	Yield weight of thigh/g
T1	1241±10.40[a]	339.00±28.61[c]	55.18±0.93[a]	294.5±5.92[b]	239.25±7.32[b]	115.50±0.17[b]
T2	1269±1.29[b]	176.50±1.29[a]	55.18±0.56[a]	245.25±52.18[a]	221.50±6.25[a]	102.26±1.71[a]
T3	1384.5±4.50[c]	169.67±0.48[a]	55.00±1.83[a]	300.73±0.98[b]	235.75±3.77[b]	100.73±0.98[a]
T4	1385.7±3.58[c]	200.73±0.98[b]	59.75±4.5[b]	315.5±1.29[b]	235.0±2.16[b]	151.20±1.99[c]

[a, b, c, d] Mean values within the same row were significantly different (P<0.05) increased from a to d

Results in table (5) refers to that the best of treatment for wing, back, neck and head weight was in T1 but this results usually appear as a secondary parts of carcasses because these parts has not abnormal tissue for accumulation fats (Naji and Hamdy, 1989).

Table 5 : Effect of adding 5% garlic, black seed and lettuce leave in layer diet on secondary parts of carcass proprieties:

Treatments	Wing weight/g	Back weight/g	Neck weight/g	Head weight/g
T1	157.75±7.18[c]	250.0±21.60[c]	84.50±2.08[c]	60.25±0.51[c]
T2	70.5±1.29[b]	166.75±1.70[a]	54.25±3.59[b]	55.18±0.56[a]
T3	64.05±1.44[a]	201.50±1.29[b]	44.0±6.78[a]	55.00±1.83[a]
T4	75.10±0.82[b]	198.25±6.29[b]	55.50±0.53[b]	59.75±4.50[b]

[a, b, c, d] Mean values within the same row were significantly different (P<0.05) increased from a to d

As very clear in table (6) T4 returned to prove that was best treatment among all treatments for heart weight, this can be attribute to function of heart very well because of rise of Vitamin A and E in leaves of lettuce, Vitamin A. This vitamin is very important and is needed for growth, health of eyes and moist surfaces of the body also function of heart. The deficiency of this fat soluble vitamin causes poor growth, weakness and decrease egg production. Vitamin E: It is required to maintain brain structure and also act as an antioxidant. Its deficiency is responsible for enlarged hocks, muscular weakness and crazy chick disease (Mahendra Pal, 2017).

On other side the T1 was obtained better value for gizzard weight this is related of function and physiological of gizzard and no affected by any additive matter (ENSMINGER,1990). For liver best value refers in T2 and T4 respectively this can be attribute of role black seed to stimulate for secretion of lipase and secondary bile acids, which can be a justification for the observed decrease in the percentage of abdominal fat in birds fed with such diets. Due to high lipid metabolism due to lipase secretion, the amount of fatty acid gathered in abdominal cavity decreases (Najafi and Taherpour, 2014). The broilers 'carcass features including back-neck, wing, leg, breast, and carcass yield were insignificantly influenced by adding some herbs to their diet. (Ciftci *et al*., 2009).

For spleen best value observed in T2this can be explained by study of (Khaligh *et al*., 2011). When they study on chickens fed with some herbs powder obtained results significant ($p \leq 0.05$) reducing serum glucose, cholesterol and triglyceride and moreover, the incorporation of a herbal blend (10 g/kg), containing garlic, cinnamon,

thyme, rosemary and anise, in diet of broilers did not have an effect on the weight of spleen, bursa of fabricius, pancreas, gizzard and abdominal fat. This results agreed with results of (Langhout, 2000; Mellor, 2000) they explained that due to, the improvement of liver and gizzard percentages may be due to the fact that the inclusion of some herbs in broiler diets could stimulate the digestive system in broilers, improve the function of liver and increase the pancreatic digestive enzymes, enhancement of the metabolism of oil, carbohydrates and proteins in the major organs would increase growth rate of these organs.

Table 6 : Effect of adding 5% garlic, black seed and lettuce leave in layer diet on edible parts of carcass proprieties:

Treatments	Heart weight/g	Gizzard weight/g	Liver weight/g	Spleen weight/g
T1	7.67 ± 0.45^{bc}	17.81 ± 0.43^{c}	44.57 ± 0.31^{c}	2.23 ± 0.09^{c}
T2	6.780 ± 0.28^{a}	13.15 ± 0.24^{b}	40.05 ± 0.05^{b}	3.16 ± 0.01^{d}
T3	7.25 ± 0.42^{b}	12.39 ± 0.04^{a}	27.14 ± 0.05^{a}	1.24 ± 0.30^{a}
T4	7.96 ± 0.05^{c}	12.16 ± 0.01^{a}	40.29 ± 0.2^{b}	1.65 ± 0.03^{b}

[a, b, c, d] Mean values within the same row were significantly different (P<0.05) increased from a to d

Table (7) refers that for chemical compassion of organic matter in breast and thigh muscles was significant ($p\leq0.01$) for moisture, protein and fat percentage but insignificant for percentage of soluble carbohydrate and Ash. From scientific axiom there is opposite relationship between percentage of moisture and protein with fat, while rise of percentage of moisture at the same time rise of percentage of protein in front of fat as clear in table (7) this especially for muscle breast because has possesses the character of softness (AL–Aswaad, 2000) the higher value observed in T4for moisture and for protein although its insignificant among all treatments but as mathematical is better value one hand on other hand for percentage fat the lowest value for percentage fat refers in T3 of garlic followed by T4and T2respectively this is related of role Garlic and black seed to inhibiting accumulation of triglyceride in muscles similar as study of Mohamed and Shanoon. (2012).Insignificant results observed for percentage soluble carbohydrate and Ash, this related because of in general very low percentage of glucose in meat AL-Hamalawy, 1982). And the percentage of Ash depends on dry matter and mineral with silica as shown is just mathematical differs no significant among all treatments.

Table 7 : Effect of adding 5% garlic, black seed and lettuce leave in layer diet on chemical compassion of main carcass parameters:

Treatments	Chemical compassion for breast%	Moisture	Protein	Fat	Soluble carbohydrate	ASH
T1		74.96 ± 0.85^{ab}	$20.97\pm0.94^{*}$	1.64 ± 0.28^{b}	$1.69\pm0.41^{*}$	$1.18\pm0.11^{*}$
T2		75.76 ± 1.01^{ab}	20.15 ± 0.25	1.35 ± 0.13^{ab}	1.33 ± 0.86	1.12 ± 0.32
T3		74.26 ± 0.19^{a}	20.28 ± 1.23	1.1 ± 0.19^{a}	1.13 ± 0.43	1.31 ± 0.14
T4		76.16 ± 0.90^{b}	21.75 ± 0.57	1.21 ± 0.18^{ab}	1.41 ± 0.70	1.23 ± 0.15
Treatments	**Chemical compassion for Thigh%**	**Moisture**	**Protein**	**Fat**	**Soluble carbohydrate**	**ASH**
T1		73.69±0.22a	17.22±0.16a	$4.42\pm0.14^{*}$	$2.53\pm0.21^{*}$	$1.24\pm0.13^{*}$
T2		74.58±0.57b	17.53±0.11ab	4.66±0.10	1.10±0.50	1.23±0.15
T3		74.10±0.21a	17.56±0.21ab	4.31±0.34	2.88±0.48	1.15±0.61
T4		74.59±0.33b	17.82±0.25b	4.51±0.10	2.75±0.27	1.22±0.13

[a,b,c,d] Mean values within the same row were significantly different (P<0.05) increased from a to d

Conclusion

Utilization of lettuce leave as adding to standard diet for laying hen even the was very poor study on it but provide that improved for many performance properties further that garlic has main role to decrease percentage of fat and lead to decreases of triglyceride in main muscles this also reflected for human health.

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