**An-Najah National University**

**Faculty of Graduate Studies**

# Performance and Body Fatty Acid Composition of Broiler Chicks, Fed Different Dietary Fat Sources.

**By**

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## Dedication

***To my father, mother, sisters and brothers.***

***I dedicate this project.***

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# الإقرار

انا الموقع ادناه مقدم الرسالة التي تحمل العنوان:

**Performance and Body Fatty Acid Composition of Broiler Chicks Fed Different Dietary Fat Sources**

**اداء دجاج اللحم ومستويات الدهنيه نتيجة للتغذية على مصادر دهن مختلفه**

أقر بأن ما اشتملت عليه هذه الرسالة إنما هي نتاج جهدي الخاص، باستثناء ما تمت الإشارة إليه حيثما ورد، وأن هذه الرسالة ككل، أو أي جزء منها لم يقدم من قبل لنيل أية درجة علمية أو بحث علمي أو بحثي لدى أية مؤسسة تعليمية أو بحثية أخرى.

## Declaration

The work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

**Student's name:** **اسم الطالب:**

**Signature:** **التوقيع:**

**Date :** **التاريخ:**

# Table of Contents

# List of Tables

# List of Figure

# List of Abbreviations

| | |
|---|---|
| **A.O.A.C** | American Official Analytical Chemist |
| **ANOVA** | Analysis of Variance |
| **BW** | Body Weight |
| **CA** | Calcium |
| **CF** | Crude Fiber |
| **CFU** | Cell Forming Unit |
| **CHO** | Serum Cholesterol |
| **CP** | Crude Protein |
| **D%** | Dressing Percentage |
| **DCP** | Di-Calcium Phosphate |
| **DM** | Dry Matter |
| **EE** | Ether Extract |
| **FCR** | Feed Conversion Ratio |
| **FI** | Feed Intake |
| **GLC** | Gas Liquid Chromatography |
| **HDL** | High Density Lipoprotein |
| **LDL** | Low Density Lipoprotein |
| **ME** | Metabolizable Energy |
| **NRC** | National Research Council |
| **OS** | Olive Oil Sediments |
| **P** | Phosphorus |
| **PG** | Poultry Grease |
| **PUFA** | Polyunsaturated Fatty Acids |
| **TSF** | Total Saturated Fatty Acids |
| **SAS** | Statistical Analysis System |
| **SO** | Sesame Oil |
| **SS** | Soap Stock Oil |
| **TCHO** | Total Cholesterol |
| **TG** | Triglycerides |
| **VLDL** | Very Low Density Lipoprotein |
| **WG** | Weight Gain |
| **WHC** | Water Holding Capacity |
| **PCBS** | Palestinian Central Bureau of Statistics |
| **SFA** | Saturated Fatty Acids |
| **MUFA** | Monounsaturated Fatty Acids |
| **Mn** | Manganese |
| **ME** | Metabolizable Energy |
| **G** | Gram |
| **Ml** | Mil |
| **NaCl** | Sodium Chloride |
| **C°** | Celsius |
| **H** | Hour |

**Performance and Body Fatty Acid Composition of Broiler Chicks, Fed Different Dietary Fat Sources**

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**Prof. Jamal Abo Omar**

## Abstract

The objective of this study was to investigate the effects of feeding different dietary fat sources in the finisher rations of broilers including sesame oil (SO) olive oil sediments (OS), and poultry grease (PG) in comparison to the traditional oil supplement, the soybean soap stock oil (SS) on growth performance, dressing percentage, carcass cut, blood lipid profile and meat quality *i.e.* water holding capacity(WHC), cell forming unit(CFU). A total of 208 day-old Cobb- 500 chicks were used in this experiment. Birds were divided into four experimental treatments of 52 birds in each, Each treatment was composed of 4 replicates with 13 birds in each. At the termination of the experiment birds were slaughtered for examining the carcass merits, visceral organs and the dressing percentages. Results showed that type of oil had significant effects on feed intake(FI), final body weight(BW) and feed conversion efficiency(FCR). Chicks fed the OS consumed more ($P<0.05$) feed compared to birds fed other oil supplements. Both PG and SS resulted in similar intake, however, birds fed with the SO had the lowest ($P<0.05$) FI. Highest ($P<0.05$) weight was observed in birds fed with SS followed by birds fed the PG. OS resulted in the lowest ($P<0.05$) average final weights. FCR was the best ($P<0.05$) in birds fed the SS, however, the lowest ($P<0.05$) was in birds fed the SO. At d 28, FCR was the best ($P<0.05$) in birds consuming the SO and PG,

however, at d 35 PG had the best ($P<0.05$) positive effect on feed conversion while the OS had the highest ($P<0.05$) negative effect. Heavier ($P<0.05$) carcass weights were observed in chicks fed the OS and the SS compared to carcasses of birds fed with PG and SO. The dressing percentages were higher ($P<0.05$) in birds fed the OS compared to that for other birds. Birds fed the SS and SO had better ($P<0.05$) dressing percentages compared to that in PG birds. Meat of broilers fed the OS had the highest ($P<0.05$) WHC followed by birds consuming the SO. However, the WHC was the lowest in birds fed the SS. The olive oil sediment caused about more than 100% improvement in WHC compared to the traditionally used soap stock oil. The highest carcass contamination was detected in carcasses of birds fed the SS, however, the least contaminated were the carcasses of birds fed the OS. At 28 d of age were affected by oil supplementation. At 40 d of age the effects of oil supplemented followed different trends. High density lipoprotein (HDL) levels were reduced ($P<0.05$) by all types of oil which had variable effects. The levels of that parameter were lowest in birds fed with SS, however, the OS has the least effect in reduction of HDL. Both SS and OS had no effect on low density lipoprotein (LDL) levels at age of 40 d. however, both SS and PG caused an increase ($P<0.05$) in LDL levels. Different effects were observed on the effect of oil type on triglycerides (TG), OS and the PG caused significant increase ($P<0.05$) in the levels of TG, which was not affected by SO and SS. Levels of total Cholesterol (TCHO) were reduced ($P<0.05$) by all types of supplemented oils. PG resulted in an increase in very low density lipoprotein (VLDL) levels compared to effects of other oil supplements that had no effects on this parameter.

# Chapter One

# Introduction

# 1. Introduction:

The energy density in diets can be improved by the addition of fat. The increased concentration of energy has certain advantage in improving feed conversion ratio (FCR) by reducing FI (Pinchasov , 1992; Scaife *et al*., 1994). Increases the palatability of rations is the main objective of the poultry industry in order to improve body weight (BW) and feed efficiency of the birds.( Harms *et al.*, 2000 and Bryant *et al*., 1995). showed that increasing dietary energy or fat supplementation decreased FI and improved FCR of broiler chicks which is important in decreasing the broilers marketing age .

he effects of animal fat and vegetable oils need to be examined not only for production characteristics as performance , but also for meat quality, carcass cut, and blood profile relative to human health (Ozdogan et al., 2003). However, it is very important to examine the fatty acid profile of poultry products (meat and eggs) due to its impact on human health and the imbalances in human dietary intake of various fatty acids as well as consumer demand for "healthier" animal protein sources (witt et al., 2009).

Scaife *et al*., (1994) and Lopez-Ferrer et al.,( 1999) reported that the lipid composition of broiler meat is modified according to the fatty acid profile of the dietary lipids sources within a week of feeding the diets.

Several studies suggest that in both birds and mammals, dietary polyunsaturated fatty acids (PUFA) inhibit lipid synthesis and increase fatty acid oxidation and induced thermogenesis (Takeuchi et al., 1995). These effects could explain why PUFA reduce abdominal fat.

There is a strong debate over the effects of animal fats compared to plant fats on body fats and the blood lipid profile. It is well documented that chronic diseases such as coronary arterial disease, hypertension, diabetes, arthritis, depression, other inflammatory and auto immune disorders and cancer can be prevented via the consumption of N-3 fatty acids (Wiseman, 1984; Simopoulos, 2000; Krauss et al., 2001; Russo, 2009).

Zollitsch et al., (1996) reported that vegetable oil resulted in higher metabolizable energy through decreasing fecal energy. Fat utilization in chicken is age dependent (Mossab et al., 2000). At ages lower than 3 weeks, utilization of fat is low because of the limited activity of lipase and bile salts (Crew et al., 1972; Mossab et al., 2000).

The objectives of present study were to determine the effects of different dietary fat sources (SO, OS and PG) in comparison to SS on broiler performance, carcass merits, visceral organs and blood fat metabolites.

# Chapter Two

# Literature review

# 2. Literature review

## 2.1. Animal production sector in Palestine:

According to Palestinian Central Bureau of Statistics,(PCBS,2010) the population of dairy cows was 33,290 cows. The breeds of cows in the Palestinian Territory are 59.7% Holstein-Friesian cows; 19.2% local cows; 13.6% hybrid cows; and 7.5% other. The results indicated that 87.6% of cows are the result of intensive breeding; 12.2% from semi-intensive breeding and 0.2% from unknown type of breeding. Cows bred primarily for milk made up 58.6%, with 41.2% bred for meat and 0.2% not stated. There were 567,236 sheep raised in the Palestinian Territory: The breeds of sheep in the Palestinian Territory were 52.9% local (Awassi) sheep; 35.7% (Assaf) sheep; 11.0% hybrid sheep; and 0.4% other. Goats were 219,364, among them 85.6% of local Baladi breed; 6.2% Shami (Syrian) goats; 7.9% hybrid goats; and 0.3% other. According to the same study there were 1,521 camels.

## 2.2. The poultry sector:

Poultry industry is very important in the world economy and the Palestinian economy. It provides a source of eggs and white meat .White meat have become one of the main sources of animal protein due to the exorbitant rise in the price of red meat therefore, the researchers around the world have devoted a considerable effort to development of poultry production in terms of quality and quantity (PCBS).

The problems that face broiler farmers in Palestine are the cost of feed. This is requiring looking for local source of feedstuffs, which could decrease the cost of production. Nutrition represents approximately 70% of total broiler production costs. The improvement in poultry production is highly dependent on many factors such as science, practices, genetics, management, and nutrition. The main ingredient used as energy source in poultry is corn and soybean meal is the main protein source (PCBS).

## 2.3. The broiler sector:

The poultry sector has developed considerably, especially in terms of the number of farms and the size of production and productivity, the area of warehouse in Palestinian Authority reach to 1.367.760 $m^2$. In addition the poultry sector in Palestinian Authority contributes in the total income from agriculture. Recent statistics showed that the number of raised broilers increased, and the broilers rose in Palestinian Authority 31.1 million. During the 2009/2010 agricultural year, there were 399,423 mothers of broiler birds in the Palestinian Territory, and 1,545,016 layers. There were also 521,130 turkeys (PCBS).

## 2.4. Fats used in the experiment:

### 2.4.1. Poultry grease

Poultry fat is also known as viscera oil and is obtained after the extraction of fat by autoclaving or in a percolator tank and expeller. After extraction, the fat is placed into a decantation tank to extract the acidulated soapstock and moisture excess. At this point, it is ready to be used in ration or to be refined (Neto,1994). Product yield varies from 1.3 to 1.6% of the live weight of the bird (Mano et al., 1999). This range depends on the level and source of energy used in the ration, besides bird sex, age and weight at slaughter. Higher percentages of fat are obtained when higher levels of energy are used, older birds are slaughtered and consequently with higher live weight; moreover, females produce more fat than males, independent of dietary energy level and age at slaughter (Neto,1994).

**2.4.2. Sesame oil:**

It is produced locally in significant amounts as a by-product of sesame seed crushing. However, this oil, obtained using a traditional pressing method with high levels of impurities, is not suitable for human consumption because bitter taste and is mainly used in poultry diets. However, Sesame oil supplemented diets are not fed to ruminants on a wide scale compared to diets supplemented with Sunflower oil or soybean oils. Several researches showed the positive effects of sesame oil on performance of several animal species (Abo Omar, 2002; Hejazi, 2009).

**2.4.3. Olive oil sediments:**

Olive oil is one of the most widely used vegetable oils for human consumption in the countries of the Middle East. Few studies have been carried out to evaluate the response of broilers to olive oil supplementation. investigated the impact of different olive oil levels (zero, 2.5 or 5.0%) on the feeding value of the feed and the composition of meat produced (El

Deek.et al., 2005) The fatty acid composition of olive oil sediment is (C 14:0-0.49, C18:1-76.37, C16:0-14.42, C18:2-7.04) while the metabolizable energy value is 8225.3 (ME/kg) (El Shanti H. et al., 2009).

### 2.4.4. Soybean soap stock:

The acidulated SS, also denominated as soybean fatty acid, is a sub-product of the industry of soybean oil. This sub-product is obtained through the alkaline neutralization of the raw oil, which produces a raw soap (a mixture of soaps, neutral oil, water, sterols, pigments, and other constituents); this unstable product is converted in acidulated SS after a treatment of sulfuric acid in hot aqueous solution. Compared to soybean oil, acidulated soybean oil soap stock contains high levels of free fatty acids (50%), unsaponifiable matter, and oxidized fatty acids, besides being also rich in carotenoids (Bornstein and Lipstein, 1963; Lipstein et al., 1965; Pardio et al.2001).

**Table 1: Fatty Acid composition in sesame oil, olive oil sediments, soap stock oil and poultry Grease.**

| Fatty Acid | | Sesame Oil% | olive oil sediments% | soap stock oil% | Poultry Grease% |
|---|---|---|---|---|---|
| **Palmitic** | **16:0** | 9.01 | 13.47 | 16.44 | 22.99 |
| **Palmitoleic** | **16:1** | -- | 0.86 | 2.28 | 0.98 |
| **Stearic** | **18:0** | 4.8 | 2.58 | 3.35 | 8.62 |
| **Oleic** | **18:1** | 37.7 | 61.90 | 20.26 | 39.79 |
| **Linoleic** | **18:2** | 45.8 | 18.05 | 48.57 | 33.82 |
| **Linolenic** | **18:3** | .1 | 1.35 | 2.85 | -- |
| **Total %** | | 98.21 | 98.32 | 94.45 | 96.2 |
| **Undetected** | | 1.79 | 1.68 | 5.55 | 3.8 |
| **SFA[1]** | | 14.2 | 16.99 | 19.79 | 31.61 |
| **MUFA[2]** | | 39.7 | 63.37 | 22.54 | 40.77 |
| **PUFA[3]** | | 41.7 | 19.64 | 51.42 | 23.82 |
| **(MUFA+PUFA):SFA** | | 5.73 | 4.88 | 3.75 | 2.04 |
| **PUFA:SFA** | | 2.94 | 1.16 | 2.60 | 0.75 |

(El Shanti H. et al., 2009), (Azman et al., 2004)|

SFA[1] : Saturated fatty acids

MUFA[2]: Monounsaturated fatty acids

PUFA[3] : Polyunsaturated fatty acids

## 2.5. Effects on Birds Performance:

Fats are frequently included in broiler diets to increase the energy density. Several experiments have shown that an increase in energy concentration produces a decrease in feed intake but does not negatively affect daily gain, resulting in an improvement in feed efficiency, Chicks fed with diets containing soybean oil, PG and beef tallow showed no significant difference in body weight (Pesti *et al.*,2002) who demonstrated that the average BW of chicks consuming a ration with soybean oil was not different from those consuming a ration of animal/vegetable blend and PG. Hulan *et al.,* (1984) reported no significant difference in average BW of chickens consuming a ration with PG, beef tallow, lard and rapeseed oil. However, Balevi and Coßkun (2000) reported that average BW of chickens consuming a ration with corn oil was higher than those consuming the ration with soybean oil or beef tallow. Weight gain was lower in broilers fed on the diets supplemented with PG than soybean oil or beef tallow for 5 to 21 days of age (Azman, , *et al.*, 2004). FCR of the poultry grease group was better compared to the other groups, and in birds fed with beef tallow daily weight gain and daily FI were higher than in the other groups. Supplemental beef tallow to the grower diets has detrimental effects on growth performance. Griffiths et al. (1977) observed that the birds fed with corn oil and poultry fat were significantly heavier than birds non-supplemented with fat.

WG, FI and FCR of broilers fed with diets containing 4% of poultry fat, 4% of soybean oil or a mixture of 2% of soybean oil and 2% of poultry fat were not affected by oil sources (Dutra Jr et al., 1991). However, there was a decrease in feed intake and weight when the mixture was used. The effects of increasing inclusion levels (0, 2, 4, 6, 8 and 10%)

of refined palm oil (8,000 kcal/ kg ME), corn oil (9,000 kcal/kg ME) and poultry fat (9,000 kcal/kg ME) in diets for broiler were studied by (Valencia et al., 1993). There were no effects of the sources of oil on weight gain and feed conversion. On the other hand, performance was proportionally better with increasing inclusion levels of the oil sources. Performance parameters were evaluated in broilers fed different lipidic sources (raw soybean oil, poultry fat and acidulated soybean soapctock and its mixtures). There were no significant differences in WG, FI, FCR and viability when soybean oil and poultry fat were used (Lara et al., 2003). Scaife et al. (1994) fed female broilers with rations containing different sources of lipids (beef tallow, soybean oil, canola oil, marine fish oil or a mixture of these oils) and observed that live weight was significantly higher when soybean oil was used. Birds fed with canola oil also showed higher intake and higher weight. Birds fed beef tallow had the poorest conversion rate. evaluated broiler rations containing 0, 4 and 8% of soybean oil and acidulated soybean oil soap stock, and observed similar weight gain between the different lipidic sources and improved feed conversion in birds fed with soybean oil in comparison to the birds fed with acidulated soybean oil soap stock. They also observed a reduction in feed intake of birds fed with acidulated soybean oil soap stock when the inclusion level was increased from 4 to 8%, whereas no reduction in feed intake was observed in birds fed with soybean oil. Lara et al. (2003) fed male broilers with different lipidic sources (degummed soybean oil, poultry fat, acidulated soybean oil soap stock, a mixture of poultry fat/soybean oil and other mixture of soybean oil/ acidulated soybean oil soap stock). It was observed better weight gain and intake in birds fed with soybean oil in relation to the birds fed with acidulated soybean oil soap stock.

## 2.6. Carcass and visceral organ mass.

Broilers when fed diets rich in polyunsaturated fatty acids (PUFA) had lower abdominal fat deposition compared with feeding diets with predominantly saturated or monounsaturated fats (Crespo and Esteve-Garcia, 2001, 2002a; Sanz, Flores et al, 1999).

Dietary fat caused an increase in body fat as tallow (Deaton *et al.*, 1981). However, dietary fatty acid are absorbed and deposited in tissues of monogastrics without modification (Scaife, *et al.*, 1994; Crespo and Esteve-Garcia, 2001).

The different lipidic sources had no influence on the levels of moisture, ether extract, and protein of the breast, thigh and whole carcasses (Lara et al., 2003).

According to Moura (2003), the inclusion of soybean oil in broiler diets does not affect the moisture and ether extract in the breast and thigh muscles. Furthermore, the deposition of fat on the breast muscle and viscera is not affected by the inclusion of the oil in the diet. Acidulated soybean oil soap stock

## 2.7. Blood metabolites:

Level and type of fat in the diet influence the biochemical parameters of the blood, which are sensitive indicators of the state of health of the animals and reflects the intensity of metabolic processes taking place.

In the available literature no data were found concerning the influence of the source of fat on the profile of fatty acids in the serum of birds. Numerous studies show, however, that the type and level of fat used and composition of fatty acids in the diet influence the digestibility of the fat and absorption of fatty acids, the level of lipid metabolism indices in the blood and the profile of fatty acids in the tissues (Scaife et al., 1994; Peebles et al., 1997a,c; Dvorin et al., 1998; Özdoğan and Akşit, 2003; Viveros et al., 2009). In the cited papers the beneficial influence of vegetable fat is underlined.

Those fats with a higher content of unsaturated fatty acids reduce the level of cholesterol, the lipoprotein LDL and VLDL fractions, at the same time increasing the content of HDL fraction in the blood of the birds (Scaife et al., 1994).

## 2.8. Water holding capacity:

The water holding capacity of meat muscles is very important as a tool that affects meat quality. During fasting, plasma glucose (Warriss et al., 1993; Edwards et al., 1999) and glycogen stores in the liver decrease

(Warriss et al., 1993; Edwards et al., 1973) whereas muscle glycogen reserves are not (Warriss et al., 1993) or are only marginally affected (Warriss et al., 1993; Edwards et al., 1973). However, glycogen depletion in muscles can be resulted from .Stress exposure during transport and lairage, on the other hand, may cause severe glycogen depletion in the muscles. By increasing various energy depots in the muscle prior to slaughter, the anaerobic production of lactate postmortem may be delayed, thereby delaying a decline in pH. Postmortem muscle pH development exerts a strong influence on a number of meat quality attributes including water-holding capacity (WHC) and color development (Edwards et al., 1973). Creatine supplementation to humans increased creatine concentrations in the muscle, which has been shown to delay the onset of fatigue as a result of increased availability of creatine phosphate (Casey et al., 1996). Creatine concentrations in the muscle may be further improved by co-administration of glucose (Green et al., 1996), because high insulin levels in the blood stimulate creatine accumulation in the muscle (Steenge *et al*., 1998).

Pyruvate supplementation may activate the pyruvate dehydrogenase complex. In the ischemic muscle, activation of this complex increases creatine phosphate and decreases lactate concentrations (Timmons *et al.*, 1996), which may delay the pH decline postmortem.

## 2.9. Microbial contamination:

Contamination of broiler carcasses and slaughter house equipment is common. To avoid this birds are subjected to feed withdrawal for 4 to 10 h prior to slaughter. Previous studies focused mainly on the fatty acid profile of meat. *Clostridium butyricum* which is found in soil and in the intestines of animals. This (Ito et al., 1997).

Our previous experiments demonstrated that fish oil diets reduced abdominal fat in broiler chickens, whereas C. butyricum supplementation increased intramuscular fat content in breast muscle However, the mechanisms for these effects remain unclear. The effects of dietary C. butyricum on the expression of genes linked to fatty acid metabolism have not been examined in chickens (Yang et al., 2010).

# Chapter Three

# Material and Methods

# 3. Material and Methods

## 3.1. Bird and experimental design:

Two hundred eight one-day-old broiler chicks of the Cobb 500 strain were be obtained from local hatchery and randomly assigned to four treatments. There are 4 diets; each will be fed to 4 replicate pens of 13 chicks of each. Feed and water will be supplied *ad labium*. All chicks were fed starter rations 1 up to 21 day, and then finisher diets from 22 to 40 day of life.

A light/dark cycle of 23:1 h and the temperature 35 C° for tow day-old and then we decries the temperature to arrived room temperature 25 C° will be maintained throughout the 40 day experimental period. Birds will be fed with isocaloric and isonitrogenous .The first, second, third groups was fed starter whit SS, and finisher diet whit SO, OS, PG respectively, forth group the control group, was fed starter and finisher whit SS.

The experimental diets were formulated according to NRC (1994) and are presented in Table 2 and Table 3. Chicks were weighed at weekly basis and feed consumption in each pen was recorded on the same days. Feed conversion ratio (FCR) was calculated at each period (g feed/ g gain). Animals in each group were closely monitored and daily mortalities were recorded. On day 35, 6 chicks from each treatment group were slaughtered.

**Table (2): Composition of the experimental starter diets fed to broilers and their chemical composition.**

| Treatments / Ingredients% | starter diets with soap stock oil |
|---|---|
| Corn | 58.5 |
| Soybean meal | 34.5 |
| Oil | 3.30 |
| Limestone | 0.80 |
| Salt | 0.30 |
| Methionine | 0.14 |
| Lysine | 0.05 |
| DCP | 1.80 |
| Premix* | 0.59 |
| Chemical composition | |
| Dry matter% | 88 |
| Crude protein% | 21 |
| Crude fiber% | 4.03 |
| Crude fat% | 4.68 |
| Ash% | 6.20 |
| Calcium% | 1.16 |
| Phosphorous% | 0.67 |
| ME, kcal/kg | 2980 |
| Mn*ppm* | 177 |

*Premix contents per 4.0 kg : Vitamin (A) 8.5 MIU. vitamin (D3) 2.5 MIU. vitamin (E) 50 KIU. vitamin (K3) 2.0 gr. vitamin (B1)0.80 gr vitamin (B2)6.00 gr.pantonec11.20 gr niacin 30.00gr. vitamin (B6)2.40gr vitamin (B12)8.00 mg. folic acid 0.80gr biotin 150.00 mg cholin 200.00gr anti oxidant 125.00gr manganese 80.00 gr. zinc 50 gr iron 20gr.copper 15 gr. iodine 1.2 gr. cobalt 0.2gr. Selenium 0.2 gr. bambermycin 10 gr. Wheat enzyme 90 gr phytase 750 kfyt. Limestone 1818.67 gr. salinomycin 60 g.

**Table (3): Composition of the experimental finisher diets fed to broilers and their chemical composition.**

| **Treatments** / Ingredients% | **Sesame oil** | **olive oil sediments** | **Soap stock oil** | **Poultry grease** |
|---|---|---|---|---|
| Corn | 63.3 | 63.3 | 63.3 | 63.3 |
| Soybean meal | 29.0 | 29.0 | 29.0 | 29.0 |
| Oil | 4.20 | 4.20 | 4.20 | 4.20 |
| Limestone | 0.80 | 0.80 | 0.80 | 0.80 |
| Salt | 0.30 | 0.30 | 0.30 | 0.30 |
| Methionine | 0.15 | 0.15 | 0.15 | 0.15 |
| lysine | 0.05 | 0.05 | 0.05 | 0.05 |
| DCP | 1.60 | 1.60 | 1.60 | 1.60 |
| Premix* | 0.59 | 0.59 | 0.59 | 0.59 |
| Chemical composition | | | | |
| Dry matter% | 89.11 | 89.01 | 89.32 | 89.83 |
| Crude protein% | 18.36 | 18.26 | 18.40 | 18.35 |
| Crude fiber% | 3.08 | 3.08 | 3.08 | 3.08 |
| Crude fat% | 5.98 | 5.83 | 6.32 | 5.57 |
| Ash% | 5.80 | 5.97 | 5.72 | 5.60 |
| Calcium% | 1.20 | 1.14 | 1.10 | 1.04 |
| Phosphorous5 | 0.66 | 0.64 | 0.65 | 0.66 |
| ME, kcal/kg | 3195 | 3195 | 3195 | 3195 |
| Mn*ppm* | 229 | 236 | 235 | 200 |

*Premix contents per 4.0 kg : Vitamin (A) 8.5 MIU. vitamin (D3) 2.5 MIU. vitamin (E) 50 KIU. vitamin (K3) 2.0 gr. vitamin (B1)0.80 gr vitamin (B2)6.00 gr.pantonec11.20 gr niacin 30.00gr. vitamin (B6)2.40gr vitamin (B12)8.00 mg. folic acid 0.80gr biotin 150.00 mg cholin 200.00gr anti oxidant 125.00gr manganese 80.00 g. zinc 50 gr iron 20gr.copper 15 gr. iodine 1.2 gr. cobalt 0.2gr. Selenium 0.2 gr. bambermycin 10 gr. Wheat enzyme 90 gr phytase 750 kfyt. Limestone 1818.67 gr. salinomycin 60 g.

## 3.2. Blood collection and analysis:

At the end of the experiment, 3 broilers from each pen were randomly selected. Blood was collected via wing vein puncture using syringe, placed into vacuum tubes containing ethylenediaminetetraacetic acid and stored at−4 °C. Samples were centrifuged at 1500×g for 15 min and then serum was separated. The separated serum was used for analysis of the content of, total cholesterol, triglyceride, high density lipoprotein cholesterol, and low density lipoprotein cholesterol.

## 3.3. Water holding capacity:

The frozen broiler carcasses were thawed in a refrigerated condition (4 °C) for 48 h and the breast fillets were dissected. pH was measured in the breast meat of broiler using a pH meter. For measuring the water holding capacity, one gram of the minced breast meat of broiler was placed on a round filter paper. The filter paper with meat was placed into the centrifuge tube and centrifuged for 10 min. The released water absorbed into the filter paper was weighed and calculated as a percentage of the initial moisture of meat.

## 3.4. Blood fat profile:

The fatty acid methyl esters were prepared from the extracted lipids with BF3-methanol (Sigma-Aldrich). The fatty acid methyl esters were, then, separated on a gas chromatograph.

## 3.5. Microbiological analysis:

The breast meat (10 g) with 100 mL saline solution (0.85%, NaCl) was homogenized for 2 min using a stomacher homogenizer and the homogenate was serially diluted 10-fold with the saline solution. Each diluent (100 μL) was spread in triplicate on each agar plate and the plate was incubated at 37 °C for 24 h. Colony forming units (CFU) per gram was counted, at a dilution giving 30–300 CFU per plate.

## 3.6. Statistical analysis:

A total of 28 pens with 10 broilers per pen were used for this experiment with 7 replications for each treatment. Analysis of variance was performed using the raw data, and the mean values and standard errors of the means (SEM) were calculated by the Statistical Analysis System (SAS, 2000). Differences among the means were determined by the Duncan's multiple range test with a significance defined at $P<0.05$.

# Chapter Four

# Results

# 4. Results:

## 4.1. Bird Performance:

Type of oil had a significant effect on FI, final body weight and FCR. Chicks fed with the olive oil sediment consumed more (P<0.05) feed compared to birds fed with other oil supplements. Both PG and SS resulted in similar intake, however, birds fed with the sesame oil had the lowest (P<0.05) feed intake (Table 4) (finger 1, 2, 3).

Final body weights were variable among oil type. Highest (P<0.05) weight was observed in birds fed with soap stock oil followed by birds fed the PG. Olive oil sediments resulted in the lowest (P<0.05) average final weights (Table 4). The feed conversion ratio was the best (P<0.05) in birds fed the SS, however, the highest (P<0.05) was in birds fed the olive oil sediments (Table 4). The FCR was variable with age. At day 21 it was the same in all birds under different treatments, however, at later age type of oil had different effect. At d 28, FCR was the best (P<0.05) in birds consuming the sesame oil and poultry grease, however, at d 35 PG had the best (P<0.05) positive effect on feed conversion while the OS had the highest (P<0.05) negative effect (Table 4).

**Table 4. Effects of dietary treatment on feed intake, Body weight ,and feed conversion ratio (FCR*) .**

| Variable | Sesame oil | olive oil sediments | soap stock oil | Poultry grease | P value |
|---|---|---|---|---|---|
| Feed intake 0-21d | 989 $^{b}$ | 1063$^{a}$ | 1058 $^{a}$ | 1059 $^{a}$ | 0.05 |
| Body weight at 21 d | 989 | 1063 | 1058 | 1059 | 0.05 |
| Feed intake 0-28 d | 1633 $^{c}$ | 1875 $^{a}$ | 1825 $^{b}$ | 1839 $^{b}$ | 0.05 |
| Body weight at 28 d | 1228b$^{c}$ | 1167$^{c}$ | 1245b | 1348 $^{a}$ | 0.05 |
| Feed intake 0-35 d | 2511 $^{c}$ | 2771 $^{a}$ | 2666b | 2687 $^{b}$ | 0.05 |
| Body weight at 35 d | 1652 $^{b}$ | 1765 $^{a}$ | 1743 $^{ab}$ | 1828 $^{a}$ | 0.05 |
| Feed intake 0-40 d | 3046 $^{c}$ | 3483 $^{a}$ | 3362 $^{b}$ | 3359 $^{b}$ | 0.05 |
| Body weight at 40 d | 1998 $^{d}$ | 2161 $^{c}$ | 2254 $^{a}$ | 2179 $^{b}$ | 0.05 |
| FCR*-21 | 1.23 | 1.25 | 1.24 | 1.25 | 0.05 |
| FCR*-28 | 1.36 $^{b}$ | 1.48 $^{a}$ | 1.46 $^{a}$ | 1.36 $^{b}$ | 0.05 |
| FCR*-35 | 1.52 $^{b}$ | 1.57 $^{a}$ | 1.53 $^{ab}$ | 1.47 $^{c}$ | 0.05 |
| FCR*-40 | 1.55 $^{b}$ | 1.61 $^{a}$ | 1.49 $^{c}$ | 1.54 $^{b}$ | 0.05 |

Rows of different letters are significantly different (P<0.05)

*feed conversion ratio (g feed: g/ gain).

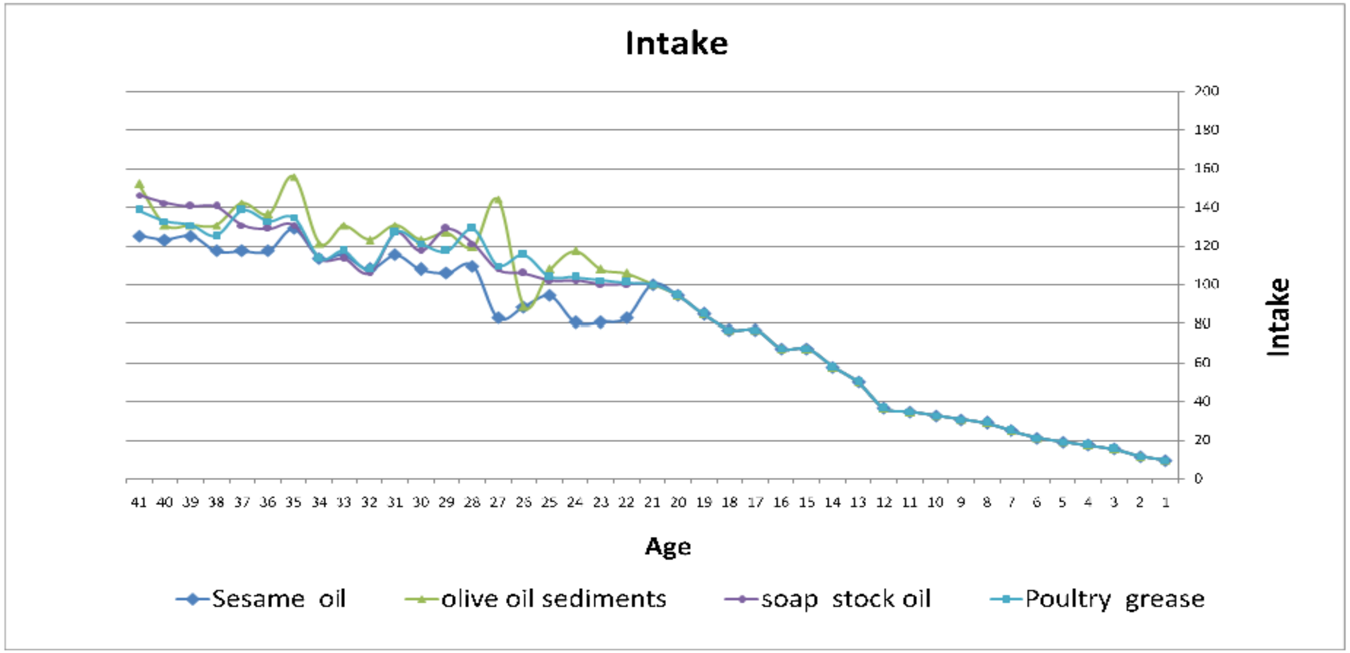


**Figure 1.Body Weight**

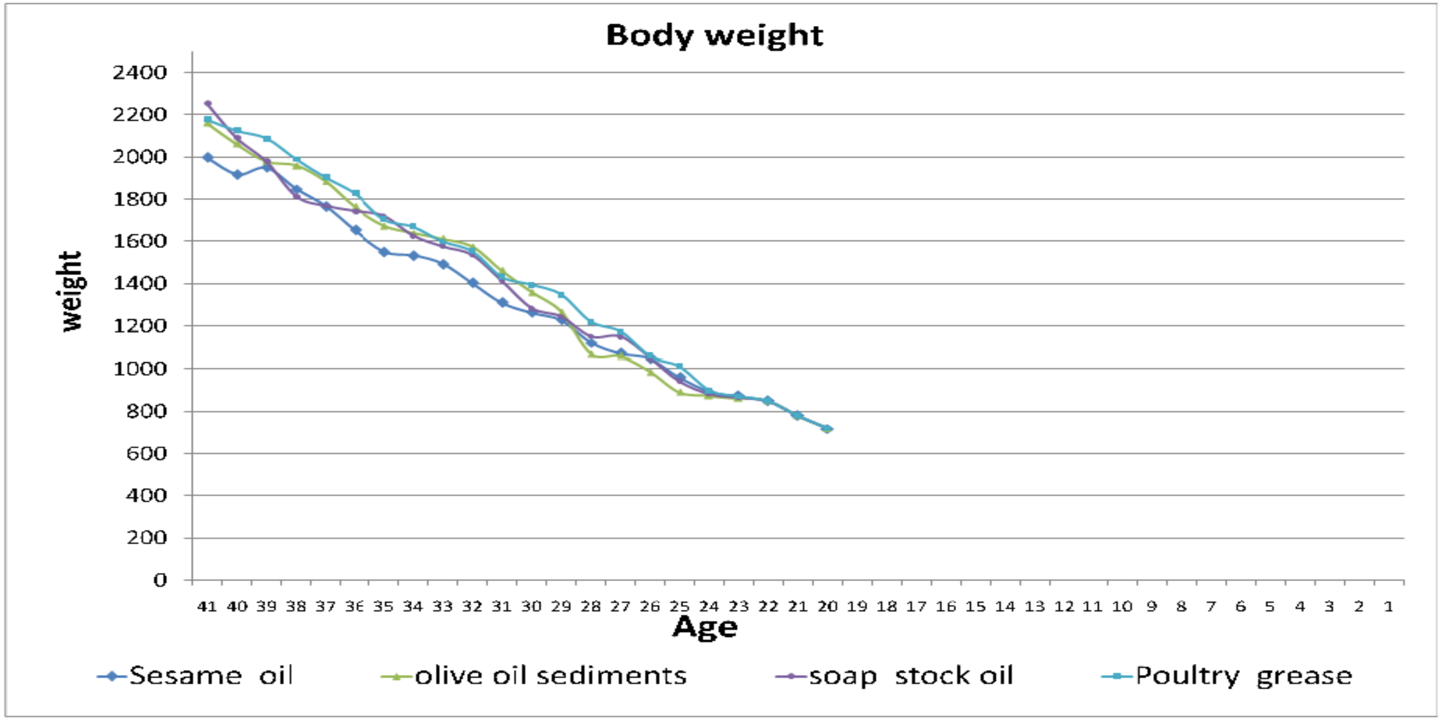
Body weight
weight
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Age
Sesame oil
olive oil sediments
soap stock oil
Poultry grease

**Figure 2.FCR**

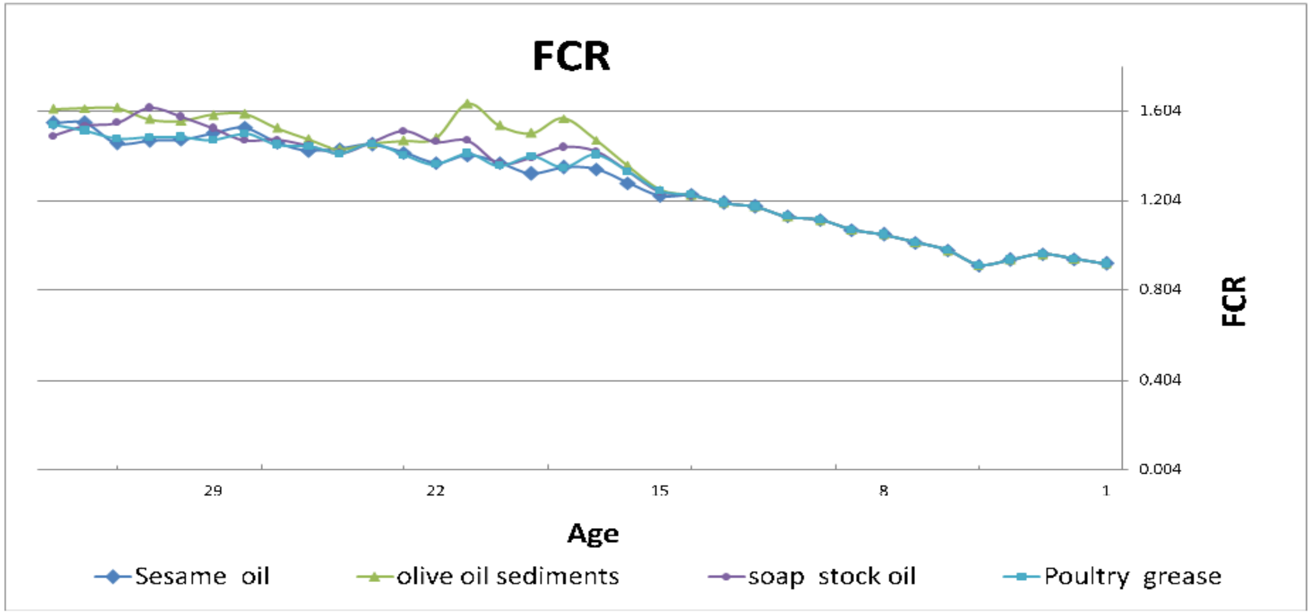


**Figure 3.Intake**

## 4.2. Carcass and visceral organs:

The average carcass weights were significantly affected by type of oil (Table 5). Heavier ($P<0.05$) carcass weights were observed in chicks fed with the olive oil sediments and the soap stock oils compared to carcasses of birds fed with poultry grease and sesame oil.

The dressing percentages were higher ($P<0.05$) in birds fed the olive oil sediments compared to that for other birds. Birds fed the soap stock and sesame oils had better ($P<0.05$) dressing percentages compared to that in poultry grease birds (Table 5).

Type of oil had variable effects on visceral organs. The average weights were the highest ($P<0.05$) in birds fed the olive oil sediments (heart and liver) and in birds fed both olive oil sediments and sesame oil (Table5).

| Variable | Sesame oil | olive oil sediments | soap stock oil | Poultry grease | P value |
|---|---|---|---|---|---|
| Live weight | 1998 [b] | 2172.3[a] | 2251.8[a] | 2178[a] | 0.05 |
| Carcass weight | 1454.5 [b] | 1669.5[a] | 1621.8[a] | 1476.8 [b] | 0.05 |
| Dressing % | 72.8 [b] | 76.9[a] | 71.9 [b] | 67.9 [c] | 0.05 |
| Fat pad weight | 17.3 [d] | 26.8 [c] | 41.5 [b] | 45[a] | 0.05 |
| Fat pad % | 0.9 [d] | 1.2 [c] | 1.8 [b] | 2.1 [a] | 0.05 |
| Gizzard | 49.5[a] | 47.3[a] | 35.0 [b] | 31.5 [b] | 0.05 |
| Liver +Heart | 48.0 [b] | 64.8[a] | 50.3 [b] | 50.8 [b] | 0.05 |
| Giblets | 97.5 [b] | 112.0[a] | 85.3 [c] | 82.3 [c] | 0.05 |
| Giblets % | 4.9b | 5.2[a] | 3.8 [c] | 3.8 [c] | 0.05 |
| Fresh weight | 0.9 | 1.1 | 0.8 | 0.8 | 0.05 |
| Dry weight | 0.4[ab] | 0.3 [b] | 0.5[a] | 0.4[ab] | 0.05 |
| W.H.C[1]% | 57.14 [b] | 74.4[a] | 33.2 [d] | 46.7 [c] | 0.05 |
| CFU[2] /1g | $20.5*10^4$ c | $9*10^4$ [d] | $191*10^{4}$[a] | $73.5*10^4$ b | 0.05 |

**Table 5: The effect of feeding broiler chicks on diets, percent of carcass, giblets, water holding capacity at age 40 days.**

Rows of different letters are significantly different (P<0.05)

## 4.3. Water holding capacity:

The water holding capacity was affected by type of supplemented oil (Table 5). Meat of broilers fed the OS had the highest (P<0.05) water holding capacity followed by birds consuming the sesame oil. However, the water holding capacity was the lowest in birds fed the soap stock oil

(Table 5). The olive oil sediment caused about more than 100% improvement in WHC compared to the traditionally used soap stock oil.

## 4.4. Colony forming units:

Type supplemented oil had a significant effect on the total CFU in broiler carcasses (Table 5). The highest carcass contamination was detected in carcasses of birds fed the soap stock oil, however, the least contaminated were the carcasses of birds fed the olive oil sediments.

## 4.5. The blood lipids profile:

Compared to blood fat parameters prior to oil supplementation, these parameters at 28 d of age were affected by oil supplementation. HDL was reduced by all types of oil supplemented, showing that sesame oil and poultry grease had the most negative effect. Oil type had no effect on LDL levels, however, sesame oil, olive oil sediment and soap stock numerically reduced the TG levels. Levels of TG were increased ($P<0.05$) by feeding poultry grease. Cholesterol levels were not affected by oil supplementation (Table 6). VLDL levels were only affected by poultry grease supplementation. Other types of oil had no effect on this blood parameter (Table 6).

At 40 d of age the effects of oil supplemented followed different trends (Table 6). HDL levels were reduced ($P<0.05$) by all types of oil which had variable effects. The levels of that parameter were lowest in birds fed with soap stock oil, however, the olive oil sediment has the least effect in reduction of HDL.

Both sesame and olive oil sediments had no effect on LDL levels at age of 40 d. however, both soap stock oil and poultry grease caused an increase ($P<0.05$) in LDL levels (Table 6). Different effects were observed on the effect of oil type on TG, olive oil sediment and the poultry grease caused significant increase ($P<0.05$) in the levels of TG, which was not affected by sesame and soap stock oil (Table 6). Levels of total cholesterol were reduced ($P<0.05$) by all types of supplemented oils. Poultry grease resulted in an increase in VLDL levels compared to effects of other oil supplements that had no effects on this parameter (Table 6).

**Table 6: Total plasma cholesterol (TCHO), triglycerides (TG) and high density lipoprotein (HDL), low density lipoprotein (LDL) and very low density lipoprotein (VLDL).**

| | HDL* | LDL* | TG* | TCHO * | VLDL* | P value |
|---|---|---|---|---|---|---|
| Age | 20 day | | | | | |
| | 79.38 | 28.63 | 49.43 | 139.35 | 9.9 | |
| Age | 28 day | | | | | |
| Sesame oil | 71.30 | 27.90 | 32.40 [b] | 131.80 | 6.36 [b] | 0.05 |
| olive oil sediments | 75.00 | 31.10 | 39.10 [b] | 152.40 | 9.16 [b] | 0.05 |
| soap stock oil | 74.85 | 29.25 | 43.38 [b] | 145.15 | 8.67 [b] | 0.05 |
| Poultry grease | 70.30 | 34.45 | 69.38 [a] | 141.33 | 13.9 [a] | 0.05 |
| Age | 40 day | | | | | |
| Sesame oil | 69.85 [ab] | 29.58 [b] | 48.33 [b] | 111.18 | 9.7 [b] | 0.05 |
| olive oil sediments | 73.55 [a] | 29.80 [b] | 57.25 [ab] | 106.50 | 11.5 [ab] | 0.05 |
| soap stock oil | 58.63 [b] | 35.45 [ab] | 39.65 [b] | 119.78 | 7.9 [b] | 0.05 |
| Poultry grease | 64.05 [ab] | 39.95 [a] | 88.15 [a] | 125.13 | 17.6 [a] | 0.05 |

Colum of different letters are significantly different ($P<0.05$)

* units of TG, CHO, HDL, LDL (mg/dl).

# Chapter Five

# Discussion

# 5. Discussion:

Solutions to improve feed efficiency and animals performance was and still a major concern of researchers. Soybean oil is the main source of vegetable fat used in poultry feeding because of the favorable fatty acids composition and high content of metabolizable energy (Smulikowska *et al.*, 2005),

The content of fatty acids is an important criterion in evaluating the use of fat in the intensive feeding of poultry. The highest content of SFA was found in poultry grease (31%), definitely the lower percentage of SFA was found in sesame oil and olive oil sediment (14 and 17%). Among SFA the dominating ones were palmitic (C16:0) and stearic acid (C18:0). The vegetable sources of fat, as compared to the lard, were characterized by a higher content of polyunsaturated fatty acids, which in the SS comprised 51%, and in SO 42%. The content of fatty acids is an important criterion in evaluating the use of fat in the intensive feeding of poultry.

## 5.1. Birds' performance:

Type of oil had a significant effect on feed intake, final body weight and feed conversion efficiency. Chicks fed with the olive oil sediment consumed more feed compared to birds fed with other oil supplements. Both poultry grease and soap stock oils resulted in similar intake, however, birds fed with the sesame oil had the lowest feed intake. Fats are often used in broiler diets to improve the energy density. Feed conversion efficiency can be improved by reducing feed intake without affecting daily gain as a result of the increased energy concentration (Pinchasov and Nir, 1992; Scaife, et al., 1994).

Final body weights were variable among oil type. Heaviest weight was observed in birds fed with soap stock oil followed by birds fed the poultry grease. Olive oil sediments resulted in the lowest average final weight. It was reported that type of dietary fat caused an increase in body fat as tallow (Deaton et al., 1981). However, dietary fatty acid are absorbed and deposited in tissues of monogastrics without modification (Scaife, et al., 1994, Crespo and Esteve-Garcia, 2001). Vegetable oil resulted in higher metabolizable energy through decreasing fecal energy (Zollitsch et al., 1996).

The results of oil inclusion in diets indicated that FI, BW gain and FCR values were affected significantly by the supplemented fat sources. This disagrees with data reported by (Crespo and Esteve-Garcia 2001 and Viveros et al. 2009) in studies comparing PUFA and SFA fat sources. However, Atteh and Leeson (1983) reported that saturation degree of a dietary fat can influence feed intake, weight gain and FCR which results from better availability of energy from unsaturated fatty acids. Moreover, digestion and absorption of dietary fat depends also on the age of birds. It is especially marked in case of saturated animal fats, which are particularly poorly digested initially and their utilization increases gradually to 8 wk of age (Krogdahl, 1985).

## 5.2. Carcass merits and visceral organs:

The average carcass weights were significantly affected by type of oil. Heavier carcass weights were observed in chicks fed with the olive oil sediments and the soap stock oils compared to carcasses of birds fed with poultry grease and sesame oil.

The dressing percentages were higher in birds fed the olive oil sediments compared to that for other birds. Birds fed the soap stock and sesame oils had better dressing percentages compared to that in poultry grease birds. It was reported that vegetable oil resulted in higher metabolizable energy through decreasing fecal energy (Zollitsch et al., 1996). Fat utilization in chicken depends on age (Mossab et al., 2000). At ages lower than 3 weeks utilization of fat is low as to the limited lipase activity and of less active bile salts (Crew et al., 1972; Mossab et al.,. 2000).

Type of oil had variable effects on visceral organs. The organs average weights were the highest in birds fed the OS (heart and liver) and in birds fed SO.

Broilers when fed diets rich in polyunsaturated fatty acids (PUFA) had lower abdominal fat deposition compared with feeding diets with predominantly saturated or monounsaturated fats (Crespo & Esteve-Garcia, 2001, 2002a; Sanz, Flores, Pérez de Ayala, & López-Bote, 1999). Poly unsaturated fatty acids when fed to broilers caused heavier abdominal fats compared to those fed saturated or monounsaturated fats (Crespo &

Esteve- Garcia, 2001, 2002a; Sanz, Flores, Pérez de Ayala, & López-Bote, 1999).

Several chronic diseases such as coronary arterial disease, hypertension, diabetes, arthritis, depression, other inflammatory and auto immune disorders and cancer can be prevented via the consumption of n-3 fatty acids (Wiseman, 1984, Simopoulos, 2000; Krauss et al., 2001; Russo, 2009).

Liver weight of chicken was significantly higher body weight resulting in higher organ weight, (Haug et al. 2007). In accordance to our results, (Scaife et al. 1994) showed that a diet containing SO resulted in increased feed intake and high liver weight of broiler chicken compared to a diet containing RLO. Final body weight of chicken was significantly different in to the groups (p=0.029). Body weight was affected by the feed intake and fat sources.

### 5.3. Blood fat profile:

Compared to blood fat parameters prior to oil supplementation, these parameters at 28 d of age were affected by oil supplementation. HDL was reduced by all types of oil supplemented, showing that sesame oil and poultry grease had the most negative effect. HDL, beneficial for the body and conditioning the transport of cholesterol from the peripheral tissues to the liver, is the main fraction of lipoproteins in the blood of the birds (Peebles et al., 1997c).

Level and type of fat in the diet influence the biochemical parameters of the blood, which are sensitive indicators of the state of health of the animals and reflects the intensity of metabolic processes taking place in their organisms (Ross et al., 1978; Bowes et al., 1989; Meluzzi et al., 1992; Krasnodębska-Depta and Koncicki, 2000).

Oil type had no effect on LDL levels, however, SO, OS and SS numerically reduced the TG levels. Levels of TG were increased by feeding poultry grease. Cholesterol levels were not affected by oil supplementation. VLDL levels were only affected by poultry grease supplementation. Other types of oil had no effect on this blood parameter.

At 40 d of age the effects of oil supplemented followed different trends. HDL levels were reduced by all types of oil which had variable effects compared to the oils effect at 28 d of age. The levels of that parameter were lowest in birds fed with SS; however, the olive oil sediment has the least effect in reduction of HDL.

Both sesame and OS had no effect on LDL levels at age of 40 d. However, both SS and PG caused an increase in LDL levels. Different effects were observed on the effect of oil type on TG, OS and the PG caused significant increase in the levels of TG, which was not affected by SO and SS. Levels of total cholesterol were reduced by all types of supplemented oils. PG resulted in an increase in VLDL levels compared to effects of other oil supplements that had no effects on this parameter. Different types oil has similar effects on the content of triglycerides and total cholesterol in the blood serum of the birds of all the experimental groups (Bowes et al., 1989; Meluzzi et al., 1992; Krasnodębska-Depta and Koncicki, 2000).

### 5.4. Water holding capacity:

The WHC of meat muscles is very important as a tool that affects meat quality. In this study, the WHC was affected by type of supplemented oil. Meat of broilers fed the OS had the highest water holding capacity followed by birds consuming the sesame oil. However, the water holding capacity was the lowest in birds fed the soap stock oil. The olive oil sediment caused about more than 100% improvement in WHC compared to the traditionally used soap stock oil.

Water-holding capacity, or the ability of meat to retain water, is influenced by several factors. Those factors include production of lactic acid and loss of adenosine triphosphate, which influences rate and extent of pH decline, protein oxidation, and changes in cell structure associated with proteolytic enzyme activity (Huff-Lonergan and Lonergan, 2005). Belitz et al. (2004) states that approximately 5% of the water found in muscle is bound by hydrophilic groups on the proteins and the other 95% is held by capillary forces between the thick and thin filaments. Some of the water in muscle is also found in free form and will be expelled during even the mildest form of applications.

Previous research has identified the occurrence of pale, soft, and exudative meat as a leading cause of reduced WHC in the poultry industry.

WHC values in this study ranged from 34 to 77% which means low denaturation levels of carcasses protein. Occurrences ranging from 5 to 50% have been reported in commercial processing plants (Barbut, 1996, 1997; McCurdy et al., 1996; Owens et al., 2000; Woelfel and Sams, 2001; Woelfel et al., 2002). Pale, soft, and exudative meat results from a rapid postmortem pH decline at warm carcass temperatures and leads to protein denaturation causing a pale color and a decrease in WHC translating into excessive yield losses (Alvarado and Sams, 2003).

**5.5. Colony forming units:**

Type supplemented oil had a significant effect on the total CFU in broiler carcasses. The highest carcass contamination was detected in carcasses of birds fed the soap stock oil, however, the least contaminated were the carcasses of birds fed the olive oil sediments.

It is known that microbes that contaminate broiler carcass can survive in the environment, especially in untreated water, but it is primarily transferred onto poultry carcasses via fluid and feces from the gastrointestinal tract of the bird, due to the high numbers of the organism found in these fluids The organism then attaches to the skin of the broiler and perseveres to final products (Benefield, 1997). The majority of viable microbial cells found on poultry skin have been trapped in either the surface water layer or entrapped with water in skin crevices or feather follicles (Chantarapanont et al., 2003). These data suggest that poultry skin is a safe harbor for microbes and may explain why researcher reported that the incidence on raw, retail poultry products decreases from 76% on whole broilers to 48% on skin-on split breast to only 2% on boneless, skinless breast meat.

Mai (2003) concluded that many organisms associated with poultry products in the processing environment, such as the pseudomonads, micrococci and staphylococci.

# Chapter Six

# Conclusions and Recommendations

# 6.Conclusions and Recommendations:

## 6.1 Conclusions:

* Type of oil had a significant effect on feed intake, final body weight and feed conversion efficiency, Chicks fed with the olive oil sediment consumed more feed compared to birds fed with other oil supplements, Olive oil sediments resulted in the lowest average final weights.

* Highest weight was observed in birds fed with soap stock oil followed by birds fed the poultry grease; the feed conversion ratio was the best in birds fed the soap stock oil.

*At d 28, FCR was the best in birds consuming the sesame oil and poultry grease. At d 35 poultry grease had the best positive effect on feed conversion while the olive oil sediments had the highest negative effect.

*Heavier carcass weights were observed in chicks fed with the olive oil sediments and the soap stock oils compared to carcasses of birds fed with poultry grease and sesame oil. The dressing percentages were higher in birds fed the olive oil sediments compared to that for other birds. Birds fed the soap stock and sesame oils had better dressing percentages compared to that in poultry grease birds. The average weights of heart and liver were the highest in birds fed the olive oil sediments and in birds fed both olive oil sediments and sesame oil.

Meat of broilers fed the OS had the highest water holding capacity followed by birds consuming the sesame oil. The olive oil sediment caused about more than 100% improvement in WHC compared to the traditionally used soap stock oil.

*The highest carcass contamination was detected in carcasses of birds fed the soap stock oil; however, the least contaminated were the carcasses of birds fed the olive oil sediments.

* At ages of 21 and 40 d, HDL was reduced by all types of oil supplemented, showing that sesame oil and poultry grease had the most negative effect.  VLDL levels were only affected by poultry grease supplementation. Other types of oil had no effect on this blood parameter.Both sesame and olive oil sediments had no effect on LDL levels at age of 40 d. However, both soap stock oil and poultry grease caused an increase in LDL levels..

**6.2 Recommendations:**

Researchers have been concerned over the recent years to find solutions for poultry feeding which to support high broiler performance and lower feeding costs. Soybean oil is the main source of vegetable fat used in poultry feeding because of the favourable fatty acids composition and high content of metabolizable energy, but its cost is relatively high. Olive oil sediment is a potential source of fat that can be used in broilers rations as indicated by its positive impact on several tested parameters. The different oil supplements had variable effects on the tested parameters with certain advantages of each.

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كلية الدراسات العليا

# اداء دجاج اللحم ومستويات المكونات الدهنية نتيجة للتغذية على مصادر دهن مختلفة

اعداد

محمد عبد الرحيم عبد الفتاح القب

اشراف

أ.د. جمال ابو عمر

قدمت هذة الاطروحة استكمالاً لمتطلبات الحصول على درجة الماجستير في الانتاج الحيواني في كلية الدراسات العليا في جامعة النجاح الوطنية في نابلس- فلسطين.

2013

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## الملخص

هدف هذه الدراسةِ لفحص التأثيراتَ لإطعام المصادرِ المختلفة من الدهون في علف الدجاج اللاحم في العلف النهائي على اداء الصيصان ونسبة التصافي لذبائح ومستويات الدهون في الدم وعلى بعض خصائص اللحوم (مثل قدرة اللحوم على حمل الماء ، وعدد الكلي للبكتيريا) وعلى بعض الاجزاء،والدهون المستخدمة هي زيتِ السمسم وطرطب زيت زيتون ودهن الدواجن مع الزيت التجاري (مخلفات مصانع الزيوت النباتية).

استخدام 208 صوص عمر يوم من سلالة كوب 500 ، قسمت الي اربع مجموعات تحتوي على 52 طير وكل مجموعة قسمت الى مكررات كل مكرر يحتوي على 13طير،في نهاية التجرية تم ذيح مجموعة من كل المكررات لتعرف على نسبة التصافي وبعض الاجزاء الداخلية ، وتم مشاهدة النتيجة على انة يوجد تاثير معنوي بسبب الانواع المختلفة من الزيوت على الوزن النهائي الحي لطيور وعلى استهلاك العلف وعلى كفائة العلف.

استهلاك الصيصان التي غذيت على العلف المحتوي على طرطب زيت الزيتون ($P<0.05$) كان اكتر بالمقارنة من التي غذيت بالانواع الاخرى، وكان الاستهلاك متشابة في العلف المحتوي على دهن الدواجن والزيت التجاري،واما المحتوي على زيت السمسم كان اقل استهلاك($P<0.05$) ، ولوحظة ان اعلى وزن ($P<0.05$) سجلة الدجاج المغذى على الزيت التجاري ويليه الدجاج المغذى على العلف الذي يحتوي على زيت السمسم ودهون الدواحن،اما بنسبة لتحويل كان العلف الذي يحتوي الزيت التجاري ($P<0.05$) واقل نسبة تحويل كانت في العلف الذي يحتوي على طرطب زيت الزيتون، في اليوم 28 نسبة التحويل كانت الاعلى في ($P<0.05$) الطيور التي استهلكت العلف المحتوي على زيت السمسم ودهن الدواجن ،اما على

اليوم ،اما على اليوم 35 كان تاثير العلف الذي يحتوي على دهون الدواجن (P<0.05)ايجابي، وسلبي على الذي يحتوي طرطب زيت الزيتون.

اثقل وزن ذبيحة (P<0.05) شوهد في الطيور المغذى على العلف المحتوي على طرطب زيت الزيتون لذا كانت اعلى نسبة تصافي بنسبة لباقي العلائق، كما شوهد في الطيور المغذى على العلف المحتوي على طرطب زيت الزيتون(P<0.05) ان لحومها قادرة على حمل كمية كبيرة من الماء تليها الطيور المغذى على العلف المحتوي على زيت السمسم، واعلى نسبة تلوث في لحوم الطيور المغذى على العلف الذي يحتوي على الزيت التجاري واقلها في شوهد في الطيور المغذى على العلف المحتوي على طرطب زيت الزيتون.

على يوم 28 الدهون ذات الكثافة العالية كانت منخفضة في جميع انواع الزيوت والدهون ذات الكثافة المنخفضه كانت متشابة،اما مستوى ترايجليسرايد (P<0.05) مرتفع في المغذى على العلف المحتوي على دهون الدواجن، اما بنسبة للكولسترول لم يتاثر . على يوم 40 كان هناك اختلاف في مستويات الدهون في الدم، الدهون ذات الكثافة العالية منخفضة (P<0.05) في المغذى على العلف المحتوي على الزيت التجاري اما الطيور المغذى على العلف المحتوي على طرطب زيت الزيتون كان لة اقل تاثير على تخفيض الدهون ذات الكثافة العالية . كل من الطيور المغذى على العلف المحتوي على الزيت التجاري و طرطب زيت الزيتون ليس هناك تاثير على مستويات الدهون ذات الكثافة المنخفضة على عمر 40يوم .

كل من الطيور المغذى على العلف المحتوي على الزيت التجاري و دهون الدواجن تسبب الارتفاع (P<0.05) تاثير على مستويات الدهون ذات الكثافة المنخفضة، كما لوحظ اختلاف متعددة في الترايجليسريد، كل من الطيور المغذى على العلف المحتوي على طرطب زيت الزيتون و دهون الدواجن(P<0.05) كان هناك ارتفاع في مستوى الترايجليسريد،اما مستوى الكيلسترول انخفض (P<0.05) في جميع انواع الزيوت،اما بنسبة لدهون ذات الكثافة المنخفضة كثيرا كانت مرتفعة في الطيور المغذى على العلف المحتوي على دهون الدواجن مقارنة بغيرها