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EFFECTS OF DIFFERENT DIETARY OILS ON THE PERFORMANCE AND CARCASS CHARACTERISTICS OF SILVER MONTAZAH GROWING CHICKS

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ABSTRACT

This experiment was conducted to evaluate the effects of feeding diets containing either sunflower oil (SFO), palm oil (PO), cotton seed oil (CSO), distillated fatty acids (DFA), or Nutri fat (NF) on the performances of Silver Montazah growing chicks. A total number of 225 unsexed, one day old chicks were allotted to five dietary treatments. Thus, five starter diets (1- day old to 6 weeks of age) and five grower diets (6 to 10 weeks of age) were formulated to be approximately similar in their majer nutrient contents. The inclusion rates of SFO, PO, CSO or DFA were 2 and 3%, while those of NF were 4 and 6% of starter and grower diets, respectively. The chicks had a free access to feed and water from 1- day old up to 10 weeks of age.

The results showed that:

1- Sunflower oil, cotton seed oil and distillated fatty acids contained large amount of unsaturated fatty acids; especially that of linoleic acid, $C_{18:2}$ (61.44, 52.79 and 55.68%, respectively) compared to the other tested oils.
2- No significant differences were observed among dietary treatments in the performance of chicks for weight gain, feed intake and feed conversion, or in efficiency of energy utilization. However, birds fed on the SFO-diet consumed less amount of feed, but exhibited, a better feed conversion than their counterparts fed diets containing either PO, CSO, or DFA.
3- There were no significant effect of dietary treatments on carcass yield of the experimental chicks.
4- As for chemical composition of chicks breast meat, no significant differences were detected in crude protein percentage. Even though significant ($P \leq 0.05$) variations were observed in ether extract and ash contents of breast meat, it seems likely that these differences were fortuitous.
5- From an economical point of view, it was observed that groups of chicks fed diets containing DFA or CSO attained higher net returns and superior economic efficiency; in comparison with the other experimental chick groups.

Keywords: Fatty acids, oils, chick performance, economical efficiency.

INTRODUCTION

Oils and fats are widely used as a source of energy in broiler diets; they also can exert an improvement in weight gain, feed utilization and palatability of mash feed (Vermeersch and Vanschoubroek, 1968; Summers and Leeson, 1977; El- Husseiny *et al* 1990 and Leeson and Atteh, 1995). Vegetable oils are rich in poly unsaturated fatty acids and are highly digestible for chickens and represent traditional fat sources in broiler diets (Engberg *et al*, 1996). Also, fats may improve the physical characteristics and palatability of diet to an extent which promotes increased feed consumption (Dale and Fuller, 1979 and Cherry, 1982).

However, the utilization of a certain type of oils or fats depends on its fatty acid composition (Sibbald and Kramer, 1980). So, there is evidence that saturated fatty acids are poorly utilized (less digestible and less absorbable) than the unsaturated fatty acids (Garrett and Young, 1975 and Leeson and Summers, 1976) which can result in a decreased availability of metabolizable energy to birds. In grower chicks, the fatty acid composition of body lipids is determined largely by the relative importance of hepatic lipogenesis and lexogenous dietary fat as sources of fatty acid deposits in the body. The supplementation with dietary fat affect both of there parameters such that they may act in the same or in opposite directions depending on the composition of the diet. However, endogenous fat measured in chickens fed a fat-free diet, is composed mainly of $C_{16:0}$ and $C_{18:1}$ with smaller amounts of $C_{16:1}$ and $C_{18:0}$. Fatty acids $C_{18:2}$ and $C_{18:3}$ are essential and not synthesized but rather introduced into the tissues through dietary fat (Bottino *et al*, 1970).

The inclusion of oils in broiler diets has been reported to have no adverse effect on performance in terms of mortality and carcass characteristics (Dorgham *et al*, 2001). However, it can improve body weight gain of chicks and the efficiency of feed utilization (Atteh *et al*, 1983; Sell and Owings, 1984; Mendes and Cury, 1986; El-Husseiny and Ghazalah, 1990; Pinchasov and Nir, 1992; Peebles *et al*, 1997 and 2000). Moreover, Abou El-Wafa *et al* (2000) studied the effect of replacing soybean oil with different sources of oils (corn oil and sunflower oil) and fats (camel fat or margarine) in broiler diets. They found that added oils or fats improved growth rate and feed conversion compared to animal fats; however, they found no significant differences in carcass characteristics or plasma total cholesterol concentration due to feeding the tested oils or fats. Also, recently, Ghazalah *et al*, (2003) reported that sunflower oil has the best ME and absorbability values as compared to other vegetable oils (Palm oil or Palm kernel oil) and animal fat sources (tallow, poultry fat and bone fat), while palm oil was the worst one. From the economical point of view, they included that, it is better to fed broiler chicks starter diets (1-4 weeks of age) having, 2% of either tallow or bone fat or 4% poultry fat, followed by finisher diets (5-7 weeks of age) containing 4% sunflower oil.

The objective of this study was to evaluate the growth performance, carcass characteristics and economical efficiency of Silver Montazah growing chicks fed diets containing different types of oil.

MATERIALS AND METHODS

This experiment was carried out at El-Fayoum, Takamoly Poultry Project (TPP), El-Fayoum Governorate, Upper Egypt. A total number of 225 unsexed, day-old chicks of Silver Montazah, as one of the developed local strains of chickens, were used in the present study. The birds were randomly distributed into five dietary treatments (designated T_1 to T_5) each with three replicates of 15 chicks. The birds were weighed, wing-banded and placed into wire-floored batteries according to the average group weight.

The compositions of the experimental diets are shown in Table 1. The experimental diets, five starter diets (one day old up to 6 weeks of age) and

the five grower diets (6 to 10 weeks of age) were formulated to be approximately similar in their major nutrients. The diets contained different types of oil and were formulated to meet the nutrient requirements of Silver Montazah growing chicks, according to the guidelines of Takamoly Poultry Project. The different types of oil used were sunflower oil (SFO; 4.5 LE/kg); palm oil (PO; 2.9 LE/kg); cotton seed oil (CSO; 3.55 LE/kg); distillated fatty acids (DFA; 1.80 LE/kg) and Nutri fat * (NF; 2.90 LE/kg), which purchased from the local Egyptian market. The inclusion rates of SFO, PO, CSO or DFA were 2% and 3% while those of NF were 4% and 6% of starter and grower diets, respectively.

Table (1): Composition of the experimental diets.

Ingredients; %	Starter diets; 0-6 weeks					Grower diets; 7-10 weeks		
	Dietary treatments					Dietary treatments		
	SF0	P0	CSO	DFA	NF	SF0	P0	CSO
Yellow corn	61.0	61.00	61.00	61.00	59.00	68.34	68.34	68.34
Soy bean meal (48%)	33.30	33.30	33.30	33.30	33.30	24.90	24.90	24.90
Bone meal	2.50	2.50	2.50	2.50	2.50	2.70	2.70	2.70
Limestone	0.50	0.50	0.50	0.50	0.50	0.30	0.30	0.30
NaCl	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Vit +Min Premix [1]	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
DL-Methionine 99%	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
L - Lysine	-	-	-	-	-	0.06	0.06	0.06
Sunflower oil (SFO)	2.00	-	-	-	-	3.00	-	-
Palm oil (PO)	-	2.00	-	-	-	-	3.00	-
Cotton seed oil (CSO)	-	-	2.00	-	-	-	-	3.00
Distillated fatty acids[2] (DFA)	-	-	-	2.00	-	-	-	-
Nutri fat (NF)	-	-	-	-	4.00	-	-	-
Total	100	100	100	100	100	100	100	100 100
Calculated analysis:[3]								
Crude protein; %	20.86	20.86	20.86	20.86	20.98	17.40	17.40	17.40
ME (kcal/kg)	3059	2982	3040	3020	3044	3198	3082	3169
C / P ratio	146.6	143.0	145.7	144.8	145.1	183.8	177.1	182.1
Meth. + cyst.; %	0.80	0.80	0.80	0.80	0.79	0.70	0.70	0.70
Lysine; %	1.21	1.21	1.21	1.21	1.20	1.02	1.02	1.02
Calcium;%	1.00	1.00	1.00	1.00	1.00	0.93	0.93	0.93
Av. Phosphorus; %	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Linoleic acid ; %	2.50	1.44	2.32	2.38	1.48	3.20	1.61	2.94

1) Vitamin-mineral premix supplied each kg of feed with: Vit. A:12000 IU; Vit .D3 2000 IU; Vit . E: 40mg; Vit. K3 : 2mg; Vit.B1: 3mg; Vit. B2 : 4mg; Vit. B6 : 1.5mg; pantothenic acid : 10mg; Vit. B12 0.01 mg; Folic acid: 1.5mg; niacin : 20 mg; biotin: 0.05 mg; choline chloride: 500 mg ; Zn: 55mg;Fe: 30mg; I: I mg; Se: 0.I mg; Mn: 55 mg; Cu: 0.5g; Co: 0.25 mg and ethoxyquin3000mg.

2) ME / kg of distillated fatty acid according to NRC, 1994.

3) According to CLFF(2001).

Analysis of fatty acids of the different types of oil used in this study was undertaken using Gas Chromatography, following the standard methods of Paquot and Hautfenne (1987). Fatty acid compositions of the various types of oil are shown in Table 2. Daily photoperiod was 23 hrs. Feed, in mash form,

*Nutri fat is commercial product composed mainly of palm kernel oil, and containing 6118 kcal/kg ME; 7% CP; 14% CF and 3% ash. Nutri fat is the registered trademark of Nutri AD International, Belgium.

and water were provided *ad-libitum*. Body weight, feed intake and mortability rate were recorded weekly and presented herein at 6 (0-6) and 10 (0-10) weeks of age. At the end of the experimental period. Six birds were randomly taken from each dietary treatment and slaughtered to determine the percentages of carcass, liver, heart, gizzard and giblets. Representative samples of breast meat were analyzed for crude protein, ether extract and ash using the standard methods of AOAC (1990). An economic efficiency (EE) was also calculated as net return/ total coat (Bayoumi, 1980).

Data were analyzed statistically; using the Statistical Analysis System, (SAS, 1996) and Duncan's multiple range test.

RESULTS AND DISCUSSION

Fatty acid compositions of the tested types of oil:

The fatty acid composition of oil are shown in Table 2. The unsaturated fatty acids $C_{18:1}$, $C_{18:2}$ and $C_{18:3}$ made up over 87, 77, 68, 48 and 26% of total fatty acids in SFO, DFA, CSO, PO and NF, respectively. Whereas, the percentages of the saturated fatty acids C_{16} and C_{18} were 41.70, 36.51, 28.41, 21.70 and 10.36% of total fatty acids in PO; NF; CSO; DFA and SFO, respectively. Also, the results indicated that SFO; DFA and CSO had large amounts of linoleic acid; $C_{18:2}$ (61.438, 55.683 and 52.790%, respectively) but PO and NF had smaller amounts of the same fatty acid (8.441 and 10.621%, respectively) compared to the other types of oil. Generally, dietary fatty acid profile plays an important rote in lipid deposition and metabolism. Linoleic acid ($C_{18:2}$) is one of the most essential fatty acid for birds. It is obvious that the experimental diets contained sufficient amounts of lionleic acid (Table 1); not only covering but also exceeding the requirements (1%) of growing chicks (NRC, 1994). These results agree with those of Garrett and Young (1975); Leeson and Summers, (1976); Nir *et al* (1988); Pinchasov and Nir (1992) and Abou El-Wafa *et al* (2000).

Table (2): Fatty acid composition of different types of oil used in the experiment.

Type of oil	Selected fatty acids, % *					
	Palmitic acid	Palmitoleic acid	Stearic acid	Oleic acid	Linoleic acid	Linolenic acid
	C16	C16:1	C18	C18:1	C18:2	C18:3
Sunflower oil	6.103	0.811	3.445	25.517	61.438	0.611
Palm oil	35.621	1.282	6.082	40.310	8.441	-
Cotton seed oil	27.191	0.298	1.215	15.629	52.791	0.439
Distillated fatty acids	18.796	0.455	2.903	22.041	55.683	-
Nutri- fat	19.007	2.887	17.507	15.861	10.621	0.612

* % of total fatty acids.

Chick performance:

Data of the effects of the tested dietary oils on body weight gain (BWG), feed intake (FI), feed conversion (FC), efficiency of energy utilization (EEU) and mortality rate at 6 and 10 weeks of age are shown in Table 3. It

was clear that the averages of initial live body weight at one-day old were similar for all the experimental groups of Silver Montazah chicks.

At 6 weeks of age, the results revealed that, there were no significant difference among chicks of the live dietary treatments in body weight gain, feed intake, feed conversion, efficiency of energy utilization or mortality rate. However, chicks fed the SFO-diet (T_1) achieved better weight gain and feed conversion compared to the other experimental groups. Whereas, chicks fed the CSO- Containing diet (T_3) attained weight gain and feed conversion similar to those fed the DFA- containing diet (T_4). On the other hand, chicks fed diets containing PO (T_2) and NF (T_5) at more feed and exhibited inferior BWG, FC and EEU values.

At ten weeks of age, there were no significant differences among chicks of the different dietary treatments in BWG, FI, FC or mortality rate, the birds fed diets containing CSO, DFA and NF achieved heavier weight gain at 10 weeks of age (886.30; 858.77 and 860.93 g for T_3, T_4 and T_5, respectively) compared to those of birds fed diets containing SFO and PO (840.10 and 813.90 g. for T_1 and T_2, respectively). Even though, dietary oils did not significantly affect feed intake, birds fed the SFO – containing diet (T_1) ate the least amount of feed (2805.10 g), while birds fed the CSO diet (T_3) consumed the largest amount of feed (2991.74 g). Moreover the birds of the SFO - and NF - treatments (T_1 and T_5) equally exhibited better feed conversion (3.34) than those observed for birds of the other treatments. Whereas, birds fed on CSO- and DFA- diets (T_3 and T_4) performed similarly for feed conversion (3.38 and 3.41, respectively), but those of the PO- treatment (T_2) exhibited the worst feed conversion (3.49).

It should be pointed out that, it is a well established fact that the various fat and oil types vary in their efficiency of utilization. Nevertheless, from a nutritional point of views, when supplementary oil is being incorporated in chicks diet at higher inclusion rates than that of the present work; it is generally accepted that, it may have possibilities to exert an extra caloric effect, to increase the efficiency of energy utilization by lowering heat increment, to improve the digestibility of dietary fat, to improve the utilization of other non-lipid constitutes of the diet, or to decrease the rate of passage through the digestive tract thereby increasing the digestibility of the diet (Touchburn and Naber, 1966, Gomez and Polin, 1974; Fuller and Rendon, 1977; Sibbald and Kramer, 1978 and Mateos and Sell, 1980). Therefore, one would speculate that, the lack of response of the experimental chicks to feeding diets containing the tested types of oil in the current study, may be attributed to the low inclusion rate of these supplemental oils into the diets. Thus, no significant differences were observed in the performance of chicks for growth or feed conversion.

Carcass characteristics:

Carcass characteristics of chicks as affected by different dietary treatments are shown in Table 4. Obtained data showed that dietary oils had no significant effect on the relative weights of carcass and liver. Whereas, there were significant ($P \leq 0.05$) differences among treatments in percentages of heart, gizzard and giblets. There were a significant ($P \leq 0.05$) decrease in

heart percentage of chicks fed diets containing CSO (T_3) and DFA (T_4) compared to the other dietary treatments (T_1, T_2 and T_5). In contrast, gizzard percentage increased significantly ($P \leq 0.05$) for chicks fed diets containing PO (T_2) or CSO (T_3) compared to that of chicks fed the SFO- diet. Also, the highest giblets percentage was recorded for chicks fed the PO-diet (T_2). These results partially agree with those reported by El-Husseiny *et al* (1990), Abou El-Wafa *et al* (2000), Dorgham *et al* (2001) and Assaf *et al* (2003) who observed no significant effect on eviscerated carcass weight due to using different types of oils and fats in broiler diets. However, Vila and Esleve-Garica (1996) found significant differences in percentage of carcass, heart, gizzard and giblets when birds were fed on diets containing different types of oil or fat.

Table (3): Effect of dietary treatments on the performance of Silver Montazah growing chicks.

Items	Dietary treatments					SE	S.L.
	T1	T2	T3	T4	T5		
	SFO	PO	CSO	DFA	NF		
Initial body weight (g)	34.60	33.87	34.70	34.40	34.43	0.380	NS
At six weeks of age (0-6 weeks)							
Body weight gain (g)	396.90	368.73	386.90	377.03	375.87	19.691	NS
Feed intake (g)	1353.0	1380.0	1328.67	1331.33	1368.8	84.910	NS
Feed conversion (g feed/ g gain)	3.41	3.74	3.43	3.53	3.64	0.333	NS
Efficiency of ME utilization (kcal intake/ g gain)	10.43	11.16	10.44	10.66	11.09	0.481	NS
Mortality (Dead /total birds)	0/45	0/45	1/45	0/45	0/45	0.001	NS
At ten weeks of age (0-10 weeks)							
Body weight gain (g)	840.10	813.90	886.30	858.77	860.93	34.811	NS
Feed intake (g)	2805.70	2840.70	2991.74	2926.69	2872.00	98.102	NS
Feed conversion (g feed/g gain)	3.34	3.49	3.38	3.41	3.34	0.394	NS
Efficiency of ME utilization (kcal intake/ g gain)	10.46	10.59	10.51	10.52	10.39	0.522	NS
Mortality rate (Dead /total birds)	0/45	1/45	1/45	0/45	1/45	0.010	NS

NS = No significant.
S.L. = Significance level

Chemical composition of breast meat:

Table 4 summarizes the data of chemical composition of breast meat. The results indicated that the percentages of ether extract and ash were significantly ($P \leq 0.05$) affected by dietary treatments. It is clear from the results that chicks fed diets containing DFA (T_4), PO (T_2) or NF (T_5) contained significantly ($P \leq 0.05$) higher ether extract and ash compared to those fed diets containing CSO (T_3) or SFO (T_1). No significant differences were detected among dietary treatments in crude protein percentage of breast meat of chicks.

One could hardly, however, give a convenient interpretation for those significant differences which were observed in ether extract content of breast meat of the experimental chicks of the present study, since there are general nutritional factors that influences the degree of fatness in chicks. In this

concentration, Donaldson *et al* (1956) and Rand *et al* (1957) stated that carcass fat deposition is controlled primarily by dietary protein level or caloric to protein ratio. Increased fat deposition in birds was observed upon feeding diets containing low protein or imbalanced proportions of amino acids, high fat or energy in excess of metabolic needs, and wide energy to protein ratio; whereas the opposite is true (Marion and Woodroof 1966; Kubena *et al*, 1972; Bartov *et al*, 1974 and Summers and Leeson, 1979). Since the experimental diets were formulated to be approximately similar in their contents of major nutrients, it seems likely therefore that those significant differences; which were observed among dietary treatments of the present work in percentage of ether extract of breast meat of chicks were unexpected; and, probably are fortuitous.

Table (4): Carcass characteristics and chemical composition of breast meat of 10-week-old Silver Montazah chicks fed the experimental diets

Items	Dietary treatments					SE	Significant of differences
	T1	T2	T3	T4	T5		
	SFO	PO	CSO	DFA	NF		
Carcass characteristics (%)							
Dressing, %	63.17	62.51	64.40	64.77	62.50	2.200	NS
Liver, %	1.87	1.94	1.81	1.81	1.77	0.160	NS
Heart, %	0.52^{a}	0.52^{a}	0.41^{b}	0.39^{b}	0.55^{a}	0.135	*
Gizzard, %	1.06^{a}	2.22^{b}	1.98^{b}	1.96^{ab}	1.94^{ab}	0.173	*
Giblets, %	4.01^{a}	4.68^{b}	4.21^{a}	4.16^{ab}	4.26^{ab}	0.219	*
Chemical composition (%; dry matter basis)							
Ether extract; %	11.68^{a}	13.81^{b}	12.54^{a}	13.92^{b}	13.69^{b}	0.825	*
Crude protein; %	86.54	85.85	87.01	86.15	85.79	1.475	NS
Ash; %	4.21^{a}	4.51^{b}	4.11^{a}	4.49^{b}	4.99^{b}	0.096	*

a,b: Means values having different superscripts in the same row are significantly different (P≤0.05)
NS= No significant
* = significant differences (P≤0.05)

Economical efficiency:

Data of the economic efficiency for Silver Montazah chicks as affected by feeding with the experimental diets up to 10 weeks of age, are shown in Table 5. The prince of different tested oils ranged from 4500 LE / Ton (SFO) to 1800 LE / Ton (DFA), therefore, the calculation of the chicks cost feeding (L.E.) of different dietary treatments were 3.75 (CSO), 3.70 (NF), 3.59 (SFO), 3.52 (PO) and 3.52 (DFA), respectively.

Highly significant differences (P≤0.01) in net income and relative economic efficiency percentages were observed for the dietary treatments containing different types of oil. Greater net income and relative economic efficiency percentages were observed for the dietary treatments containing DFA (T_4) or CSO (T_3) than those of the other dietary treatments.

Table (5): Effect of dietary treatments on the economic efficiency of silver Montazah growing chicks up to 10 weeks of age

Criteria	Dietary treatments					SE	S.L.
	T1 SFO	T2 PO	T3 CSO	T4 DFA	T5 NF		
Cost of feeding; L.E. [1]	3.59	3.52	3.75	3.52	3.70		
Total cost; L.E. [2]	6.09	6.02	6.25	6.02	6.20		
Selling income; L.E. [3]	8.40	8.14	8.84	8.58	8.59		
Net income; L.E. [4]	2.31^{b}	2.12^{c}	2.59^{a}	2.56^{a}	2.39^{b}	0.025	**
Economical efficiency; % [5]	37.93^{b}	35.22^{c}	41.44^{a}	42.53^{a}	38.55^{b}	0.500	**

a,b: Means values having different superscripts in the same row are significantly different (P≤0.05)

** = High significant difference (P<0.01).

[1] Cost feeding = Total feed consumption (starter and finisher) X price of kg feed.

[2] Total cost = 1 + fixed cost (price of chick, labor, medication, electricity, ... etc.).

[3] Selling income = body weight X price of one kg live body weight.

[4] Net income = selling income – total cost.

[5] Economical Efficiency = Net income / Total cost X 100.

S.L. = Significance level

CONCLUSION

It could be concluded that it is possible; from the economic point of view to use the distillated fatty acids or cotton seed oil at levels of 2% in starter and 3% of grower diets for Silver Montazah growing chicks without any adverse effects on chick performance or carcass characteristics.

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تأثير التغذية على مصادر مختلفة من الزيوت على الأداء الإنتاجى وصفات الذبيحة لكتاكيت المنتزه الفضى النامية

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أجريت هذه التجربة لتقيم تأثير التغذية على علائق تحتوى على زيت عباد اشمس (SFO) – زيت النخيل (PO) – زيت بذرة القطن (CSO) – الأحماض الدهنية المقطرة (DFA) أو الدهن الجاف التجارى (NF) على الأداء الإنتاجى لكتاكيت المنتزه الفضى النامية.

استخدمت فى هذه الدراسة عدد ٢٢٥ كتكوت غير مجنس عمر يوم وزعت على خمس معاملات غذائية. غذيت الكتاكيت على خمس علائق بادئ (من عمر يوم حتى ٦ أسابيع من العمر) وعلى خمس علائق نامى. (٦ أسابيع إلى ١٠ أسابيع من العمر) وكونت العلائق لتكون متساوية تقريباً فى محتواها من المكونات الغذائية الأساسية . أضيفت الزيوت المستخدمة CSO, PO, SFO أو DFA بمعدل ٢% و ٣% بينما أضيف الدهن الجاف التجارى (NF) بمعدل ٤% و ٦% إلى علائق البادئ والنامى على التوالى الكتاكيت قدم إليها العلف والماء بصورة حرة من عمر يوم حتى ١٠ أسابيع من العمر .

النتائج أوضحت الآتى :-

١- يحتوى زيت عباد الشمس وزيت بذرة القطن والأحماض الدهنية المقطرة على كميات كبيرة من الأحماض الدهنية غير مشبعة وخصوصاً الحمض الدهنى اللينوليك (٦١,٤٤ و ٥٢,٧٩ و ٥٥,٦٨% على التوالى) بالمقارنة بالزيوت المختبرة الأخرى.

٢- لا يوجد فروق معنوية بين المعاملات الغذائية المختلفة فى وزن الجسم المكتسب والغذاء المأكول ومعامل التحويل الغذائى وأيضاً فى الكفاءة الغذائية للطاقة إلا أن الطيور المغذاه على العلائق المحتوية على زيت عباد الشمس (SFO) أستهلكت كميات علف أقل ولكنها أعطت احسن معامل تحويل غذائى بالمقارنة بالطيور المغذاه على علائق تحتوى على زيت النخيل (PO) – زيت بذرة القطن (CSO) أو الأحماض الدهنية المقطرة (DFA) المضافة بنفس النسب للعلائق (البادئ والنامى) .

٣- لا يوجد تأثير معنوى بين المعاملات الغذائية على بعض صفات الذبيحة لطيور التجربة عند عمر ١٠ أسابيع.

٤- لا يوجد تأثير معنوى على التركيب الكيميائى للحم الصدر بالنسبة للبروتين الخام بينما كان هناك فروق معنوية فى محتوى لحم الصدر من الدهن الخام والرماد ويبدو أن هذه الاختلافات كانت غير متوقعة.

٥- نتائج الدراسة الاقتصادية أوضحت أن الطيور المغذاه على علائق تحتوى على الأحماض الدهنية المقطرة (DFA) أو زيت بذرة القطن (CSO) أعطت أعلى عائد اقتصادى وأفضل كفاءة اقتصادية بالمقارنة بالطيور المغذاه على العلائق المحتوية على أنواع الزيوت الأخرى.