IMPACT OF COMBINATION OF FENUGREEK SEEDS (*Nigella sativa*), LAURELS LEAVE (*Laurus nobilis*) AND VITAMIN C ON SOME EGG QUALITY CHARACTERISTICS OF QUAIL

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ABSTRACT

The results of the study showed the statistical significant difference (P≥0.05) for each of the relative weight of the yolk and egg whites, the relative weight of the shell and the Hauh unit, which is affected positively by the addition of ground fenugreek seed and Laurels leave to the quail bird's diet. There is also a statistically significant difference positively for each of the percentage of ash, protein and carbohydrates for qualis egg, while there is no significant difference for both the percentage of moisture and fat. The results of the mineral estimation showed an increase in each of the elements of iron, copper and cadmium from the addition of fenugreek and laurels leave, while there was no significant difference for the lead element. The results also showed an increase in the percentage of unsaturated fatty acids such as oleic, linoleic and linolenic, and a decrease in the proportions of saturated fatty acids. In addition, the results of the sensory evaluation of boiled quail eggs presented to the evaluators showed high acceptance in terms of color, flavor, taste and general appearance of all additives and their high conformity from the control sample.

Keywords: Quail egg, fenugreek seeds, laurel leaf powder, egg quality.

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تأثير مزج بذور الحلبة (*Nigella sativa*)، أوراق الغار (*Laurus nobilis*) وفيتامين C للعلف الحيواني على بعض خصائص الجودة لبيض طيور السمان

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الخلاصة

أظهرت نتائج الدراسة وجود فروق ذات دلالة إحصائية (P≥0.05) لكل من الوزن النسبي للصفار وبياض البيض، الوزن النسبي للقشرة ووحدة هو HUAH، والتي تأثرت إيجابياً بإضافة مسحوق بذور الحلبة واوراق الغار في غذاء طائر السمان، كما بينت النتائج وجود فروقات ذات دلالة إحصائية ايجابية لكل من نسبة الرماد والبروتين والكربوهيدرات لبيض السمان، بينما لا توجد فروقات معنوية لكل من نسبة الرطوبة والدهون، كما أظهرت نتائج تقدير المعادن زيادة معنوية لكل من عنصر الحديد والنحاس والكادميوم من إضافة مسحوق بذور الحلبة واوراق الغار، بينما لم يكن هناك فرق معنوي لعنصر الرصاص، كما أظهرت النتائج زيادة في نسبة الأحماض الدهنية غير المشبعة مثل الأوليكو اللينوليك واللينولينيك وانخفاض نسب الأحماض الدهنية المشبعة، فضلا عن ذلك، أظهرت نتائج التقييم الحسي لبيض السمان المسلوق والمقدم للمقيمين بالقبول العالي من حيث اللون والنكهة والمذاق والمظهر العام لجميع الإضافات ومطابقتها العالية لعينة السيطرة

الكلمات المفتاحية: بيض السمان، بذور الحلبة، مسحوق أوراق الغار، جودة البيض.

INTRODUCTION

Poultry meat and eggs are consumed in very large quantities. In particular, the consumption of eggs is increased in very high quantities for use in many food products such as cakes, pastries, pancakes and biscuits, as well as many different food entrees and around the world **(Makkar *et al.*, 2015; Seham *et al.*, 2018)**. Chicken eggs contain high-quality essential proteins for human consumption as well as other nutrients from fat, saturated and unsaturated fatty acids, nutrients and antioxidants **(Tolik *et al.*, 2014; Mohammed & Hussain 2016)**. But increased consumption may lead to high cholesterol, harmful blood, which affects the coronary heart disease and other arterial diseases **(Aziz *et al.*, 2012; Miranda *et al.*, 2015)**. Therefore, much scientific research has been conducted to investigate and were used many different herbal ingredients can improve the performance of quail egg quality due to its biological activity and were founded low cholesterol eggs **(Sharifi *et al.*, 2013; Nosrati *et al.*, 2017)**. Many efforts and research have found it difficult to select the genetic traits of low-cholesterol chickens, so research has focused on feeding animals and poultry with various grains and leafy plants to reduce cholesterol in eggs or meat **(Rahardja *et al*., 2010; Abdouli *et al.*, 2014)**. The seeds of fenugreek and laurel leave are known for their experimental therapeutic benefits for many diseases such as lowering blood sugar, anti-inflammatory, lowering blood cholesterol, defaming heat, anti-microbes and affecting blood qualities **(Tunsaringkarn *et al.*, 2013)**. Quail birds spread wildly in large parts of the world, particularly Asia, Europe and Africa **(Genchev 2012)**. The first of its hybrids are Japanese, belonging to the *Coturnix C. Japonica* species and used for meat and eggs **(Tunsaringkarn *et al.*, 2013)**. It has been shown that quail eggs are characterized by high containment of protein and unsaturated fats and vitamins, especially complex B and fine elements, as well as low cholesterol **(Teuşan *et al.*, 2012)**. Also it was found that quail eggs can help prevent sufferer of liver, kidney or gallbladder stones, and remove these types of stones. Quail eggs have higher nutritional value than those offered by other eggs with they are rich sources of antioxidants, minerals, and vitamins, and give us a lot of nutrition than do other foods **(Shibi *et al.*, 2016)**. Among the several ingredients attempted are the Fenugreek seeds and Laurel leave have been used due to their many therapeutic effects such as hypoglycemic, hypocholesterolemic, anti-inflammatory, antipyretic, antimicrobial and anthelmintic properties **(Riyed *et al.*, 2019)**. So, the objective of this study was to evaluate the effect of different concentration dietary addition of Fenugreek seeds and Laurels leave on physic-chemical properties on equal's egg and the extent to which the consumer accepts quail eggs by the sensory properties of eggs.

MATERIAL AND METHODS

Experimental design

A basal mash form diet for quail (female and males) were gave as in (Table 1). Thereafter, a total number of 380 eight week old quails (*Coturnixcoturnix japonica*) were randomly distributed into 5 groups (60 female and 16 males each) with five replicates per group (13 females and 3 males) and fed for eight week on basal diet involved with combination with different percent of Fenugreek seed (*Nigella sativa*), Laurels leave (*Laurus nobilis*) addition as follow: just a basal diet without any addition as control (T_1), 1 g Laurels leave/kg basal diet (T_2), 2 g Laurels leave/kg basal diet (T_3), 5 g fenugreek seed and 250 mg of vitamin C/kg basal diet (T_4), and 10 g fenugreek seed and 500 mg of vitamin C/kg diet (T_5) as in (Table 2). These were individually prepared by mixing the classic feed thoroughly with the corresponding ground fenugreek seed and Laurels leave at the combination level. All quails were housed in conventional type cages with dimensions of 60×50×30 cm^3 and kept under

appropriate conditions, also and quail were exposed to 16 h. light/day during the experiment. Feed in mash form and freshwater were add libitum supplied all the time.

Table (1): Ingredients and chemical composition of basal diet**.**

Composition (%)	
Corn	53.10
Soybean meal (48% protein)	33.10
Oil plant (Sun flower oil)	4.00
Premix	2.50
$CaCO_3$	7.00
NaCl	0.30
Nutrient Concentrations (%)	
Metabolizable energy (MJ kg^{-1})	2832.73
Crude protein (g kg^{-1})	20.50
Crude fiber (g kg^{-1})	3.62
Ca (g kg^{-1})	2.89
P (g kg^{-1})	0.40
Lysine (g kg^{-1})	1.12
Methionine (g kg^{-1})	0.47
Methionine+cysteine	0.80

Premix (WAFI) provided the following per kilogram of diet: vitamin A, 440000 IU; vitamin D_3, 120000 IU; vitamin E (DL-tocopheryl acetate), 1200 mg; K_3 100 mg; B_1/thiamin 120 mg; B_2/riboflavin 280 mg; B_6/pyridoxine 160 mg; B_{12} 1400 mg; folic acid 40 mg; biotin/vitamin H 100 µg; iron 2000 µg; copper 400 µg; Mg 3200µg; zinc 2400 µg; selenium 10 µg; colin chloride 1200 mg and provided lysine 1.6%; methionine 6%; methionine+cystine 6%; Ca 23.2%; available phosphorous 9.3%; Na 4.9%.

Table (2): Experiment design**.**

Treatments	Diet
T_1	basal diet only
T_2	1 g Laurels leave /kg diet
T_3	2 g Laurels leave /kg diet
T_4	5 g fenugreek seed and 250 mg of vitamin. C/kg diet
T_5	10 g fenugreek seed and 500 mg of vitamin. C/kg diet

Fenugreek seed and Laurels leave preparation

The fenugreek seeds and laurels leaves were obtained from the herbal store in Baghdad in May 2019. Fenugreek seed and Laurels leave were cleaned manually to remove foreign matter and damaged seeds then grounded into fine powder with electrical grinder, and then kept in sealed polyethylene bags until used for different combinations to basal diet for the fourth treatments. It was used Vitamin C (natural vitamin C-1000 mg, Dis. By TEM industries Swedesboro, NJ 08085).

Egg preparation

Intact eggs were collected twice a day. The eggs were sanitized by using 1% sodium hypochlorite solution for 30 seconds **(Alleoni & Antunes, 2004)**. Collect quail eggs daily and transferred to the lab of market research and consumer protection center, university of Baghdad, Iraq. The eggs were placed in refrigerator at 5°C until it used for physic-chemical determination. Five random eggs were individually weighted (replicate 3 times) for all eggs measured.

Egg quality characteristics

Five eggs were individually weighed and broken out onto a flat surface dish where white and yolk height (in mm) was measured precisely by using a micrometer, yolk were

separated from the white and then weighed replicate 3 times with a (Sartorius AG Gottingen BL 3100/ Germany) balance. The shells were carefully washed and cleaned of any adhering albumen, dried for 48 hr at room temperature 25°C, then weighed. Albumen weight was calculated by the difference between total egg weight and shell weight plus yolk. Yolk, albumen, and shell percentages were determined in relation to the egg weight, shell thickness without membrane was measured with Vernier Caliper tow sided in µm. Also, yolk color was determined with Swiss La Roche scale scrod from 0-13, 0 were very light yellow and 13 were very dark yellow or orange. Haugh unit, which is one of the factors that are reflecting the internal quality of eggs **(Aboonajmi *et al.*, 2010)** was measured by using the following equation:

$$Hu = 100 \log (H - 1.7\ W\ 0.037 + 7.57)$$

Where, Hu = Haugh unit, H = white height (mm), W = egg weight (g)

Chemical analysis of quail eggs

Whole quail egg analysis were conducted which involved; moisture, crude protein, crude fat, ash, carbohydrates, minerals and fatty acids contents **(AOAC 2000)**. The eggs were washed, carefully opened and homogenized using the hand stirring method for nutrient content determination. The crude protein content was determined using the Kjeldahl method by a factor 6.25 was used to estimate the crude protein content from sample percentage nitrogen. The crude fat content was determined by the Soxhlet extraction method using diethyl ether as the solvent. Total ash content was determined through ashing in scientific laboratory muffle furnace (C Carbolite, Parsons Lane, Hope, S33 6RB, England) at 550°C for 4-5 hr. Carbohydrates expressed by subtractions.

Minerals analysis

Two gram of sample was placed in dry crucible and then desiccate in a muffle furnace (C Carbolite, Parsons Lane, Hope, S33 6RB, England) at 550°C for 4 hr. After cooling the crucible, diluted deionized water and with the addition of 5 mL of hydrochloric acid, boiled, cooled at room temperature, filtered in a volumetric flask capacity of 100 mL, then completed also with deionized water. Then the metals were measured are potassium, magnesium, sodium, iron, and zinc concentrations in the samples were assessed with an atomic absorption spectrophotometer (Schimadzo, AA-7000). Pb, Fe, Cu, Co, Ni, and Cd were determined according to the method **(Lalwani 2011; Tanasorn *et al.*, 2013)** by using flam atomic absorption (Fame Emission) from company Shimadzo (Model AA-7000), in lab of market research and consumer protection center, University of Baghdad, Iraq.

Fatty acid analyses

For fat content determination lipids were extracted from 10 g egg yolk, then FA were measured by the GC analysis as **(Omri*et al.*, 2015)**.

Sensory Evaluation

The sensory properties of consumers were applied for the boiled quail egg. Ten evaluators who are working in the laboratory of the market research and consumer protection center given free time for the evaluation. The characteristics evaluated were color, flavor, texture and overall acceptability. For each sample, evaluators scored their liking of these

characteristics using a five-point hedonic scale (1 = dislike very much, 2 =dislike slightly, 3 = neither like nor dislike, 4 = like slightly, 5 = like very much) **(Abdouli*et al.*, 2014)**.

Statistical analysis

One way analysis were done using General Linear Model (GLM) procedure of Statistical package SAS version 9.1 **(SAS institute, 2004)**. The portability value were test according to LSD test (P≥0.05).

RESULTS AND DISCUSSIONS

The physical characteristics of quail egg with different diet treatments

The weights of quail eggs and their components are shown in (Table 2). Egg weight is among the most important parameters not only for consumers, but also for egg producers **(Genchev 2012)**. Results of this study showed that the relative weight of the egg was not statistically significant compared to the control. But the relative weight (as a percentage), of eggs yolk and whites was statistically significant (P≥0.05) as in Table 3.Where it was found that the increase in the percentage of addition of laurels leave 1 and 2 g/kg of weight of diet led to an increase in the weight of egg yolk statistically to 4.6 and 5.4 g, respectively, and also increased the relative weight of egg yolk significant (P≥0.05) statistical increase higher where it was 39.45 and 44.85 increased the proportion of addition laurels leave as it is in (Table 3) compares control treatment. On the other hand, white egg weight (albumen) was statistically higher (p≥ 0.05) reduced to 5.8 and 5.9, and egg whites percentage decreased statistically to 49.74 and 48.17, respectively, compared with control. This result comes in accordance with **(Park *et al.*, 2018; Habibi *et al.*, 2019)**. The content of the active ingredients and vitamins of fenugreek seeds and laurel plant, as well as the main components of protein and fats and thanks to the good absorption of birds led to an improvement in the performance of eggs **(Morshedi *et al.*, 2018)**. Eggshell integrity is important not only from economic point of view, but also with regard to human health safety **(Genchev 2012)**. The egg shell weight was significant higher (p≥ 0.05) lower than the control in the following table, that was similar result with **(Zita *et al.*, 2013)** reported. Also, the egg shell % were decreased significant (P≥0.05) to 9.94 and 9.42 for 5 g and 250 mg vitamin C and 10 g and 500 mg vitamin C of fenugreek supplemented diet compared with control group. **Alasahan *et al.* (2015)** and **Hrnèár *et al.*, (2014)** also reported lower egg shell percentages 8.74 and 8.89%. Thus reduction may be due to incubation process is less successful that's effect shell to be thinner than average, eggs shape are more rounded rather than pointed, and the egg contents not firm as presented by **(Azouz 2020)**. As well as the percentage of the Haugh unit is found to be statistically significant (P≥0.05) decreased in the proportion of the addition of laurel leaf to animal feed and reached to increase the percentage of addition 1 and 2 g/kg higher respectively compared to control. Since Haugh unit is indicator of internal egg quality and this is high in this study for the eggs from all treatments, it can be said that the eggs from these treatments are of good quality. High internal egg quality of quail eggs was also reported by **(Omri *et al.*, 2015; Abdulwahid *et al.*, 2018)**. The Haugh unit (Table 2) which is depending on egg weight and albumen height is an expression refers to the albumen quality and hence to the egg quality, the higher Haugh value, the better albumen quality of the egg **(Habibi *et al.*, 2019)**. High internal egg quality of quail eggs was also reported by **(Omri *et al.* 2015)**. It was found by adding Laurel leaves to the diet decreased the Haugh unit significantly (P≥0.05) compared with control group, also Haugh unit decreased significantly (P≥0.05) by adding 10 g/kg plus 500 mg/kg of vitamin C as shown in (Table 2). The yolk color was affected by adding fenugreek seed and Laurel leaves on quail diet. The color of the yolk is higher by adding Laurels leave compared with control, this may be due to

increase the percent of chlorophyll content in Laurels leave so enhance the yolk color. While, the yolks color increased slightly with fenugreek seed as shown in (Table 2). Similar results were founded by **(Saki *et al.*, 2014)**.

Table (3): Effect of fenugreek and Laurels leave on some egg qualities.

Levels of fenugreek and Laurels leave (%)						LSD value
Components	T_1	T_2	T_3	T_4	T_5	
Egg weight (g)	11.20	11.66	12.04	11.77	11.15	NS
Yolk weight (g)	3.80	4.60	5.40	6.90	6.20	1.09 *
Yolk (%)	33.92	39.45	44.85	58.62	46.64	4.73 *
Yolk height (mm)	16.1	13.8	12.7	11.5	12.8	2.94 *
Albumen weight (g)	5.90	5.80	5.80	3.70	3.90	1.33 *
Egg Albumen (%)	55.10	49.74	48.17	31.44	43.95	4.84 *
Shell weight (g)	1.40	1.25	0.84	1.17	1.05	0.447 *
Egg shell (%)	13.10	10.72	6.89	9.94	9.42	3.52 *
Haugh Unit	109.391	96.150	95.9110	93.636	90.961	15.62 *
Yolk Color (LR)	6.60	6.86	6.90	5.35	5.06	NS

T_1= control group without any addition; T_2= who fed 1g Laurel leaf /kg diet; T_3= who fed 2g Laurel meal /kg diet; T_4= who fed 5g fenugreek seed and 250mg of vitamin C/kg diet; T_5= who fed 10g fenugreek seed and 500mg of vitamin C/kg diet.

Chemical composition

The chemical composition of quail eggs as shown in (Table 4), showed no statistical difference in moisture and ash contents (P>0.05) between the treatments compared with control group. Whereas, the proximate compositions of protein and fat showed highly different by different treatments. Protein content increased significantly (P≥0.05) by adding fenugreek seed and Laurel leaves to standard diet as followed 18.0, 18.6, 19.0 and 19.4 for groups 2, 3, 4 and 5, respectively, compared with control group 1. This result accordance by finding **(Shibi *et al.*, 2016)**. The content of fat of the quail egg was 34.2% in control group, while by adding the Laurel leaves decreased significantly (P≥0.05) to 33.6 and 33.0 with 1 and 2 g/kg of diet, respectively. In contrast, the percent of fat increased significantly (P≥0.05) to 34.9 and 35.5% by adding 5 and 10 g fenugreek seed/ kg, respectively. Thus increasing due to the high content of fat in fenugreek seed. This result were similar that founded by **(Tolik *et al.*, 2014; Azouz 2020)**.

Table (4): Effect of fenugreek and Laurels leave on some eggs chemical composition.

Levels of fenugreek and Laurels leave(%)						LSD value
Components	T_1	T_2	T_3	T_4	T_5	
Moisture (%)	41.4 ± 1.58	41.9 ± 2.07	42.4 ± 1.52	40.0 ± 1.37	38.8 ± 1.04	NS
Ash (%)	5.0 ± 0.16	4.3 ± 0.09	4.8 ± 0.13	5.0 ± 0.16	5.0 ± 0.16	0.502 *
Protein (%)	17.4 ± 0.53	18.0 ± 0.74	18.6 ± 0.62	19.0 ± 0.87	19.4 ± 0.79	1.833 *
Fat (%)	34.2 ± 1.28	33.6 ± 1.05	33.0 ± 1.17	34.9 ± 2.08	35.5 ± 1.41	NS
CHO (%)	2.0 ± 0.05	2.2 ± 0.07	1.2 ± 0.02	1.1 ± 0.02	1.3 ± 0.07	0.651 *

T_1= control group without any addition; T_2= who fed 1 g Laurel leaf /kg diet; T_3= who fed 2 g Laurel meal/kg diet; T_4= who fed 5 g fenugreek seed and 250 mg of vitamin C/kg diet; T_5= who fed 10 g fenugreek seed and 500mg of vitamin C/kg diet.

Minerals content

The mineral analysis of quail eggs were presented in (Table 5). It was clearly showed that quail eggs have high minerals content with iron and calcium, and the content were increased significantly (P≥0.05) by increasing the percent of fenugreek seed and Laurels leave

addition, this may be due to these seed and leaves contain a high percentage of iron and calcium. While, heavy metal contamination as Cd, Pb and Ni were very little and less than Iraqi standard quality. This result were similar that founded by **(Abdulwahid *et al.*, 2018)**.

Table (5): Effect of fenugreek and Laurels leave on mineral content of some quail eggs.

Treatments	Minerals content (ppm)				
	Fe (ppm)	Cu (ppm)	Cd (ppm)	Pb (ppm)	Ni (ppm)
T_1	0.2519	1.2778	0.0883	0.4925	-
T_2	0.1926	0.7044	0.1310	0.5871	-
T_3	0.4593	0.3511	0.1594	0.6344	-
T_4	0.3259	0.3178	0.0457	0.5140	-
T_5	0.4148	0.3644	0.0362	0.6430	-
LSD value	0.107 *	0.,552 *	0.061 *	NS	-

T_1= control group without any addition; T_2= who fed 1gm Laurel leaf /kg diet; T_3= who fed 2gm Laurel meal /kg diet; T_4= who fed 5gm fenugreek seed and 250mg of vit. C/kg diet; T_5= who fed 10gm fenugreek seed and 500mg of vit. C/kg diet.

Fatty acids composition

Quail is the good source of both saturated and unsaturated fatty acids as pointed by **(Augustine *et al.*, 2018)**. Saturated fatty acids play important role in different biological functions like source of metabolic energy and in cell membrane structure formation. In our studies, we found that boiled quail eggs used in study contain saturated and unsaturated fatty acids. As shown in (Table 6), Palmitic acid (C14:0) is present in higher percent in control group, then decreased significantly ($P \geq 0.05$) in group 2 that's diet supplemented with 2 g/kg diet which decreased to 26.3%. Also, with 5 g fenugreek and 250 mg of vitamin C, the palmitic acid decreased significantly ($P \geq 0.05$). While, by increased the fenugreek seed to 10 g and 500 mg of vitamin C to each kg of diet, the saturated palmitic acid increased compared with control, followed by stearic acid (C18:0) as shown in (Table 6). Also, it was shown clearly quail egg contain good percent of unsaturated oleic acid 39.05 in control group. By adding 1 and 2 g of Laurel leaves increased significantly ($P \geq 0.05$) which were 44.45 and 43.01, respectively. In addition of that, it was shown that by adding 10 g of fenugreek with 500 mg of vitamin C increased the linoleic acid to 19.87%, while other groups 1, 2, 3, and 4 shows neglected contents **(Bayomy *et al.*, 2017)**. It is similar with results reported by **Omri *et al.* (2019); Reda *et al.* (2020)**. They found that Palmitic acid (C16:0) was the major fatty acid, followed by stearic acid (C18:0) Whereas Oleic (C18:1) was highest value in all fatty acids, also, they reported that Quail eggs have lower content of polyunsaturated fatty acid 25.1% than chicken eggs 31.3%. It is possible to conclude that it is possible to improve the content of quail eggs from monounsaturated and di unsaturated fatty acids and reduce the proportion of saturated fatty acids by fortifying the food provided to birds with seeds and medicinal herbs such as the fenugreek seeds and laurels leave. This result accordance by finding **(Tatiana *et al.*, 2013; Omri *et al.*, 2015)**.

Table (6): Effect of fenugreek and Laurels leave on fatty acid composition of some eggs .

Fatty acid (%)	Levels of fenugreek and Laurels leave (%)					
	T_1	T_2	T_3	T_4	T_5	LSD value
Palmitic C_{16}	28.20	27.42	26.31	25.44	27.25	NS
Palmiloleic $C_{16:1}$	3.92	5.51	4.18	3.42	4.73	NS
Stearic C_{18}	8.98	7.79	8.23	39.09	6.74	11.49 *
Oleic $C_{18:1}$	39.05	44.95	43.01	22.16	10.32	7.64 *
Linoleic $C_{18:2}$	19.00	13.15	17.17	20.56	30.49	3.42 *
Linolenic $C_{18:3}$	2.50	2.71	2.80	17.23	19.87	3.96 *

T_1= control group without any addition; T_2= who fed 1g Laurels leave/kg diet; T_3= who fed 2 g Laurel meal/kg diet; T_4= who fed 5g fenugreek seed + 250mg of vitamin C/kg diet; T_5= who fed 10 g fenugreek seed + 500 mg of vitamin C/kg diet.

Sensory properties

Sensory properties was conducted to measure the organoleptic characteristics of sense organic, which include color, taste, odor, flavor and overall acceptance of boiled quail eggs. All the necessary general precautions have been taken for the taste tests in terms of providing the right atmosphere, providing water bottles, drying wipes, suitable light, Quiet….etc. Evaluation of sensory properties of boiled quail eggs are shown in (Table 7). In general, the assessment of panelists indicates high like ability, perhaps most people now care and by the belief that these do not contain cholesterol or its content is irrelevant and greater value nutritious. The results of the study came close to what was found by the study **(Abdouli *et al.*, 2014)**. Although, it was found fenugreek seed supplementation with vitamin C significantly decreased (P≥0.05) compared with laurels leave especially the color of egg yolk was very pale and the egg albumin was been spread when egg was broken **(Benakmoum *et al.*, 2013)**.

Table (7): Effect of fenugreek and Laurels leave on sensory properties of some boiled quail eggs.

Properties	Treatments					
	T_1	T_2	T_3	T_4	T_5	LSD value
Color	4.2	4.5	4.5	4.3	3.6	0.782 *
Taste	4.4	4.6	4.5	4.3	4.5	NS
Odor	5.0	4.6	4.6	4.5	4.5	NS
Flavor	4.3	4.4	4.5	4.2	4.2	NS
Texture	4.5	4.6	4.6	4.6	4.5	NS
Overall acceptability	4.5	4.6	4.6	4.0	4.0	NS

T_1= control group without any addition; T_2= who fed 1 g Laurel leaf/kg diet; T_3= who fed 2 g Laurels leave/kg diet; T_4= who fed 5g fenugreek seed + 250 mg of vitamin C/kg diet; T_5= who fed 10 g fenugreek seed + 500 mg of vitamin C/kg diet.

CONCLUSION

It was found the significant (P≥0.05) differences were found in egg, shell, albumen and yolk weights by adding different percent of fenugreek seed and Laurel leaf. In addition, it was found that the addition of fenugreek seed and Laurel leaves to poultry feed led to raise the proportion of monounsaturated fatty acids, such as oleic and linoleic, and it is not insignificant (P≥0.05) in relation to blood serum lipid profile (notably the decrease in undesirable low-density cholesterols VLDLs and LDLs. Also, it was found no significant (P≥0.05) differences among different treatment on sensory characteristics compared with control, that means a high acceptable by panelists. Therefore, it is necessary to encourage and transfer this knowledge to the people so that they can obtain many benefits of healthy food and may be part of the

solution of many nutritional problems, especially in developing countries to enable them to obtain essential animal proteins and health from eating healthy quail egg safe health.

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