EFFECT OF DIETARY FATS ON LIPID CONSTITUENTS IN EGG AND SERUM OF LOCAL HEN STRAIN DOKKI 4.

BY

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ABSTRACT

Egg production (for Dokki 4 hens strain) was increased by different dietary treatments and also by age of hens.

The increment in egg weight is due to age progress rather than dietary oil feeding. The ration based on wheat germ oil produced the lowest egg weight and production.

Diet based on 10% acidulated corn oil soapstock reduced the total cholesterol content of yolk by 12.03% while diet containing 5% wheat germ oil caused a high cholesterol content in yolk.

Lipids in egg yolk was not significantly influenced by the dietary oils.

The diet containing 10% acidulated corn oil soapstock or 10% corn oil reduced the total cholesterol content of serum by 25% and 37% respectively. The total lipids in serum increased with age progress. Hens fed 10% corn oil or 10% soybean oil were characterized by lower lipid content in serum than the other feeding diets.

Phospholipids content in serum was significantly increased in all treatments.

INTRODUCTION

The addition of oil to laying hen diets increased egg weight. Vegetable oils i.e. soybean and sunflower oils, were significantly better in improving the average egg weight than animal fats, Guenter et al. (1971). On the other hand, Horani and Sell (1977) stated that the addition of fats in levels ranged from 2 to 4% to the diet of laying hens from different sources did not affect egg production.

Younis (1981) found that corn oil at a level of 3% increased egg production and egg weight compared to control of white Plymouth Rock.

Cholesterol content of eggs had an increased attention due to its harmful effect on human health. Both clinical and experimental evidences suggested that higher blood cholesterol in human resulted in more severe arterial disease, Turk and Barnett (1971). They found that the amount of cholesterol per egg increased with increasing age of the layers. Weiss el at. (1967) reported that egg cholesterol increased when hens were fed diets containing either safflower, hydrogenated safflower or coconut oils at a level of 30%, but the increase was slight when corn oil was fed. Plant sterols have pronounced effect in increasing yolk cholesterol than animal fats when the level of added oils was 8%, Amer (1977). However, Sim and Bragg (1978) stated that levels of dietary fat appears to have no effect on lipid content of egg yoik.

Intensive studies were carried out to investigate the effect of oil or its type and quantity on cholesterol level in blood plasma. Brown et al.(1966) demonstrated that replacement of saturated fats with unsaturated ones, reduced blood serum cholesterol level by 10 to 20%, which might be attributed to the increase of sterol excretion from the body. Younis (1981) stated that the addition of corn oil to laying hen diets decreased blood cholesterol compared with animal fats. Wiseman (1964) stated that the effect of phytosterol as anticholesterolemic might be attributed to the formation of a nonabsorbable phytosterol-cholesterol complex. On the other hand, Sim et al. (1980) reported that phytosterol effect as anticholesterogenic in laying hen diets is probably due to the influence on cholesterol catabolism rather than cholesterol absorption.

MATERIALS AND METHODS

One local hen strain (Dokki 4) was used in this nutritional experiment at age of nine months. These hens were separated into five groups of twelve birds each, and fed on the following diets :

1- Basal diet introduced by Middle East Company, Cairo. Its main constituents were not less than 17.1%, 2.8% and 3.0% of protein, fat and fiber respectively. Its composition of vitamins and salts mixture are shown in Table 1.

Table 1. Basal diet composition of vitamins and salts mixture.

Vitamins	g/1000 kg diet	Vitamins	g/1000 kg diet	Salts	g/1000 kg diet
Vitamin A	33.34	Vitamin D3	0.063	Manganese	60.0
Vitamin E	11.00	Vitamin K3	3.00	Zinc	45.0
Vitamin B1	10.00	Vitamin B2	5.00	Iron	60.0
Vitamin B6	3.00	Biotin	75.00	Copper	5.0
Pantothenic	11.00	Folic acid	60.00	Iodine	0.5
Nicotenic	30.00	Choline	500.00	Selenium	0.099
Methionine	0.65				

2- Basal diet plus 10% acidulated corn oil soapstock.
3- Basal diet plus 10% corn oil.
4- Basal diet plus 10% soybean oil.
5- Basal diet plus 66.67% wheat germ (7.5% oil) which is equal to 5% wheat germ oil.

Egg yolk samples:

Whole eggs were collected daily and stored at 5°c. Every week the yolk was separated from the albumin and carefully rolled on a paper towel to get rid from the adhering albumin. Ten yolks from each treatment were pooled for chemical analysis. All yolk samples were frozen at-10°C untill chemical analysis which were carried out according to Chung et al. (1965).

Blood plasma samples:

The individual blood samples were collected from the wing vein of each group (five hens per treatment) as mentioned by Chung et al. (1965). Heparin was used as an anticoagulant, then the blood samples were centrifugated at 3000 rpm for 10 min. The clean and clear plasma was received in dry sterile sample tube and kept in a deep-freeze at -20°C until analysis.

Egg analysis:

Total lipids and the dry matter of egg yolk were determined according to A.O.A.C. (1975).

Total and free cholesterol levels were determined according to the method of Zlatkis et al. (1953).

Serum analysis:

Total lipids were colorimetrically measured in serum according to the method of Frings et al. (1970).

Total and free cholesterol in serum were determined using the method of Zoppi and Fenili (1976). Triglycerides were determined enzymatically acçording to the method of Jacobs and Van Demark (1960). Phospholipids in serum were determined by the method of Zilversmit and Davis (1950).

Data were statistically analyzed using Least-squares programs of Harvey (1987).

RESULTS and DISCUSSION

Effect of dietary oils on laying hen (performance and quality):

The performance of laying hen, Dokki 4 fed on different dietary composition is presented in Tables 2 and 3. The peak of egg production started during the first 15 days and reached the maximal after 75 to 105 days of feeding. The irregular trend of egg production could be attributed to different factors. Jones et al. (1976) concluded that certain factors are affecting the productivity of laying hens i.e. dietary levels of calories, sex, age and environmental conditions.

Table 2 shows that the highest rate of egg production was significantly higher (64.53%) by hens fed basal diet plus 10% corn oil and was (62.96%) in other group fed 10% soybean oil. This significant increase in egg production could be attributed to the high linoleic acid content of both corn (48.55%) and soybean (55.83%) oils. The lowest rate of egg production (19.36%) was obtained by hens fed on basal diet plus 5% wheat germ oil.

It is clear from the data presented in Tables 2 and 3 that the increase in egg weight is mostly due to age rather than dietary oils feeding. On the other hand, hens fed ration based on wheat germ produced eggs with the lowest average weight (11.10 ± 2.54 g). This remarkable decrease in egg production and egg weight caused by ration containing

Table (2): Effect of dietary oils as food additives on Dokki 4 hens performance and quality.

Independent variables:	Means ± standard error			
	Egg production	Egg weight	Yolk percentage	Dry matter of yolk %
Treatment X periods:-				
Control:				
Zero time	32.33±2.55	46.70±2.54	34.76±0.93	48.80±0.32
15 day	47.86±2.55	53.46±2.54	34.73±0.93	47.76±0.32
30 day	52.70±2.55	52.10±2.54	35.26±0.93	47.90±0.32
45 day	54.83±2.55	53.23±2.54	35.16±0.93	47.60±0.32
60 day	59.20±2.55	54.76±2.54	34.63±0.93	47.40±0.32
75 day	59.06±2.55	53.80±2.54	36.50±0.93	47.80±0.32
90 day	60.16±2.55	53.13±2.54	36.86±0.93	47.06±0.32
105 day	57.03±2.55	54.60±2.54	35.53±0.93	47.83±0.32
120 day	54.40±2.55	56.96±2.54	36.66±0.93	47.30±0.32
10% Acid.corn oil soapstock:-				
Zero time	32.43±2.55	44.33±2.54	36.23±0.93	48.26±0.32
15 day	41.83±2.55	50.50±2.54	31.40±0.93	47.20±0.32
30 day	43.90±2.55	50.56±2.54	36.10±0.93	45.80±0.32
45 day	49.33±2.55	48.16±2.54	36.50±0.93	46.16±0.32
60 day	52.80±2.55	52.16±2.54	36.56±0.93	47.13±0.32
75 day	54.50±2.55	51.33±2.54	35.80±0.93	46.90±0.32
90 day	56.96±2.55	54.00±2.54	35.60±0.93	47.00±0.32
105 day	59.26±2.55	51.10±2.54	34.53±0.93	46.53±0.32
120 day	53.00±2.55	56.10±2.54	38.06±0.93	46.56±0.32
10% Corn oil:				
Zero time	30.96±2.55	43.33±2.54	35.86±0.93	47.56±0.32
15 day	46.63±2.55	52.23±2.54	34.86±0.93	46.93±0.32
30 day	50.06±2.55	54.93±2.54	35.56±0.93	49.96±0.32
45 day	56.56±2.55	55.50±2.54	34.63±0.93	46.43±0.32
60 day	59.80±2.55	48.23±2.54	34.03±0.93	47.23±0.32
75 day	62.46±2.55	54.70±2.54	33.86±0.93	47.10±0.32
90 day	62.76±2.55	54.33±2.54	36.96±0.93	47.36±0.32
105 day	64.53±2.55	56.43±2.54	35.26±0.93	47.56±0.32
120 day	62.00±2.55	54.33±2.54	39.50±0.93	46.83±0.32
10% Soybean oil:				
Zero time	32.20±2.55	46.03±2.54	33.40±0.93	48.36±0.32
15 day	45.20±2.55	47.46±2.54	34.46±0.93	47.13±0.32
30 day	46.40±2.55	51.43±2.54	35.06±0.93	48.93±0.32
45 day	49.73±2.55	52.73±2.54	35.20±0.93	47.10±0.32
60 day	57.53±2.55	55.90±2.54	35.16±0.93	48.13±0.32
75 day	60.50±2.55	55.73±2.54	35.00±0.93	47.13±0.32
90 day	61.43±2.55	57.50±2.54	35.10±0.93	47.56±0.32
105 day	62.96±2.55	54.93±2.54	35.40±0.93	47.30±0.32
120 day	55.80±2.55	54.66±0.254	36.73±0.93	46.66±0.32
5% Wheat germ oil:-				
Zero time	36.53±2.55	35.63±2.54	35.56±0.93	48.36±0.32
15 day	32.13±2.55	28.30±2.54	35.16±0.93	47.03±0.32
30 day	37.10±2.55	37.50±2.54	35.13±0.93	48.36±0.32
45 day	43.80±2.55	47.66±2.54	35.66±0.93	44.40±0.32
60 day	33.23±2.55	30.10±2.54	32.90±0.93	46.86±0.32
75 day	35.70±2.55	34.15±2.54	35.43±0.93	46.53±0.32
90 day	32.00±2.55	22.76±2.54	34.40±0.93	47.13±0.32
105 day	20.00±2.55	12.20±2.54	35.13±0.93	47.20±0.32
120 day	19.36±2.55	11.10±2.54	33.73±0.93	46.63±0.32

wheat germ could be interpreted by the phytate content of the germ which reduce the bioavailability of Mg, Ca, Zn and Fe in monogastric species. This means that the presence of substantial amounts of phytate in the diet could give rise to mineral deficiencies, (Robinson, 1987). Also another explanation for the decrease in egg production and egg weight might be attributed to the deficiency of calcium in ration caused by the complexes formed between the anionic side chains of proteins, calcium cations and the phosphate groups of phytates which amounted to 1.23 % in wheat germ (El-Bardeny et al. ,1991).

Table 3. F-ratios and test of significance of the least-squares analysis of variance of dietary oils affecting egg production, egg weight, yolk percentage and dry matter percentage in yolk for Dokki 4 hens.

		F - ratios			
Source of variation	D.F	Egg production	Egg weight	Yolk percentage	dry matter %of yolk
Treatment (T)	4	119.364 ***	156.161 ***	1.562 **	7.899 ***
Period (P)	8	37.996 ***	4.727 ***	3.437	24.408 ***
T X P	32	6.993	6.329	1.691	2.681
Error	90				
Error mean squares		19.55	19.40	2.60	0.32

** : P < 0.01 & ***: P < 0.001.

From the results obtained in Tables 2 and 3, it is clear that the sources of dietary oils have no significant effect on both yolk percentage and its dry matter. These results are in good agreement with those reported by Marion and Edwards (1964) and younis (1981).

Effect of different dietary oils on cholesterol and total lipids of egg yolk:

The results of feeding four oils on the total cholesterol in egg yolk are summarized in Tables 4 and 5. The data obtained showed that feeding 10% acidulated corn oil soapstock to Dokki 4 hens reduced the total cholesterol content of yolk by about 12.03% compared with control. This decrease

Table (4): Effect of dietary oils as food additives on cholesterol and total lipids content of egg yolk in Dokki 4 hens.

Independent variable	Means ± standard error			
	Total cholesterol mg/g fat	Free cholesterol mg/g fat	Cholesterol ester mg/g fat	Total lipids g/100 g yolk
Treatment X periods:-				
Control:-				
Zero time	34.77±0.62	18.50±0.73	16.30±0.36	38.23±0.53
15 day	36.80±0.62	22.73±0.73	14.13±0.36	38.53±0.53
30 day	39.87±0.62	22.85±0.89	17.06±0.36	38.23±0.53
45 day	44.40±0.62	32.77±0.73	11.70±0.36	38.13±0.53
60 day	41.77±0.62	38.57±0.73	6.63±0.36	37.30±0.53
75 day	44.97±0.62	38.40±0.73	6.67±0.36	37.63±0.53
90 day	44.16±0.62	36.50±0.73	8.30±0.36	37.33±0.53
105 day	47.87±0.62	41.77±0.73	6.20±0.36	37.56±0.53
120 day	48.80±0.62	42.93±0.73	6.10±0.36	37.70±0.53
10% Acid.corn oil soapstock:				
Zero time	35.50±0.62	19.17±0.73	16.37±0.36	40.37±0.53
15 day	37.33±0.62	22.77±0.73	14.57±0.36	38.73±0.53
30 day	40.07±0.62	22.88±0.63	17.20±0.36	37.83±0.53
45 day	44.50±0.62	35.70±0.73	8.83±0.36	37.80±0.53
60 day	46.97±0.62	39.83±0.73	7.23±0.36	37.27±0.53
75 day	49.20±0.62	42.60±0.73	6.60±0.36	37.20±0.53
90 day	41.83±0.62	31.10±0.73	10.90±0.36	37.33±0.53
105 day	44.17±0.62	35.07±0.73	9.17±0.36	37.13±0.53
120 day	42.93±0.62	34.57±0.73	8.40±0.36	38.10±0.53
10% Corn oil:-				
Zero time	35.80±0.62	19.27±0.73	16.10±0.36	38.50±0.53
15 day	37.10±0.62	22.83±0.73	14.30±0.36	37.77±0.53
30 day	39.93±0.62	22.83±0.73	17.10±0.36	37.67±0.53
45 day	43.30±0.62	36.73±0.73	6.60±0.36	39.06±0.53
60 day	46.67±0.62	39.90±0.73	6.83±0.36	37.43±0.53
75 day	48.27±0.62	39.40±0.73	8.90±0.36	37.17±0.53
90 day	40.56±0.62	33.17±0.73	7.47±0.36	37.77±0.53
105 day	47.20±0.62	40.50±0.73	6.70±0.36	37.70±0.53
120 day	50.30±0.62	38.70±0.73	11.50±0.36	38.50±0.53
10% Soybean oil:-				
Zero time	35.30±0.62	19.20±0.73	16.16±0.36	39.20±0.53
15 day	37.57±0.62	22.97±0.73	14.70±0.36	38.97±0.53
30 day	40.23±0.62	22.87±0.73	17.40±0.36	38.60±0.53
45 day	43.53±0.62	36.73±0.73	6.87±0.36	38.43±0.53
60 day	51.40±0.62	39.90±0.73	11.30±0.36	37.70±0.53
75 day	50.73±0.62	41.37±0.73	9.40±0.36	37.17±0.53
90 day	41.10±0.62	32.10±0.73	9.10±0.36	37.40±0.53
105 day	47.76±0.62	42.17±0.73	6.10±0.36	37.27±0.53
120 day	53.13±0.62	42.93±0.73	10.23±0.36	37.80±0.53
5% Wheat germ oil:				
Zero time	35.23±0.62	18.87±0.73	16.30±0.36	39.57±0.53
15 day	37.30±0.62	22.93±0.73	14.50±0.36	38.27±0.53
30 day	40.17±0.62	22.87±0.73	17.16±0.36	38.73±0.53
45 day	45.70±0.62	33.87±0.73	8.60±0.36	38.07±0.53
60 day	49.53±0.62	40.80±0.73	8.76±0.36	38.10±0.53
75 day	51.03±0.62	43.03±0.73	8.00±0.36	37.43±0.53
90 day	41.90±0.62	32.70±0.73	9.33±0.36	38.03±0.53
105 day	48.33±0.62	42.27±0.73	6.06±0.36	37.77±0.53
120 day	56.80±0.62	46.77±0.73	10.20±0.36	37.23±0.53

in egg yolk cholesterol might be attributed to the fact that acidulated corn oil is rich in phytosterols (1.92%). On the contrary, the addition of 10% corn oil and 10% soybean oil to the diet of Dokki 4 hens, increased egg yolk cholesterol by about 3.07%. This increment is significantly at p< 0.001.

Table 5. F-ratios and test of significance of the least-squares analysis of variance of dietary oils affecting cholesterol content and total lipids in egg yolk of Dokki 4 hens.

Source of variation	D.F	F - ratios			
		Total cholesterol	Free cholesterol	Cholesterol ester	Total lipids
Treatment (T)	4	31.283 *	12.549 *	8.833 *	0.359 *
Period (P)	8	354.956 *	734.382 *	583.822 *	6.151 *
T X P	32	12.462 *	8.456 *	15.139 *	0.802 *
Error	90				
Error mean squares		1.180	1.610	0.400	0.870

* : P < 0.001

Bartov et al. (1970) noticed that the anticholesterolic effect of the phytosterols was dependant on the phytosterol : cholesterol ratio. This ratio increased in case of the diet containing corn oil soapstock which contains higher amount of B-sitosterol (1.33%), while corn oil contains 0.74% and soybean oil 0.30%. The diet containing high amount of phytosterol caused a significant drop of egg cholesterol level as reported by Clarenburg et al. (1971).

Feeding diet with 5% wheat germ oil to laying hens resulted in a significant raise of egg yolk cholesterol levels by about 16.39% (p< 0.001) when compared with control. This increase in egg yolk cholesterol might be caused by the decrease in egg production as mentioned by Bartov et al. (1971), who found that when the production of egg decreased, the amount of cholesterol in the whole yolk increased.

Most of cholesterol was found to exist as free compound (42.95 mg/g fat) in eggs produced by Dokki 4 fed basal diet (Table 4). A minor proportion is presented as cholesterol esters (6.10 mg/g fat). These results agreed with those

Table (6) Effect of dietary oils as food additives on cholesterol content of serum of Dokki 4 hens.

Independent variable	Means ± standard error		
	Total cholesterol mg/100 ml	Free cholesterol mg/100 ml	Cholesterol ester mg/100 ml
Treatment X periods:-			
Control:			
Zero time	272.36±8.13	121.70±6.17	155.70±6.19
15 day	248.66±8.13	143.50±6.17	105.20±6.19
30 day	236.40±8.13	141.60±6.17	94.80±6.19
45 day	255.23±8.13	115.60±6.17	139.17±5.36
60 day	246.46±8.13	133.50±6.17	113.00±6.19
75 day	274.50±8.13	140.73±6.17	133.76±6.19
90 day	273.30±8.13	137.20±6.17	117.90±7.59
105 day	251.50±8.13	132.40±6.17	119.20±6.19
120 day	257.53±8.13	136.76±6.17	118.33±6.19
10% Acid.corn oil soapstock:			
Zero time	364.10±8.13	136.40±6.17	227.70±6.19
15 day	346.36±8.13	206.50±6.17	139.90±6.19
30 day	211.26±8.13	141.20±6.17	70.66±6.19
45 day	204.80±8.13	116.63±6.17	88.56±6.19
60 day	249.23±8.13	143.66±6.17	105.63±6.19
75 day	233.20±8.13	118.40±5.30	107.70±6.19
90 day	275.40±8.13	163.93±6.17	111.26±6.19
105 day	278.96±8.13	172.60±6.17	106.40±6.19
120 day	272.96±8.13	154.03±6.17	105.23±6.19
10% Corn oil:			
Zero time	302.80±8.13	126.53±6.17	181.30±6.19
15 day	275.30±8.13	134.83±6.17	113.06±6.19
30 day	168.06±8.13	87.20±6.17	80.46±6.19
45 day	170.03±8.13	99.80±6.17	70.30±6.19
60 day	224.26±8.13	111.63±6.17	111.00±6.19
75 day	157.93±8.13	92.13±6.17	66.36±6.19
90 day	191.73±8.13	116.16±6.17	76.10±6.19
105 day	190.00±8.13	126.30±6.17	63.73±6.19
120 day	188.63±8.13	121.10±6.17	71.16±6.19
10% Soybean oil:			
Zero time	151.90±8.13	56.20±6.17	96.20±6.19
15 day	204.86±8.13	115.53±6.17	88.90±6.19
30 day	149.70±8.13	66.00±6.17	84.20±6.19
45 day	163.00±8.13	93.60±6.17	69.43±6.19
60 day	156.83±8.13	97.56±6.17	59.30±6.19
75 day	178.33±8.13	105.66±6.17	86.46±6.19
90 day	177.56±8.13	103.40±6.17	64.30±6.19
105 day	188.40±8.13	119.53±6.17	73.43±6.19
120 day	180.43±8.13	108.20±6.17	67.16±6.19
5% Wheat germ oil:			
Zero time	151.56±8.13	85.80±6.17	65.73±6.19
15 day	439.60±8.13	208.13±6.17	231.86±6.19
30 day	435.20±8.13	249.36±6.17	200.90±6.19
45 day	351.80±8.13	193.60±6.17	143.26±6.19
60 day	304.10±8.13	164.66±6.17	139.50±6.19
75 day	243.70±8.13	157.06±6.17	109.20±6.19
90 day	257.50±8.13	160.40±6.17	97.20±6.19
105 day	281.53±8.13	180.90±6.17	100.70±6.19
120 day	263.03±8.13	166.20±6.17	96.93±6.19

reported by Bitman and Wood (1980). Cholesterol esters increased to 11.5, 10.23 and 10.20 mg/g fat after feeding corn oil, soybean oil and wheat germ respectively. In the same time, lipid content of egg yolk was not significantly

influenced by the dietary oils. The same results were obtained by Sim and Bragg (1978).

Effect of dietary oils on total cholesterol and lipid composition in serum of laying hens:

The effect of feeding 10% acidulated corn oil soapstock, 10% corn oil 10% soybean oil and 5% wheat germ oil on total, free and esterified cholesterol in serum is reported in Tables 6 and 7.It is clear that feeding 10% acidulated corn oil soapstock to hen diets reduced the total cholesterol content of serum by about 25% This reduction of serum cholesterol might be caused by the high content of phytosterols as reported by Sim and Bragg (1977).

Addition of 10% corn oil to basal diet (Table 6) had better effect on serum cholesterol level. The total cholesterol content of serum reduced by about 37%. This reduction could be attributed to the high unsaturated fatty acids content of corn oil (79.5%). These results are in accordance with those reported by Younis (1981). Also, Cannor et al. (1969) reported that an increase in total neutral sterols in fecal output was noticed in human when unsaturated fatty acids were included in his diet.

Table 7. F-ratios and test of significance of the least-squares analysis of variance of dietary oils affecting cholesterol content in Dokki 4 laying hens serum.

Source of variation	D.F	F -ratios Total cholesterol	Free cholesterol	Cholesterol ester
Treatment (T)	4	367.793*	221.595*	121.470*
Period (P)	8	44.511*	33.014*	48.063*
T X P	32	44.459*	15.356*	32.722*
Error	90			
Error mean-squares		198.700	114.310	115.290

*:P < 0.001

Table (8): Effect of dietary oils as food additives on serum total lipids, triglycerides and phospholipids in Dokki 4 hens.

Independent variable	Means ± standard error		
	Total lipids mg/100 ml	Tri-glycerides mg/100 ml	Phospho-lipid mg/100 ml
Treatment X periods:			
Control:			
Zero time	1546.6±51	1172.5±86	297.0±12
15 day	1966.6±51	1247.3±86	389.3±12
30 day	1820.0±51	1343.7±86	518.2±12
45 day	1636.6±51	1098.7±86	521.4±12
60 day	2200.0±51	1303.2±86	553.8±12
75 day	1900.0±51	1146.2±86	563.7±12
90 day	2256.6±51	1317.5±86	649.4±12
105 day	2260.0±51	1390.0±86	642.9±12
120 day	2250.0±51	1318.5±86	639.9±12
10% Acid.corn oil soapstock:			
Zero time	1136.6±51	752.2±86	330.3±12
15 day	1060.0±51	772.4±86	355.9±12
30 day	1206.6±51	903.1±86	445.7±12
45 day	1190.0±51	865.6±86	481.7±12
60 day	1486.6±51	805.7±86	411.5±12
75 day	1376.6±51	843.0±85	448.7±12
90 day	1600.0±51	1075.5±86	524.3±12
105 day	1936.6±51	1290.0±86	613.7±12
120 day	1910.0±51	1263.0±86	550.9±12
10% Corn oil:			
Zero time	1556.6±51	1070.1±86	421.1±12
15 day	1300.0±51	1138.8±86	386.4±12
30 day	1676.6±51	1012.7±86	491.6±12
45 day	1366.6±51	889.0±86	507.4±12
60 day	1340.0±51	840.1±86	441.2±12
75 day	1333.3±51	833.1±86	469.9±12
90 day	1350.0±51	940.9±86	505.9±12
105 day	1300.0±51	867.7±86	526.2±12
120 day	1230.0±51	908.1±86	510.7±12
10% Soybean oil:			
Zero time	1426.6±51	930.4±86	417.9±12
15 day	1630.0±51	958.1±86	414.7±12
30 day	1996.6±51	1107.6±86	439.8±12
45 day	1500.0±51	1019.0±86	412.3±12
60 day	1686.6±51	1032.1±86	457.1±12
75 day	1440.0±51	1064.5±86	446.6±12
90 day	1216.6±51	765.6±86	528.0±12
105 day	1316.6±51	734.7±86	375.7±12
120 day	1290.0±51	770.1±86	495.6±12
5% Wheat germ oil:			
Zero time	1686.6±51	912.3±86	481.8±12
15 day	2460.0±51	1402.7±86	525.4±12
30 day	2046.6±51	1330.3±86	442.1±12
45 day	1886.6±51	1230.5±86	451.8±12
60 day	1760.0±51	1241.7±86	432.4±12
75 day	1900.0±51	1210.3±86	674.4±12
90 day	1883.3±51	1234.6±86	566.6±12
105 day	2090.0±51	1413.1±86	578.7±12
120 day	1763.3±51	1037.2±86	582.3±12

Tables 8 and 9 show the means and standard deviation of total lipids, triglycerides and phospholipids in serum (of Dokki 4 hens) as influenced by dietary oils. The total lipids in serum of laying hens which fed basal diet was dramatically increased with the increase in age. It was increased from 1546 ± 51 mg/100 ml serum at the begining of the experiment to 2250 ± 51 mg/100 ml serum after 120 days of feeding basal diet. The same increase in serum lipids was observed by feeding 10% acidulated corn oil soapstock. Such results might be attributed to the increase of triglycerides *biosynthesis* in their liver (Thayer et al., 1973). In the same time, hens fed 10% corn oil or 10% soybean oil were characterized by lower serum lipid content than the other diets. Lipid content in serum reduced by about 20.98% for hens fed diet containing 10% corn oil.

Table 9. F-ratios and test of significance of the least-squares analysis of variance of dietary oils affecting total lipids, triglycerides and phospholipids content in Dokki 4 laying hens serum.

Source of variation	D.F	F - ratios		
		Total lipids	Triglycerides	Phospholipids
Treatment (T)	4	451.245*	95.538*	92.953*
Period (P)	8	43.637*	7.426*	111.762*
T X P	32	66.037*	14.704*	26.167*
Error	90			
Error mean-squares		0.008	224.930	460.320

* : P < 0.001

The results in Table 8 indicate the highly significant increase in serum phospholipids in all treatments. The increase of phospholipids in serum may be due to their enhancement synthesis by the liver, since it was evidenced that synthesis of phospholipids in the bird occurred mainly, if not entirely in the liver. The variability in plasma phospholipid concentration was directy attributable to change in liver fat content (Neill et al.,1977)

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تأثير اضافة الدهون على عليقة

الدواجن على المكونات الدهنيه فى البيض والسيرم للدجاج المحلى (دقى ٤).

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بدراسة تأثير اضافة بعض الزيوت النباتيه ومخلفاتها وكذلك جنين القمح الى علائق الدواجن للصنف المحلى دقى ٤ وجد أن مختلف العلائق المستعمله تزيد انتاج البيض . بينما العلائق المحتويه على جنين القمح أعطت أقل انتاج ووزن للبيض.

وجد أن العلائق المحتويه على ١٠٪ سوب ستوك زيت الذرة تقلل نسبة الكوليستيرول – فى صفار البيض بحوالى ٣ر١٢٪ بينما العليقة المحتويه على جنين القمح تزيد من نسبه الكوليسترول فى صفار البيض . ووجد أن نسبة الدهون فى الصفار لاتتأثر باضافة الزيوت النباتيه الى العليقة .

وجد أمكن تخفيض النسبة الكليه للكوليسترول فى السيرم بمقدار ٢٥٪ ، ٣٧٪ وذلك بالتغذيه على علائق تحتوى على ١٠٪ سوب ستوك زيت الذرة أو ١٠٪ زيت الذرة على الترتيب .

تقل نسبة الدهون فى السيرم بالتغذيه على العلائق المحتويه على ١٠٪ زيت الذرة أو ١٠٪ زيت فول الصويا عن باقى العلائق ..

وعموما فان محتوى السيرم من الفوسفوليبيدات يزداد معنويا بزيادة عمر الدجاج.