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EFFECT OF DIETARY GROUNDED FENUGREEK (*TRIGONELLA FOENUM GRAECUM L.*) SEEDS AND GINGER (*ZINGIBER OFFICINAL*) RHIZOMES POWDER ON PERFORMANCE AND SOME BLOOD TRAITS OF LAYER HENS

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Abstract

This study was conducted to investigate the effect of grounded fenugreek seeds (GFS) and ginger rhizomes powder (GRP) on productive performance and some blood traits of Layer Hens. Ninty Lohman Brown laying hens at 20 weeks old were fed regular layer diet during the preliminary period of the experiment (first two weeks of the experiment) then the birds divided randomly into five treated groups: T_1(control)no any addition,T_2 and T_3 included 1% and 2 %(GFS) however T_4 and T_5 included 1% and 2%(GRP) respectively. The results revealed that T_2, T_4 and T_5 showed significant increase ($p<0.05$) in egg production percentage at 5th and 6th production period (90.10, 90.44 and 90.50) %,(89.13,88.70 and 90.09) %respectively. Significant increase ($p<0.05$) in egg weight produced by hens in all treatments with the addition as compare to control group at the 3th production period. T_2 and T_4 showed significant increase in feed consumption as compared to the control group during the production periods (3th, 4th, 5th and 6th) but gave the best feed conversion ratio during the production periods (4th,5th,6th) as well as during the whole production period, meanwhile showed T_1 (control) significant increase ($p<0.05$) in the means of change in live body weight over all addition treatments during the 4th,5th,6th and at the whole rearing period. Blood serum glucose was decreased significant ($p<0.01$) due to the effect of adding GFS and GRP to the treated diets as compared to the control group at 34th and 46th weeks of age, however led the addition of 2% GFS and GRP to the diets significant increase of the total blood protein at the 46th week of age in comparison with control group. Significant improvement in total blood albumen of all addition treatments (T_2-T_5) at the 34th week of age as compared to T_1, T_3 and T_5 which were continued in showing the highest blood albumen at 46th weeks of age and they gave the highest blood serum globulins as compared to T_4 at 34th and 46th weeks of age. The total cholesterol, triglycerides and the Low Density Lipoprotein(LDL) of blood were significantly decreased($p<0.05$) in hens of control group as compared with treated groups mean while no significant difference between the different treatments in High Density Lipoprotein (HDL) level of blood serum. It can be concluded from this study that the addition of GFS and GRP to layer diet will improve the performance of the hens and some of their blood traits.

Key words *:* grounded fenugreek seed, ginger rhizomes Powder Layer hen, performance, blood traits.

Introduction

Fenugreek (*Trigonella foenum graecum L.*) and Ginger(*Zingiber officinal*) are common medicinal herbs used in preparing human feed as spices which improves taste and digestibility. The recent studies concerned poultry nutrition revealed that introducing the medicinal herbs in poultry diets as feed additives to their contents of some affective natural substances, resulted to some significant effects on many undesirable microorganisms and improved birds performance as be considered as an natural antioxidant which enhance birds immunity (Bukhari *et al.,*2008; Dash *et al.,* 2011; Nathiya *et al.,*2014; Adil *et al.,* 2015; Al-Hameed *et al.,*2015; Khorshidian *et al.,* 2016; Saaci *et al.,*2018 and Ali *et al.,*2019).

Fenugreek is one of these important medicinal herbs as its content: flavonoids, saponins, polysaccharides and alkaloid (Xue *et al.,* 2007; Mullaicharam, 2013)which their treatment effects rolled as antibacterial.It is being used as growth promoter in broiler (Alloui *et al.,* 2012; Elbushra, 2012; Weerasingha and Atapattu, 2013; Abdel-

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Rahman *et al.,* 2014; Mamoun *et al.,* 2014; Qureshi *et al.,* 2015; Patel *et al.,* 2017) and in Layer hens diet (Abdouli *et al.,* 2014).

Ginger is known as one of the oldest global spices which rolled as digestion and metabolics regulation substance due to its content of some treatment substances such as gingerol, shogaols, gingerdiol, gingerdicne and some phenolice ketone derivatives (Fuhrman *et al.,* 2000; Stoilova *et al.,* 2007; Zhao *et al.,* 2011). It is being used as growth promoter in broiler (Belal *et al.,* 2018; Shewita and Taha, 2018) and Layer diet (Al-Hameed, 2012a; Al-Hameed, 2012b; Malekizadeh, 2012; Zomrawi *et al.,* 2014 ; Fahar *et al.,* 2019).The objective of this study were to assess the effects of supplementing (GFS) and (GRP) to the diets on laying hens performance and some blood traits.

Materials and Methods

Ninety Lohman Brown laying hens 20 weeks age were housed in individual cages (40 x 40 x 40 cm). They fed and regular layer diet during the 1st 2 weeks of the experiment which considered as preliminary period to the experiment. At the age of 22 weeks, the hens were individually weighed and distributed randomly into five treatment groups each of three replicates (6 hens / replicate). The treatments were as follows: T1 (control) no addition, T_2 and T_3 included addition of 1% and 2% (GFS) respectively, T_4 and T_5 included 1% and 2% of (GRP)respectively. The regular layer basal diet table1 was formulated to satisfy nutrient

Requirements of laying hens according to the strain catalog recommendations, light regime of 16h constant lighting and 8h dark and continuous ventilation were provided to the birds which were kept under uniform management conditions throughout the experimental period (20-46 weeks of age).

Individual body weights were recorded at the beginning and at the end (20 and 46 weeks of age) of the experiment to calculate live body weight changes,egg production and egg weight were recorded daily, feed intake was recorded weekly in order to calculate feed conversion. Blood samples were collected at the end of 34th and 46th weeks of age from brachial vein (8 birds per treatment were taken randomly). Serum glucose, total protein, albumin, cholesterol, triglycerides, HDL, LDL were measured according to Trinder (1969), Doumas *et al.*, (1981), Coles (1974), Zake *et al*., (1954), Sidney and Barnard (1973) respectively. The albumin content was deducted from the total protein to obtain globulin level. A completely randomized design (CRD) within the statistical analysis system (SAS, 2001) was used to analysis the data for the effect of difference factors in the studied parameters.

Table 1: Composition and chemical calculated analysis of experimental diet.

T_5	T_4	T_3	T_2	T_1	Ingredients %
31.0	31.0	31.0	31.0	31.0	Yellow corn
32.5	32.5	32.5	32.5	32.5	Wheat
2.0	3.0	2.0	3.0	4.0	Bean
16.0	16.0	16.0	16.0	16.0	Soybean meal (44%)
8.0	8.0	8.0	8.0	8.0	*protein concentrate
---	---	2.0	1.0	---	GFS
2.0	1.0	---	---	---	GRP
0.5	0.5	0.5	0.5	0.5	Vegetable oil
7.7	7.7	7.7	7.7	7.7	Limestone
0.3	0.3	0.3	0.3	0.3	Salt
100	100	100	100	100	Total
					Calculated analysis**
2772	2760	2775	2767	2756	ME(kcal/kg)
18.30	18.27	18.30	18.52	18.55	Crude protein%
151.5	151.1	151.6	149.40	151.00	CP ratio
0.74	0.73	0.73	0.74	0.73	Methionin+cysteine%
0.81	0.82	0.82	0.83	0.82	Lysine%
3.78	3.63	3.61	3.60	3.60	Calcium
0.59	0.55	0.51	0.50	0.50	Avialable phosphorus%
3.93	3.89	3.94	3.89	3.84	Crude fiber%
3.13	3.18	3.42	3.25	3.10	Crude fat%

*Provides per kg of diet: 40% crude protein, 2500 kcal/kg ME. ** NRC (1994).

Results and Discussion

The effect of supplementation of GFS and GRP to the layer diets on egg production percentage is presented in (Table 2). The data revealed that the addition of GFS at the rate of 1% and of GRP at the rates of 1% and 2% to the layer diets (T_2, T_4 and T_5) resulted in significant increase ($p<0.05$) in egg production percentage as compared to T_3 which contained 2% GFS and T_1 (control) at the 5thand 6th production periods.

Data of table 3 revealed that significant differences in the means of egg weights that recorded during the3th production period, in which hens of treatments 3,4 and 5 gave the highest egg weights as compared to that produced from hens of T_2 and control group T_1.

It can be seen from data of table 4 that no significant difference between all treatments under study in the means of feed consumption amounts during the 1st and 2nd production periods meanwhile the differences became significant during all other

Table 2: The effects of supplementing dietary GFS and GRP to the Layer diets on hen day egg production (H.D %)

H.D. % at production periods (weeks)							
Mean 22-45	642-45	538-41	434-37	330-33	226-29	122-25	Treatment
89.03±1.81	87.70±2.22^{b}	89.00±1.33^{b}	89.61±1.14	89.50±1.32	89.40±1.61	89.01±1.11	T_1
89.76±1.77	89.13±1.11^{a}	90.10±1.01^{a}	90.31±1.00	90.17±0.98	89.57±177	89.30±1.14	T_2
89.35±1.31	88.20±2.18^{b}	89.30±1.19^{b}	90.44±0.78	90.20±0.87	89.10±1.23	88.88±2.11	T_3
89.89±1.76	89.70±1.86^{a}	90.44±1.09^{a}	90.18±0.99	90.10±0.65	89.88±1.78	89.01±1.00	T_4
89.86±1.76	90.09±1.01^{a}	90.50±1.12^{a}	90.22±1.00	90.13±0.34	89.12±1.12	89.11±1.11	T_5
N.S	*	*	N.S	N.S	N.S	N.S	Significance Level

Means in the same row with different letters are significantly different at ($p \leq 0.05$), N.S: non-significant, T_1:control, T_2:1%GFS, T_3:2% GFS, T_4:1%GRP, T_5:2%GRP.

Table 3: The effects of supplementing dietary GFS and GRP to the Layer diets on egg weights (gm).

Egg weight (gm) at production periods(weeks)							
Mean 22-45	642-45	538-41	434-37	330-33	226-29	122-25	Treatment
60.00±0.44	62.45±0.74	61.09 ±1.34^{b}	60.85±0.62	59.20 ±0.04^{b}	58.55±0.66	57.80±0.33	T_1
60.05±0.11	62.31±0.56	61.84 ±1.55^{a}	60.90±0.88	59.14±0.21^{b}	58.52±0.43	57.61±0.33	T_2
60.60±0.22	62.00±0.10	61.87 ±1.70^{a}	61.00±1.32	61.01 ±0.72^{a}	59.11±0.22	58.11±0.32	T_3
60.31±0.17	62.01±0.24	61.75 ±1.53^{a}	61.00±1.32	60.83 ±0.11^{a}	58.77±0.66	57.52±0.71	T_4
60.58±0.07	62.07±0.22	62.02 ±2.91^{a}	61.11±1.45	61.03 ±0.89^{a}	59.13±0.23	58.17±0.66	T_5
N.S	N.S	N.S	N.S	*	N.S	N.S	Significance Level

Means in the same row with different letters are significantly at different at ($p \leq 0.05$), N.S: non-significant, T_1: control, T_2: 1%GFS, T_3: 2%GFS, T_4: 1%GRP, T_5: 2%GRP.

Table 4: The effects of supplementing dietary GFS and GRP to the Layer diets on feed consumption (gm\hen\day).

Feed consumption (gm\hen\ day) at production periods(weeks)							
Mean 45-22	645-42	541-38	437-34	333-30	229-26	125-22	Treatment
109.4 0.11^{b}±	113.1 1.34^{b}±	111.2 1.35^{b} ±	110.1 ±1.22^{b}	108.8 0.30^{b} ±	106.31.20±	106.60.80±	T_1
110.90.21^{a}±	113.7 1.35^{ab}±	113.8 2.22^{a} ±	112.8 ±1.67^{a}	110.3 0.78^{a}±	107.71.04±	107.10.40 ±	T_2
111.4 0.76^{a}±	115.2 2.76^{a}±	114.1 2.76^{a} ±	114.1 1.98^{a}±	111.5 0.88^{ab}±	107.31.40±	106.30.60±	T_3
111.3 0.56^{a}±	116.1 2.99^{a}±	114.0 2.88^{a} ±	113.7 ±2.21^{a}	109.3 ±0.11^{ab}	107.71.55±	107.20.30±	T_4
111.2 0.55^{a}±	115.6 2.66^{a}±	114.0 2.88^{a} ±	114.3 ±2.87^{b}	109.1 0.12^{ab}±	107.51.34±	106.80.90±	T^5
*	*	*	*	*	N.S	N.S	SignificanceLevel

Means in the same row with different letters are significantly different at ($p \leq 0.05$), N.S: non-significant, T_1: control, T_2: 1%GFS, T_3: 2%GFS, T_4: 1%GRP, T_5: 2%GRP.

Table 5: The effects of supplementing dietary GFS and GRP to the Layer diets on feed efficiency (gm feed\gm egg).

Feed efficiency(gm feed \ gm egg) at production periods(weeks)							
Mean 22-45	642-45	538-41	434-37	330-33	226-29	122-25	Treatment
2.08 2.05^{a} ±	2.332.60^{a} ±	2.20 2.44^{a} ±	2.01 ±2.12^{a}	1.931.18±	1.871.66±	1.711.21±	T_1
1.86 1.43^{b} ±	1.94 1.60^{b} ±	1.90 1.88^{b} ±	1.87 ±1.66^{b}	1.881.06±	1.791.72±	1.831.45±	T_2
1.79 1.20^{b} ±	1.84 1.45^{b} ±	1.89 1.80^{b} ±	1.84 1.60^{b} ±	1.881.06±	1.811.32±	1.471.11±	T_3
1.87 1.44^{b} ±	1.93 1.64^{b} ±	1.91 1.80^{b} ±	1.93 1.86^{b} ±	1.901.13±	1.801.30±	1.771.32±	T_4
1.83 1.32^{b} ±	1.88 1.60^{b} ±	1.73 1.54^{b} ±	1.77 1.32^{b} ±	1.871.09±	1.821.33±	1.881.54±	T_5
**	**	**	**	N.S	N.S	N.S	SignificanceLevel

Means in the same row with different letters are significantly different at ($p \leq 0.01$), N.S: non-significant, T_1: control, T_2: 1%GFS, T_3: 2%GFS, T_4: 1%GRP, T_5: 2%GRP.

production periods (3rd,4th,5th and 6th periods), in which hens of all remainder treatments contained herbs (T_2-T_5) consumed high feed as compared to control group (T_1) and the whole mean of this trait.

Data in table 5 revealed, that the best feed efficiency values were recorded for hens in treatments with addition GFS and GRP as compared to control group during the 4th,5th and 6th production periods as well as in calculating the whole mean of this trait.

The changes in the means of live body weights of the hens of this experiment can be seen in table 6 in

Table 6: The effects of supplementing dietary GFS and GRP to the Layer diets on Weight gain (gm).

Weight gain(gm)at production periods(weeks)						
645-42	541-38	437-34	333-30	229-26	125-22	Treatment
41.7 ±1.96[a]	73.7 ±2.31[a]	81.3 ±2.33[a]	83.3±3.30	87.8±0.88	85.0±0.83	T_1
30.4±1.01[b]	52.2 ±0.87[b]	67.3 ±0.44[c]	81.1±2.34	84.4±0.80	83.4±1.33	T_2
25.1 ±1.33[b]	65.5±1.45[ab]	75.3 ±1.22[b]	79.1±1.84	82.2±0.78	79.8±0.89	T_3
20.2 ±1.10[b]	41.4 ±0.76[c]	65.6 ±0.34[c]	79.8±1.66	81.1±0.79	82.2±1.03	T_4
19.7 ±1.04[b]	40.7±0.66[c]	72.7 ±1.70[bc]	75.5±1.06	80.2±0.70	84.3±1.65	T_5
*	*	*	N.S	N.S	N.S	SignificanceLevel

Means in the same row with different letters are significantly at different at ($p \leq 0.05$), N.S: non-significant, T_1: control, T_2: 1%GFS, T_3: 2%GFS, T_4: 1%GRP, T_5: 2%GRP.

which birds of control group (T_1) gave significantly ($p<0.05$))the heaviest body weights as compared to those in all other treatments (T_2-T_5) during the 4th,5th and 6th production periods.

Such improvement in birds performance of treated groups which contained GFS and GRP during the latest production weeks may be deu to the effects of their contents of the affective substances such as (flavonoids and antioxidant substances)in improving the feed efficiency of the birds which reflects on positive effects on remained performance traits, such materials rolled an important action that balance the microbes contents of the digestive tract of the birds which increase birds immunity, as well as their contents in aldehydes, alkaloids, and spaniels which work as natural antibacterial and natural antioxidant and growth promoters, that enhance body immunity throughout their effects on birds immunity system so it leads in improving birds production characteristics and birds health (Bukhari *et al.,* 2008; Dash *et al.,* 2011; Zhao *et al.,* 2011; Khorshidian *et al.,* 2016). The superiority of birds in T_4 and T_5 over those in control group may be deu to the content of GRP in some effective substances such as gingerols which stimulate the peptides juice in animal digestive tract (stoilova *et al.,* 2007) so it increase birds efficiency in make use of food which support live activity and production performance of birds, this finding are in agreement with results reported by Umatiya *et al.*, (2018).

This finding are in agreement with those reported by Malekizadeh *et al.*, (2012) and AL-Hameed (2012a) that the addition of GRP to layer diets led to significant increase in egg production percentage during the latest production periods of egg production and in the amount of feed consumption from other hand the ginger treatments showed the best feed efficiencies as compared to control group (Shewita and Taho, 2018; Fahar *et al.,* 2019). Meanwhile Zomrawi *et al.*, (2014) demonstrated that no significant differences between the treatment ginger rhizomes powder added at the levels of 0.5, 1.0 and 1.5% to the layer diets as compared to control groups in above traits.

The treatments of addition of fenugreek and ginger gave the lowest values in changes in live body weights as compared to that in control group which was free from addition so that mean that the highly consumption of feed directed to egg production of hens and not their live body weights. However Incharon and Yamauch (2009) didn't find significant differences between treatments contained fermented of dried zingber (at 1% and 5% of the diet) and control group (free from addition) in initial and final body weight of the hens.

The effects of supplementation of GFS and GRP to the layer diets on blood serum characteristics of hens at 34th and 46th weeks of age are presented in table 7. The data revealed that there was significant ($p<0.01$) decline in blood serum glucose in the supplemented groups as compared with the control group at those two weeks of age. Meanwhile there were no significant differences between the control group and all supplemental groups with regard total serum protein at 34th week of age, however gave T_3 and T_5 at the 46th of age the high value of total protein (5.7 and 5.6 g /100 ml) followed by T_2 (5.1 gr /100 ml) which did not differ from other treatments in this comparison. The data in table 7 revealed that the supplemented groups superior over control group with regard of total albumen level at the 34th week of age, meanwhile showed T_3 and T_5 the highest values in this parameter as compared to control group, followed by T^2 and T_4 which did not differ significantly from control group at 46 week of age.

Treatments 2, 3 and 5 gave significantly the highest values of globulin followed by T_4 as compared to T_1 at the 46th of age. The cause of decline blood serum glucose of birds in the supplemented groups with GFS may be due to the content of these seeds of 4- Hydroxy isoleucine, which helps the pancreas in Insulin excretion which rolled in lowering glucose level in blood serum through gluconeogenesis (Khosla *et al.,* 1995 and Sauvaire *et al.,* 1998). Meanwhile reported Xue *et al.*, (2007) that the effect due to the high level of fiber in GFS which lowered the glucose absorption. The effect of effective substances in GFS such as flavonoids and saponin played an important role in stimulating the steroid hormones

Table 7: The effects of supplementing dietary GFS and GRP to the Layer diets on blood Glucose, Total Protein, Total Albumin and Globulin.

Globulin100ml/g		Total Albumin100ml/g		Total Protein100ml/g		Glucose 100ml/mg		Treatment
46	34	46	34	46	34	46	34	
2.2 b±0.90[b]	2.4±1.11[ab]	2.1 ±0.09[b]	2.2±0.07[b]	4.3±0.65[b]	4.6±0.43	163±3.70[a]	1703.41[a]±	T_1
2.7 ±0.55[a]	2.4±1.20[ab]	2.4 ±1.40[ab]	2.5±1.12[a]	5.1±3.54[ab]	4.9±8.60	153±4.66[b]	164±5.33[b]	T_2
2.9 ±0.65[a]	2.6 ±3.14[a]	2.8 ±0.53[a]	2.7±0.44[a]	5.7±2.22[a]	5.3±6.33	149±4.76[c]	160±6.50[bc]	T_3
2.6±0.90[ab]	2.1 ±0.44[b]	2.3±0.28[ab]	2.6±0.22[a]	4.9±2.5[b]	4.7±2.77	151±4.87[bc]	162±4.33[b]	T_4
2.9 ±0.54[a]	2.6 ±1.33[a]	2.7 ±1.33[a]	2.5±0.16[a]	5.6±1.33[a]	5.1±0.80	153±6.60[b]	158±5.22[c]	T_5
**	**	**	**	**	N.S	**	**	SignificanceLevel

Means in the same row with different letters are significantly different at ($p \leq 0.01$), N.S: non-significant, T_1: control, T_2: 1%GFS, T_3: 2%GFS, T_4: 1%GR P, T_5:2%GRP.

Table 8: The effects of supplementing dietary GFS and GRP to the Layer diets on Total Cholesterol, Triglyceride, LDL, HDL.

HDL100ml/mg		LDL100ml/mg		Triglyceride 100ml/mg		Total Cholesterol 100ml/mg		Treatment
46	34	46	34	46	34	46	34	
57.4±0.55	54.0±0.55	128 ±0.55[a]	120 ±0.55[a]	128 ±2.55[a]	127±0.59[a]	140±1.55[a]	141±1.64[a]	T_1
57.5±0.33	55.5±0.10	110 ±2.33[b]	115 ±0.43[ab]	117 1.18[b]	120±1.14[b]	135±1.21[ab]	138±0.55[ab]	T_2
60.7±0.55	60.3±0.32	98.1±1.55[c]	100±0.33[b]	110 ±0.11[b]	114±0.12[b]	130±0.51[b]	133 ±1.05[b]	T_3
58.2±0.65	58.1±0.11	112 ±2.43[b]	100±0.31[b]	115 0.17[b]	121±0.16[b]	132±0.64[b]	134±1.64[b]	T_4
60.5±0.11	58.7±0.55	108 ±1.32[b]	108 0.34[b]	111±0.05[b]	1200.11[b]	120±0.03[c]	127±0.12[c]	T_5
N.S	N.S	*	*	*	*	*	*	SignificanceLevel

Means in the same row with different letters are significantly different at ($p \leq 0.05$), N.S: non-significant, T_1: control, T_2: 1%GFS, T_3: 2% GFS, T_4: 1%GRP, T_5: 2%GRP.

which played an important role in release feed metabolism because they considered as builder hormones which elevate protein synthesis (Sturkie,1986).

The significant improvement in total albumen and total globulin concentrates of blood serum of birds feed GFS may be deu to whole factors that lead to the improvement in total protein so that the albumen is the main part of blood protein, which transport food nutrients and thyroxine in blood. These results came in agreement with that reported by AL-Hameed (2012b); Abdul-Rahman (2012); Safaei *et al*., (2013); Mamoun *et al*., (2014); Toaha *et al.*, (2016) whom added different levels of GFS to Layer and Broiler diets and noticed significant decline in glucose level of blood serum and with that found by AL-Hameed (2012b) in improving the rang of total protein of Layer blood serum. On other hand the significant decrease in the serum blood glucose of Layer hens fed on diets containing (1 and 2) % GRP (T_4 and T_5) may be deu to the fiber and the miosilage content and to the alkaline effects (Saac *et al.,* 2018) meanwhile reported Cabuk *et al.*, (2003) that the essential oils of herbs and their alkaline substances together rolled an affective effects in the inhibition of glucogensis but enhance glycolysis which lead to minimize blood glucose level. These are in agreement with that found by (AL-Hameed, 2012b; Malekizadehl *et al.,* 2012); Shewita and Taha, 2018) revaled that the ginger had an important effect in stimulating protein synthesis which lead to elevat total albumen level of blood of Layer hens at the age of 34 and 46 weeks of age which improved globulin concentrate because the blood serum protein already exists in limited levels when the birds are in normal circumstance case but it changed according to the changes in hygiene and nutrition of the birds.

It can be seen from data in table 8 significant decline ($p<0.05$) in the total cholesterol level of blood of birds in T_3, T_4 and T_5 comparing with that of birds in T_1 at 34 and 46 weeks of age, also showed all treatments with herbs addition significant decrease in the triglycerides concentrate and the LDL level during both weeks as compared to that of control group. Meanwhile no significant differences in HDL levels was found between the different experimental treatments. The components of GFS have an effective roll in minimizing serum blood lipids concentrate thus Sharma *et al.*, (1996) repaired that the fiber content especially the galactomannan inhabit the absorption of the cholesterol in the small intestine and prevent the reabsorption of the bile salts, as well as reported by Han *et al*., (2000) that the saponifieds substance delate the absorption of the feed fat in the intestine through the inhibition act of Lipase enzyme.

Cara *et al*., (1992) declared that the main cause of lowering Triglycerides level in blood serum under the effect of GFS may be due to the fiber and pectin contents of this seeds, also may be due to the effect of decrease in the LDL of birds consumed GFS to their content in

some effective substance. In this case referred Arora *et al*., (2000) that the Flavoniods have an strong act in preventing the activity of free radical roots, so they have an antioxidant rol in this case. These results are in agreement with that obtained by (Abdul-Rahman, 2012; Safaei *et al.,* 2013; Mamoun *et al.,* 2014; Abdouli *et al.,* 2014).

The effect of GRP act in lowering the total cholesterol concentrate, triglyceride level and the LDL in blood serum of Layer hens which may be due to the activity of their contents, that the Oleoresin has an activity in prevention cholesterol absorption through the small intestine, so declared Bujo (1997) that such mechanism occurred through the inhibition of the enzyme which responsed in cholesterol synthesis which are existed in the chromosomes of liver cells.

Fuhrman *et al*., (2000) reported that the effective effect of rhizomes of ginger such as shogaol have an antioxidant act besides the effect of the phenolic compounds, so they have the same act that the ascorbic acid and Vit. E have which protect fat oxidation which protect the HDL. The results of ginger effects are in agreement with that obtained by AL-Hameed (2012b); Malekizadeh *et al.,* (2012); AL-Hameed et al. (2012) Zomrawi *et al.,* (2014); Habibi *et al*., (2014); Shewita and Taha (2018); Belal *et al*., (2018).

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