REPUBLIC OF TURKEY
BİNGÖL UNIVERSITY
INSTITUTE OF SCIENCE

PERFORMANCE AND PHYSIOLOGICAL TRAITS OF BROILER CHICKENS FED DIFFERENT LEVELS OF THYME, ADIANTUM, ROSEMARY AND THEIR COMBINATION

MASTER THESIS IN AVIAN PHYSIOLOGY

Nechirvan Hazam Ramadhan ARTOSHI

ANIMAL SCIENCE

SUPERVISOR OF THESIS
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PREFACE

I am extremely grateful to my supervisor Dr. Bünyamin SÖĞÜT for giving his wonderful opportunity to pursue my M.Sc. degree at Bingol University. His mentorship has made my study very productive and smoother than I could ever imagine. Special thanks going to Dr. Ihsan T. TAYEB for all his practical suggestions and insightful feedback as Co-supervisor in my study. Also many thanks to Dr. Mowfeq S. Berware and Dr. Kamal N. Dosky in Duhok University for all the kindness and help. Many thanks also owed to Mr. Kawa Y. Merkhan, Mr. Renas H. Issa, Mr. Merkhan M. Mustafa, Dr. Khalal Oray and Mr. Saifaddin A. Zangana for all the guidance and help. Above all, I thank my beloved family members and special my lovely father for their boundless love and constant encouragement.

Nechirvan H. ARTOSHI

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LIST OF ABBREVATIONS

FCR	: Feed Conversion Ratio
FI	: Feed İntake
G	: Gram
Kg	: Kilogram
GC/MS	: Gas Chromatography/Mass Spectrometry
M	: Meter
Mm	: Millimeter
Min	: Minute
C^{O}	: Celsius
°N	: North
°E	: East

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BROİLER RASYONLARINA FARKLI DÜZEYLERDE İLAVE EDİLEN KEKİK, VENÜS SAÇI VE BİBERİYE BİTKİSİNİN BESİ PERFORMANSI VE FİZYOLOJİK ÖZELLİKLER ÜZERİNE ETKİSİ

ÖZET

Bu çalışma, etlik piliç rasyonlarına farklı düzeylerde ilave edilen Kekik, Venüssaçı ve Biberiye türlerinin etlik piliçlerin büyüme-gelişme özellikleri ve bazı fizyolojik özellik özelliklerine etkilerinin araştırılması amacıyla yürütülmüştür. Denemede günlük yaşta 288 adet civciv 8 deneme grubuna 3 tekerrürlü olacak şekilde şansa bağlı olarak dağıtılmıştır. Rasyona tıbbi bitkiler 7. günde ilave edilmiştir. Aktif olarak kullanılan tıbbi bitkilerin analizleri gaz kromotrafi cihazında yapılmıştır.

Canlı ağırlıklar ve ölüm oranları haftalık olarak ölçülmüştür. Deneme sonunda karkas özellikleri, hematolojik, biyokimyasal ve hormanal, kan parametreleri ölçülmüştür. Kekik, Venüssaçı ve biberiye örneklerinde 14, 15 ve 21 bileşik tespit edilmiş olup, bu bitkilerin başlıca bileşikleri sırasıyla carvacrol (% 60,77), gamma-terpinene (% 41,23) ve α-Pinene (% 51,87)'dir. Muamele gruplarına ait 42. gün sonunda elde edilen canlı ağırlık ortalamaları arasındaki fark önemli bulunmuştur ($p<0,05$). T7 (biberiye 10 g/kg) grubu tüm muamele grupları arasında en yüksek canlı ağırlığa sahip olmuştur. Yem tüketimi bakımından T6 (biberiye 5 g/kg) grubunda en yüksek, T2 (kekik 5 g/kg) grubunda en düşük yem tüketimi ortalaması elde edilmiştir. Muamele grupları arasında yem tüketimi ortalamaları arasında herhangi bir farklılık olmamıştır. Ölüm oranları bakımından kontrol ve muamele grupları karşılaştırıldığında T2 ve T7 gruplarında en yüksek ölüm oranı tespit edilmiştir. Muamele gruplarına ait karkas özellikleri ortalamaları arasındaki farklılıklar önemli bulunmuştur ($P<0,05$). Karkas ağırlığı, karkas randımanı, but, kanat, sırt ve boyun ağırlıkları bakımından en yüksek değerler T3 (kekik 10 g/kg) grubunda sırasıyla 1484±41,81 g, %73,51±1,1, 414,5±14,07 g, 176±5,57 g ve 436,33±15,53 g tespit edilmiştir. Muamele grupları arasında karaciğer ve abdominal yağ ağırlıkları ortalamaları bakımından T3 (kekik 10 g/kg) grubunda en düşük abdominal yağ ağırlık ortalaması ve en yüksek ciğer ağırlık ortalaması tespit edilmiştir. Ciğer ve abdominal yağ ağırlıkları bakımından muamele grupları arasında önemli farklılıklar tespit edilmiştir. Venüs saçı tozu muamelesi diğer muamele gruplarına kıyasla bursa ve dalak ağırlıkları üzerine önemli etkiye sahip olmuştur. Albumin, globülün, colestrol ve glukoz seviyeleri bakımından muamele grupları arasında önemli farklılıklar gözlemlenmiştir. Tıbbi bitkiler hormanal tepkimeyi önemli ölçüde etkilemiştir. Ayrıca T6 grubunda en yüksek TSH ve GH hormon düzeyleri tespit edilmiştir. Rasyona tıbbi bitkilerin eklenmesi RCB oranını düşüren PCV, Hb ve damak belirgin şekilde etkilenmiştir. Muamelelerin et renginde önemli bir etkisi olmamıştır.

Anahtar Kelimeler: Kekik, venüs saçı, biberiye, kan parametresi, enzim, et rengi, etlik piliç.

PERFORMANCE AND PHYSIOLOGICAL TRAITS OF BROILER CHICKENS FED DIFFERENT LEVELS OF THYME, ADIANTUM, ROSEMARY AND THEIR COMBINATION

ABSTRACT

The objective of this study was to investigate the effects of different levels of medical plants (thymus vulgaris, Adiantum capillus-veneris L, Rosemarinus Officinalis and their combination) in the diet on Physiological and Growth Performance traits of broiler chicken. A Total of 288 mixed broiler chicks, were randomly distributed to eight treatments with three replicate. Medical plants at different levels added to basal diets at 7^{th} days old. The active compounds of the three plants were analyzed by Gas Chromatography/Mass Spectrometry.

Live body weight and mortality rates were measured at weekly intervals. At the end of the experiment the following traits were measured: carcass traits, hematology, blood biochemical, hormonal responses, and serum enzymes parameters. The results obtained could be summarized as follows: Fourteen, Fifteen and Twenty one compounds were identified in the Thyme, Adiantum and Rosemary samples, the major compounds of these plants were carvacrol (60.77%), gamma-terpinene (41.23%) and α-Pinene (51.87%), respectively. There is a significant effect of medicinal plants on live body weight. At day 42, T7 group (Rosemary level 10 g/kg) noticed heavier live body weight among all treatments. There was a significant effect of medicinal plants on feed intake among treatment and T6 (Rosemary 5 g/kg) was higher and T2 (thyme (5 g/kg) lower feed intake. mortality rate in T2 and T7 was significant highest while, FCR wasn't effect by medicinal plants. There was a significant effect of treatment on carcass traits. T3 group which contain (thyme 10 g/kg) observed best results in regard to carcass yield, dressing percentage, legs, wings, back and neck being (1484±41.81 g, 73.51±1.1%, 414.5±14.07 g, 176±5.57 g and 436.33±15.53 g, respectively). While, breast weight was higher in T8 (Thyme 7.5 g/kg+ Adiantum 4 g/kg+ Rosemary 7.5 g/kg). There was a significant effect of treatments on abdominal fat and liver weights. T3 group have lower abdominal fat and higher liver weight among treatments. Adiantum powder at different levels has significant effect on bursa and spleen weights compared to other groups. There was a significant effect of treatments on albumin, globulin, cholesterol and glucose concentration. Medicinal plants significantly affect hormonal response. The combination of plants (T8) investigated high concentration of T3 and T4 hormones. Also, addition of rosemary at 5 g/kg to the diet observed higher concentration of TSH and GH hormones. There was significant effect of medical plants on AST and ALT enzymes. Addition of medicinal plants to diets decreased RBC cont., while PCV, Hb and palatal were not significantly affected. There is none significant effect of medical plants on meat color among treatment.

Keywords: Thyme, adiantum, rosemary, blood biochemical, hematology, hormone response, enzymes, meat color, broiler.

1. INTRODUCTION

Broiler production is one of the most important exchequer of white meats in any country that because the high costs of red meat as compared with white meat, which has its crucial position in the national economy (Al-khatib and Al-Hassani 2016). The highest demand for broiler meat led the producers to intensive livestock production. In intensive farming, diseases spread quickly among birds, this situation obligate breeder to apply treatment for all birds in the group as a protective measure against infection (Guerrero-Legarreta and Hui 2010). Also broiler production is growing quickly as a result of the population expansion and increasing demand for poultry products (Thornton 2010). Because of genetic improvement and the feed formulation also through improved management practices, broilers today grow much quickly and reach higher market weights than ever before, to solve these problem and improvement the nutritional and biological characters of broiler chicken, antibiotic as chemical compound been used escalating in broiler production (Lee et al. 2003).

Generally, using antibiotics drugs which could be administrated in the feed, in drinking water or by injection in poultry for therapeutic and prophylactic purposes and they include a large number of different types of compounds (Elmanama and Albayoumi 2016). It are low molecular weight and can inhibit the growth of other microorganisms even in low concentration and produced by algae and fungi (Nir and Ve-Senkoylu 2000) and it are substances that destroy or inhibit the growth of bacteria (Shareef 2009). Mechanism work of antibiotic is related interactions with intestinal microbial population (Dibner and Richards 2005; Niewold 2007). The main objective of antibiotic as growth promoters in poultry industry through improved feed conversion, better appetite, stimulation of the immune system, higher vitality, regulation of the intestinal micro-flora (Schwarz et al. 2001; Bach Knudsen 2001).

It’s been banned or decreased using in poultry industry as a growth promoter because of lower effect and increasing the bacterial–resistant strains and especially concerns about transferring resistant from animals to human through food (Kamel 2001). Recently, some unwanted results been observed by utilization of antibiotics as a growth promoter in broiler industry (Botsoglou and Fletouris 2001).

Many authors searched for alternative of using antibiotic in poultry industry as growth promoters (Mellor 2000; Langhout 2000; Wenk 2000; Kamel 2001).Broiler breeder producers pressure for checking alternative substance and strategies for poultry growth promotion and prevention of diseases are been investigated, natural additives such as phytogenic and medicinal plants and their products including plant extracts or essential oils have received increased attention because of believed to be safer, healthier and less regarded than synthetic additives (antibiotics) (Gill 2000; Manzanilla et al. 2001; Ibrahim et al. 2005; Ocak et al. 2008; Toghyani et al. 2010; Farag et al. 2014; Alagawany et al. 2015a,b).

Medicinal plants and their products are introduced as candidates for use in broiler diets or through drinking water in which their beneficial effects as phytogenic feed additives have been proven (Bolukbasi and Erhan 2007; Soltan et al. 2008 and Dalkiliç et al. 2009). Herbs have been identified to improvement antimicrobial, antiviral, and antioxidative activities and to simulate the immune and endocrine systems (Dahiya et al. 2006). Besides, scientists recently observed that the stimulating and appetizing activity of herbs and plant extracts on poultry digestive and immune system could be benefit health and performance of poultry farm (Lopez-Bote et al. 1998; Cowan 1999; Gill 1999; Newman and Devegowda 1999; Gollnisch and Halle 2001; Tucker 2002b).

In many studies, the different active components of herbal plants reported the different influence on poultry performance, so the current study aimed to investigate the effects of different levels of herbs (*thymus vulgaris, Adiantum capillus-veneris L* and *Rosemarinus Officinalis*) and their combination in the diet as an alternative of antibiotic growth promoter on Growth Performance, Physiological, meat color, immunological and Carcass traits of broiler chicken.

2. LITERATURE REVIEW

The poultry industry is becoming a leading industry in the world. The sector has been growing an annual rate of around 20 percent for the last two decades. This industry has immense potential for boosting the economic growth of any country as well as ensuring food security. Poultry feeds are regularly supplemented with pharmacological Products, either for preventive purposes, as prevention of certain diseases or as growth stimulators, primarily for young chicks (Doyle 2001). It has mention the discovery and widespread use of a number of "feed additives" in poultry feeds. The term feed additive is applied in a broad sense, to all products other than those commonly called feedstuffs, which could be added to the ration with the purpose of obtaining some special effects. Chemical feed additives have been widely used in poultry industry since long time to increase animals' performance with regard to growth and feed efficiency (Collington et al. 1990). In 1950 antibiotics were approved for use as animal feed additives (Gersema and Helling 1986). Antibiotics are microbial metabolites produced by fungi and algae which have low molecular weight and can inhibit the growth of other microorganisms even in low concentrations (Nir and Ve-Senkoylu 2000).

Many synthetic drugs and growth promoters are supplemented to the broilers to effect rapid growth, but their use have shown many disadvantages like high cost, adverse side effect on health of birds and long residual properties etc. It has been reported that the use of antibiotics as a growth promoter in chicken has caused some unwanted results in humans (Botsoglou and Fletouris 2001). Various estimates have been calculated by the Institute of Medicine (Khachatourians 1998; Committee on Drug Use in Animals 1999; Mellon 2001; the Animal Health Institute, a trade organization (Carnevale 2000) and the Union of Concerned Scientists (Mellon 2001). Using antibiotic in broiler diets showing the increase in bacteria´s resistance which are human pathogens may cause diseases that are difficult to treat even if the resistant bacteria are not human pathogens, they may still

be dangerous because they can transfer their antibiotic resistance genes to other bacteria that are pathogenic (Taylor 1997; Barton 1998; Witte 1998; Wegener et al. 1999).

During the last two decades, considerable research has been done in exploring suitable alternative to antibiotics as growth promoters. There are several non-pharmacological products from the group prebiotics, Probiotics, organic acids and other essential oils, medicinal plants or parts of plants which are alternatives to antibiotics as growth stimulators (Simon 2005). Herbs or products including plant extracts, essential oils or the components of the essential oils hold promise as alternatives to antibiotics in broiler feeds as natural additives (Ocak et al. 2008; Ibrahim et al. 2005).

2.1. Using Medicinal Plants in Poultry Feeds as Alternative for Antibiotics:

Natural feed additives of plant origin are generally believed to be safer, healthier and less subject to hazards. It was believed that there are 250000- 500000 species of plants including medical plants in world (Borris 1996; Hashemi and Davoodi 2010). Using medical plant including thyme, rosemary and adiantum in broiler diets could have many effects to broiler performance and health like as enhancing digestion system throughout stimulation of endogenous enzyme (Brugalli 2003), having autoxidation properties (Hui 1996), antimicrobial activities of due to their phytochemical components (Lee et al. 2004b; Dorman and Deans 2000). Medical plant including herbs or products containing plants leaves, essential oil or main components of the essential oil and plant extracts are among the alternative antibiotics that are already being used in practice (Williams and Losa 2001; Lee et al. 2003; Acamovic and Broker 2005; Bampidis et al. 2005; Griggs and Jacob 2005). However, active components of medical plant including herbs may improve stimulate the immune function and digestion activities in broilers (Ghazalah and Ali 2008). Herbs and herbal products are incorporated in poultry diets to replace synthetic products in order to stimulate or promote the effective use of feed nutrients which may subsequently result in more rapid body weight gain, higher production rates and improved feed efficiency. Moreover, Many studied discovered that alternative of antibiotics by utilization of some of these plant extract in broiler diets or throughout of drinking water (Longhout 2000; Mellor 2000b; Wenk 2000; Kamel 2001; Alcicek et al. 2003).

2.1.1. Thyme (*Thymus vulgaris*)

Thyme (Thymus Vulgaris) is one of Lamiaceae family (Mikaili et al. 2010). It's planted in many regions in the world (Davis 1982; Al-Khdri 2013). It has received attention due to its antibacterial properties and antioxidant (Toghyani et al. 2011). Also it has used for many medicinal purposes: antimicrobial, antinociceptive, respiratory diseases and etc. (Demir et al. 2008). The main phenolic components in Thymus vulgaris are carvacrol (5-isopropyl-2-methyl phenol) and Thymol (5-methyl-1-2-isopropyl phenol) (Masada 1976). The ratio of carvacrol (15%) and the thymol is about (40%) (Mikaili et al. 2010). Twetman and Peterson (1997) thymol has used to inhibit oral bacteria Carvacrol Thymol and proved that can improve the digestion of nutrients (Cabuk et al. 2006) also it has believed to exhibit a range of beneficial physiological effects. Platel and Srinivasan (2004) Thymol has been reported to stimulate digestive secretions such as salivary amylase in humans and bile acids, gastric, pancreatic enzymes (i.e. lipase, amylase, and proteases), and intestinal mucosa in rats. Hagmuller et al. (2006) and Cross et al. (2007) discovered that antibacterial, anticoccidial and antifungal and no cytotoxic effects, preventing further mortality and improving general health of broilers. However, thyme is used stimulates production of saliva (Lueng and Foster 1996; Jellin et al. 2000; Barnes et al. 2002).According to (Allen et al. 1998; Denil et al. 2004; Cross et al. 2007) proved that the beneficial effects of thyme in broiler production.

2.1.2. Adiantum (*Adiantum capillus-veneris)*

Adiantum capillus veneris is one of Adiantaceae Families and the most common species with potential importance for medicinal and nutritive purposes. About 150 species of adiantum in all wards, it is a large and diverse genus of ferns (Tryon et al1990). Adiantum been used for medicinal due to their significant effects and traditionally used to treatment of many ailments for a long period (Husson et al. 1986; Ambusta 1986). Grieve and Herbal (1985) the fresh or dried leafy of adiantum fronds are antidandruff, antitussive, astringent, demulcent, refrigerant, stimulant, sudorific depurative, emetic, weakly emmenagogue, febrifuge, galactogogue, laxative, pectoral, emollient, weakly expectorant and tonic. Most used of adiantum species in India are in the indigenous system of medicine (Chopra et al. 1956; Ambusta 1986).

It was reported that it contains 24.00 % water extractable matter, 11.44 % ethanol extractable matter and 8.3 % moisture. Rajurkar and Kunda Gaikwad., (2012) discovered that ten elements including Mg, Ca, K, Mn, Fe, Co, Na, Ni, Cu, and Zn were determined from plant sample using inductively coupled plasma atomic emission spectroscopy (ICP-AES) technique among which Ca and K were found to be at major level. Adiantum Capillus-Veneris could be playing a vital role in regulation blood glucose levels of diabetic patients (Neef et al. 1995). The Iraqi species of genus Adiantum possess cardiovascular activity (Al-Jebary et al. 1984). The methanotic extract of adiantum Capillus veneries show high degree of antimicrobial potency against Gram (+), Gram (-) bacteria and candida (Mohmoud et al. 1989).There is no publishing paper on effect of Adiantum capillus veneris on broiler performance, carcass and physiological traits.

2.1.3. Rosemary (*Rosmarinus officinalis*)

Giugnolinini (1985) mention that the word rosemary is derived from the Latin word “rosemarinus", meaning sea dew. It was also called “antos" by the ancient Greeks, meaning the flower of excellence. It is one of kingdom plantae, family Lamiales and it belongs to two species in the genus Rosemarinus (Al-Kassie et al. 2011). Rosemary is aromatic plant that used in all around the world for different medicinal purposes. Al-Kassie (2008) rosemary is an annual herb in digeneous to many warm regions in the world such as Iran, India, Turkey, and Egypt. Carnosal, epirosmanol, carnosic acid, caffeic acid and its derivatives such as rosmarinic acid are the most importance contain of rosemary with a wide range of different phenolic compounds with biological activities (Cuvelier et al. 1996; Richheimer et al. 1996; Offord et al1997). Mona et al. (2010) and Al-Kassie et al. (2011) rosemary and their active compound known have powerful antioxidant activity and thus a therapeutic potential in treating many disease conditions. Nielsen et al. (1999) rosemary has high amounts of a rosmaric acid, Flavonoids and phenolic acids that have antioxidant capacities (Ho et al. 2000).

According to Leung and Foster 1996 and Newall 1996 It contains phenotic acids; phenolic diterpenoid bitter substances; titerpenoid acids; flavonoids; 1.2 to 2.5% volatile oil and tannins. Many studied has reported that rosemary extracts have a variety of pharmacological activities, such as antimicrobial, antioxidant, cognition- improving,

cancer chemoprevention and DNA-protective effects (Tsukamoto et al. 1995). Rosemary and their contains mentioned by many author that improved performance of broiler (Basmacıoğlu et al. (2004); Abd El-Latif et al. (2013); Souri et al. (2015).

2.2. The Effect of Thyme, Adiantum, Rosemary and Their Mixture on Broiler's Performance

2.2.1. Live Body Weights

Live body weight is very important parameter in poultry industry special in broiler branch. After banding antibiotics in many countries, medical plants as alternative in broiler industry have been focused. To investigate the effect of medical plants (Thyme, Adiantum, Rosemary and their mixture) on live body weight many studies were conducted (Al-Mashhadani 2014; Pourmahmoud et al. 2013; Soltani et al. 2016; Cetin et al. 2016).

Abd El-Hakim et al. (2009) indicated that using 0.2% of thyme extract in broiler diet at starter period (1-21 days) was improved live body weight while, during the finisher period (22- 42 days), there was no significant differences in live body weight compared to control group. Other researcher investigated that birds received 0.8% of thyme powder had best result in body weight compared with different levels of thyme powder (0.2, 0.4 and 0.6%) and control group (Al-Jugifi 2009). Moreover, El-Ghousein and Al-Beitawi (2009) observed that using dried crushed thyme in broiler diet at different level 0.5, 1.0, 1.5 and 2.0% had significantly increased live body weight over whole trail period compared with control group. According to Najafi and Torki (2010) who reported that using 200 mg/kg of thyme essential oil in broiler diets didn't show any effects on live body weight as compared with control groups during the experimental periods (1- 42 and 1-49days of age). Furthermore, Toghyani et al. (2010) observed that live body weight was significantly improvement by supplementing 5 g/kg of thyme to the diet, while significantly decreased live body weight when added 10 g/kg thyme compared to control groups during the experiment period. Moreover, thyme essential oil at 180 mg/kg in broiler diet was significantly increased final body weight while, high dose 270 mg/kg had lower final body weight compared control group (Foroughi et al. 2011).

Other authors observed Rahimi et al. (2011) that using 0.1% of thyme powder in broiler diet had no differences in live body weight when compared with control and antibiotic groups. However, Sadeghi et al. (2012) who observed that using (5g/liter) of thyme infusions in diet in replacement of drinking water that caused significant decrease in live body weight compared with the control group during (21days) period. Broiler chicken fed at level 200 mg/kg of thyme essential oil in diet had significantly improved live body weight compared with control group (Sameh 2013). According to the result investigated by AL- Khdri (2013) that added 0.5 and 0.1% of thyme powder in broiler diet had no significant differences live body weight over whole trail period compared with control. However, Saleh et al. (2014) that observed 100, 200 and 300 mg/kg of thyme essential oil in broiler diet were had no significant affected body weight compared with control group over whole trail period. Also, broiler chicken fed 0.5,1 and 1.5% of thyme powder in diets was significantly heavier live body weight compared with control group (Ali 2014).Similar result obtained by Al-Mashhadani (2014) that studied thyme powder in broilers diets at levels 0.25 and 0.5% was significantly improved live body weight compared with the control group during 42 days of age.

Broiler chicken fed 150 and 300 mg/kg of rosemary essential oil had significant improvement live body weight when compared with control group over whole trail period (Basmacıoğlu et al. 2004). Also, Danka et al. (2007) reported that 500 mg/kg of rosemary powder in broiler chicken was significantly improved live body weight compared control group during 42 days of experiment. However, Al - Kassie (2008) indicated that 0.5 and 1% rosemary powder in broiler diet had significant improvement in live body weight when compared with control group. Furthermore, Rosemary leaves meal in broiler diet at level 0.5, 1 and 2% had significant higher live body weight when compared with control group (Ghazalah and Ali 2008). Similarly result obtained by Osman et al. (2010) that used 0.5 and 1 g/kg of rosemary powder in broiler diet had significant higher live body weight compared with control group. However, Yasar et al. (2011) that used 0.25, 0.5, 1 and 1.5% of ground rosemary in broiler diet was significant improvement live body weight when compared with control group over whole experimental period. Broiler chicken fed 200 mg/kg of rosemary oil in diet had significant differences live body weight when compared with control group, while 100 mg/kg did not show any affected (Abd El-Latif et al. 2013). Added 0.4 and 0.6 % of thyme extract in broiler chicken diets

had significantly increased live body weight compared to control, while 0.2% was not affected live body weights (Pourmahmoud et al. 2013). However, Mathlouthi et al. (2015) reported that 100 mg/kg of rosemary essential oil in male broiler diet caused significantly increased live body weight compared with control group. Also, Souri et al. (2015) using thyme extract in drinking water at 1% had no significant changed live body weight compared with control group. Live body weight was no significant differences when broiler chicken fed rosemary powder at 1.5 and 3 g/kg levels in diet, while 9 g/kg was significant reduced body weight as compared with control group (Zeweil et al. 2015). Similar result observed by Ahmed et al. (2015) that added 0.75 and 1.5 g/kg of rosemary leaf to broiler diet was significantly higher body weight compared with control group. Moreover, Jameel et al. (2015) that added 0.25 and 0.5% of rosemary leaves in broiler diet was lower body weight compared with control group during 6 week of trail period. Also, Cetin et al. (2016) reported that using 100 mg/kg of rosemary volatile oil in broiler diet had significant higher live body weight compared with control group.

Broiler chicken fed 5 g/kg of thyme extract had significant increased live body weight compared with control group (Fallah and Mirzaei 2016). Also, Soltani et al. (2016) reported that added rosemary to broiler diet and drinking water at (3 and 7 g/kg) and (2.5 and 5 g/kg) had significant improved body weight compared to control group over whole trail period.

2.2.2. Feed Intake

Feed intake and its efficient utilization is most important concerns in poultry production industry as feed cost is one of highest components in these sector about 60%-70% of total cost according to FAO (2006). Feed intake can be influenced by a large number of factors. Selection of food depends on visual appearance, temperature, viscosity, saliva production, nutritive value of feed, toxicity of feed components, particle size and social interaction (Blair 2008). To evaluated the effect of medical plants (thyme, adiantum, rosemary and their mixture) on feed intake of broiler chicken many research been done before (Mansoub et al. (2011); Saleh et al. (2014); Zeweil et al. (2015); Cetin et al. (2016).

Toghyani et al. (2010) observed that added 5 and 10 g/kg of thyme powder to broiler chicken diet had no significantly differences daily feed intake compared with antibiotic and control groups during 42 days. Furthermore, Najafi and Torki (2010) observed that 200 mg/kg thyme essential oil in broilers diet had significantly decreased feed consumption compared with control group. Moreover, the result mentioned by Rahimi et al. (2011) that used 0.1% of thyme extract in broiler diet had significant difference when compared with antibiotic and control groups. Broiler chicken fed by 300 mg/kg of thyme essential oil in diet had not differences feed intake compared to control group (Al - Mashhadani et al. 2011). Same author Mansoub et al. (2011) mentioned in other studied that added1, 1.5 and 2% of thyme powder in broiler diet had significant difference in feed intake while, 0.75% did not have any difference when compared with control group. However, Amouzmehr et al. (2012) that used 0.3 and 0.6% of thyme extract in broiler diet had no differences feed intake compared with control over whole trail period. Moreover, Sadeghi et al. (2012) that used 5g/L of thyme infusions as replacement of drinking water to broiler diet had not affected on average daily feed intake as compared with control. Broiler chicken fed 0.5 and 1% of thyme powder in broiler diet had no significantly differences feed intake when compared with control group over whole trail period (AL-Khdri 2013). Furthermore, Ali, (2014) that added 0.5, 1.0 and 1.5% of thyme leaves powder to broiler diets had no significant differences feed intake with control group. Also, Saleh et al. (2014) observed that added 100 and 200 mg/kg thyme essential oil to broiler diet had significant difference feed intake while, 300 mg/kg didn't had any affected compared with control group. Moreover, Souri et al. (2015) observed that added 1% thyme extract to broiler drinking water had no significant differences feed intake compared with control group during 42 days. Also, Pourmahmoud et al. (2016) different level (0.2, 0.4 and 0.6%) of thyme extract in broiler diets had no significantly differences feed intake when compared to control group.

According to result obtained by Osman et al. (2010) mentioned that added 0.5 and 1.0 g/kg of rosemary was significant reduced feed consumption compared to control group. Also, Ashan (2011) reported that 200 ppm of rosemary extract in broiler diets had significantly differences feed intake when compared with control group. Moreover, Yasar et al. (2011) 0.25, 0.5, 1.0 and 1.5 % of Ground aerial parts of rosemary in broiler diets was significantly increased feed intake than control group during 21 days of age. Also,

Abd El-Latif et al. (2013) observed that100 and 200 mg/kg of rosemary essential oil was a significant increased feed intake when compared with control group. However, Ahmed et al. (2015) studied that 0.75 g/kg of rosemary leaves in broiler diets had a significant increased feed intake compared with control group during 2-3, 3-4 and 4-5 weeks of trail period. Mathlouthi et al. (2015) who mention that 100 mg/kg of rosemary essential oil in male broiler diet had no differences feed intake compared to control group. Also, Zeweil et al. (2015) reported that 1.5 and 3 g/kg of rosemary powder in broiler diet had no difference in feed intake when compared with control group, while 9 g/kg was significant differences. According to result reported by Cetin et al. (2016) that added 100 mg/kg rosemary volatile oil to broiler diet had no differences feed intake when compared with control group. Also, Soltani et al. (2016) that used rosemary in broiler diet and drinking water at (3 and 7 g/kg) and (2.5 and 5 g/kg) had no affected feed intake compared with control group over whole trail period. According to result obtained by Norouzi et al. (2016) that added 0.5, 1.0 and 1.5% of rosemary powder to broiler diets had significant differences feed intake when compared control group.

2.2.3. Feed Conversion Ratio

The feed conversion ratio (FCR) describes the relation of feed intake and body weight gain. More precisely, it is the animal's overall efficiency in converting feed mass into body mass over a specific period of time. Broiler chickens are more efficient in conversion feed than other farm animals (Rosario et al. 2007). To evaluated the effect of medical plants (thyme, adiantum, rosemary and their mixture) on feed conversion ratio of broiler chicken many research been done before (Souri et al. (2015) ; Pourmahmoud et al. (2016); Soltani et al. (2016) ; Mathlouthi et al. (2015).

Najafi and Torki (2010) reported that used 200 mg/kg of thyme essential oil in broilers diet had no significant differences feed conversion ratio compared with control group. Similar result obtained by Abdulkarimi et al. (2011) that added 0.2, 0.4 and 0.6% of alcoholic thymus vulgaris extract to broiler drinking water had no affected feed conversion ratio compared with control group. According to result of Mansoub and Myandoab (2011) reported that higher level of thyme powder in broiler chicken diets had a significant negative feedback on the feed conversion ratio, especially when used 1, 1.5

and 2% when compared with control group. Furthermore, Sadeghi et al. (2012) mentioned that 5g/liter of thyme infusions in broiler drinking water was not affected feed conversion ratio compared with control groups over whole trial period (21 days). However, Abdel-Wareth et al. (2012) 10, 15, 20, 25 and 30 g/kg of thyme powder in broiler diet had significantly decreased feed conversion ratio when compared with control group. According to result obtained by AL-Khadri (2013) that added 0.5 and 0.1% to broiler diet had no affected feed conversion ratio compared with control group. Using 200 mg/kg of thyme essential oil in broiler diet had significant decreased feed conversion ratio compared to control group (Sameh 2013). Moreover, Adel Feizi et al. (2014) observed that 500 ppm of thyme extract had higher feed conversion ratio compared with 1000 ppm and control groups. Also, Zhu et al. (2014) different level of thyme essential oil (0.05, 0.1, 0.15, 0.2, 0.25, 0.3 and 0.35 mg/kg) in broiler diet had significant improves feed conversion ratio compared with control group. Broiler chicken received 100 mg/kg of thyme and rosemary essential oil in broiler diet had not differences feed conversion ratio compared with control group (Belenli et al. 2015). However, Souri et al. (2015) mentioned that using 1% of thyme extract in broiler drinking water had no differences feed conversion ratio compared with control group. According the result of Pourmahmoud et al. (2016) indicated that 0.2, 0.4 and 0.6% of thyme extract wasn't affected feed conversion ratio compared with control group.

Rosemary powder at level 0.5 and 1 g/kg in broiler diet had significant lower feed conversion ratio when compared with control group (Osman et al. 2010). Moreover, Ashan (2011) mentioned that feed conversion ratio was not affected by 200 ppm of rosemary extract in broiler diet when compared with control group. Similar result obtained by Loetscher et al. (2013) that 25 g/kg of rosemary in male broiler diet had no affected feed conversion ratio compared with control group during 2-5 weeks of ages. According to result of Norouzi et al. (2015) obtained that 0.5, 1 and 1.5% of rosemary in broiler diet had significantly lower feed conversion ratio when compared with control group. However, added 9 g/kg of rosemary powder to broiler diet had significant differences feed conversion ratio when compared with control group while, 1.5 and 3 g/kg did not have any differences (Zeweil et al. 2015). Broiler chicken fed 100 mg/kg of rosemary essential oil in diet had significantly differences feed conversion ratio when compared with control group (Mathlouthi et al. 2015). Also, Cetin et al. (2016) reported

that 100 mg/kg of rosemary volatile oil in broiler diet had lower feed conversion ratio compared with control group. According to result of Soltani et al. (2016) that added 2.5, 3, 5 and 7 g/kg of rosemary to in broiler drinking water was no significant differences feed conversion ratio compared with control group over whole trail period.

2.2.4. Mortality Rate

Broiler chicken´s mortality ratio defines as the number of death bird in the trail as result of many factors such as disease, injury, physiological system failure or unidentified causes. It is very important economic factor that affect the broiler chicken profitability. Many studies were done to minimize the percentage of broiler chicken's mortality adding different feed additives in diet such as medicinal plant. To evaluated the effect of medical plants (thyme, adiantum, rosemary and their mixture) on mortality ratio of broiler chicken many research done been before (Foroughi et al. (2011); Sameh (2013); Manafi et al. (2014); Jameel et al. (2015).

Ocak et al. (2008) obtained that 0.2% thyme powder in broiler diets had no differences mortality rate between treated and control group during trail period (42days). Also, El-Ghousein and Al-Beitawi (2009) observed that0.5, 1.0, 1.5 and 2.0% of dried thyme in broiler diet had significant reduced mortality rate compared with control group. However, Foroughi et al. (2011) reported that different level of thyme essential oil in Broiler diet did not had any effect on mortality ratio with the control group during 48days. Mortality rate was zero when added 0.1% thyme extract to broiler diet when compared with control group (Rahim et al. 2011).According to result of Sameh (2013) that mentioned 200 mg/kg of thyme essential oil in broiler diet had significantly reduced the mortality rate compared with control group. However, mortality rate of treated group by 0.5 and 0.1 % of thyme powder was lower than control group (AL-Khdri 2013). Other author observed that 500 and 1000 ppm of thyme extract in broiler diet caused significant lower mortality rate compared with control group (Adel Feizi et al. 2014). Broiler chicken fed 150 and 300 mg/kg of rosemary oil in diet had no affected mortality rate when compared with control group (Basmacıoğlu 2004). Similar result obtained by Loetscher et al. (2013) that used 25 g/kg in male broiler diet had no significant different in mortality rate compared with control group. However, Manafi et al. (2014) reported that 500ppm of rosemary

essence in broiler diet was significantly improvement mortality rate when compared with control group. Similar result observed by Jameel et al. (2015) who added rosemary leaves in broiler diet at 0.25 and 0.5% had lower mortality rate compared with control group over whole trial period.

2.3. The Effect of Thyme, Adiantum, Rosemary and Their Mixture on Broiler's Carcass Cuts and Internal Organs

Research has been done on improvement of broiler carcass parts in order to meet the customer's desire. This improvement accomplishes through genetic selection, nutrition and breeding technology to produce high carcass weight with limited abdominal fat. To indicated the effect of medical plants (Thyme, Adiantum, Rosemary and their mixture) on Broiler's Carcass Cuts and internal Organs many studies been done before (Al-Mashhadani (2014) ; Zeweil et al. (2015) ; Pourmahmoud et al. (2016); Soltani et al. (2016).

Toghyani et al. (2010) that carcass yield, liver, gizzard and heart percent of body weight was no significant differences when broiler chicken fed 5 and 10 g/kg in diet compared with control group while, significantly reduced fat abdominal percent of body weight. Also, Najafi and Torki (2010) indicated that 200 mg/kg of thyme essential oil in broiler diet had no significant differences relative weight of breast and thigh compared with control group. Mansoub and Myandoab (2011) reported that 2% of thyme powder in broiler diet caused increased relative weight of breast and thighs yield while, gizzard and liver being significantly increased, it also abdominal fat being significantly reduced compared with control group respectively. Moreover, Abdulkarimi et al. (2011) studied that 0.2, 0.4 and 0.6 % of thyme extract in broiler drinking water caused significantly lower relative weight of liver and fat abdominal, while 0.4% caused a significant higher relative weight of wings compared 0.2, 0.6% and control group respectively. Other author observed that 0.75 and 1% of thyme powder in broiler chicken diet had no affected gizzard, thigh and liver percent while, 1.5 and 2 % had significantly differences but breast percent was different through whole treatment while, fat abdominal percent when compared with untreated group (Mansoub et al. 2011). Similar result mentioned by Amouzmehr et al. (2012) that added 0.3 and 0.6 % of thyme extract to broiler diet had no

significantly differences relative weight of carcass yield, breast and thigh compared with control group. Added 0.05% of thyme essential oil to broiler diet had no significantly affected Carcass, Breast, Thigh, Giblet and Edible Parts % compared with untreated groups while ,significantly differences Breast+ thigh % (Alfaig et al. 2013). However, AL-Khdri (2013) reported that 0.5 and 0.1% of thyme powder in broiler diet was not affected Carcass weight, dressing percentage with giblet and without giblet, breast, legs, wing, liver, heart and neck % while, back, gizzard and abdominal fat had significant differences. However, Al-Mashhadani (2014) investigated that 0.25 and 0.5% of thyme powder in broiler diet was no significant differences breast, legs, dressing, wings, neck, and abdominal fat percentage compared with control group. Furthermore, Pourmahmoud et al. (2016) mentioned that 0.2, 0.4 and 0.6 % of thyme extract in broiler diet had no significantly differences relative weight of heart, liver, carcass yield and breast compared with control group while, gizzard and fat abdominal weight had significantly differences.

Osman et al. (2010) reported that 0.5 and 1 g/kg rosemary powder in broiler diet had no significantly differences liver, heart and fat abdominal percent while, carcass yield and gizzard percent significant difference when compared with control group. However, Ashan (2011) reported that broiler chicken received 200 ppm of rosemary extract in diet had significant difference gizzard, fat abdominal, breast and liver percent when compared with control group. According to result mentioned by Loetscher et al. (2013) that added 25 g/kg of rosemary to male broiler diet was no significant differences heart, breast muscle, thigh muscle, fat abdominal weight and dressing percent while, carcass yield and liver weight was significantly differences when compared with control group. Moreover, Norouzi et al. (2015) mentioned that 0.5, 1 and 1.5% of rosemary powder in diet had no significantly differences carcass yield and breast percent of body weight while, 1% significant difference in liver percent when compared with control group. Also, Zeweil et al. (2015) reported that 0.5, 3 and 9 g/kg of rosemary powder in broiler diet was significantly reduced fat abdominal weight while, carcass yield and liver weight did not affected when compared with control group. According to result of Ahmed et al. (2015) observed that 0.75 and 1.5 g/kg of rosemary leaf broiler diet was significant differences wing, back and neck % while, thigh, carcass yield and breast percent did not affected but 1.5 g/kg was significantly differences dressing percent compared with untreated group. Also, Soltani et al. (2016) that used 3 and 7 g/kg of rosemary in broiler diet and 2.5 and 5

g/kg of rosemary in broiler drinking water was no significant difference in fat abdominal, heart, liver and gizzard percent compared with control group, while carcass yield was significant difference.

2.4. The Effect of Thyme, Adiantum, Rosemary and Their Mixture on Broiler's Hormonal Immunity and Lymphoid Organs Weight

Immunological response is influenced by several factors. Among them, the nutritional condition of the animal subjected to antigenic challenge has been studied, including the effects of medicinal plants. To evaluated the effect of medical plant (Thyme, Adiantum and Rosemary) on Broiler's Hormonal Immunity and Lymphoid Organs Weight many studied been done (Saleh et al. (2014); Al-Shuwaili (2014); Belenli et al. (2015) ; Soltani et al. (2016) ; Pourmahmoud et al. (2016).

Demir et al. (2008) mentioned that 1 g/kg of thyme powder in broiler diet had no significantly differences relative weight spleen when compared with control group. According to the result mentioned by Ghazalah and Ali (2008) that added rosemary leaves meal in broiler diet at level 0.5, 1 and 2% had significantly differences T3 and T4 concentration, while did not affect in spleen percent when compared with control group. Also, Toghyani et al. (2010) reported that broiler chicken fed 5 and 10 g/kg of thyme powder in diet was no significantly differences bursa and spleen percentage of body weight when compared with control group. Moreover, Osman et al. (2010) reported that added 1 g/kg of rosemary to broiler diet had significant differences spleen and bursa percent of body weight while, 0.5 g/kg did not show any significantly differences when compare with control group. However, Najafi and Torki (2010) founded that used 200 mg/kg of thyme essential oil in broiler diet had not affected in Relative weight of bursa of fabricious and spleen when compared to the control group. According to result of Sadeghi et al. (2011) observed that 5g/liter of thyme in male broiler chicks drinking water had no differences relative weight of bursa of fabricious and spleen compared with control group. Similar result mentioned by Rahimi et al. (2011) that used 0.1% thyme extract in broilers diet were not significant differences relative weight of fabricious and spleen when compared with the control group. Furthermore, Abdulkarimi (2011) 0.2, 0.4 and 0.6% of Alcoholic extract of thyme in broiler drinking water had no significant

difference in relative weight of spleen and bursa when compared with control group. Also, Sadeghi et al. (2012) noted that using 5g/litter of thyme infusions in as replacement of drinking water had no significant different bursa and spleen % compared with control at 21 days of broiler age. Also result of Abd El-Latif et al. (2013) observed that 100 and 200 mg/kg of rosemary oil in broiler diet were not differences relative weight Spleen and bursa when compared with control group. Sameh (2013) noted that used 200 mg/kg of thyme essential oil in broiler diet had no significantly differences spleen and bursa % of body weight compared with control. According to result of Loetscher et al. (2013) noted that used 25 g/kg of rosemary leaf in male broiler diet had no affected in spleen weight of body weight compared with control group. Spleen and bursa percentage was not effect by using 0.5, 1.0 and 1.5 % of thyme leaves powder in broiler diet compared with control group (Ali 2014). However, Al-Shuwaili (2014) that mentions broiler chicken fed 0.25 % thyme and 0.50% rosemary powder in diet had not effect in bursa and spleen percentages compared to control group. Moreover, Saleh et al. (2014) reported that added 100, 200 and 300 mg/kg of thyme essential oil in broiler diet had significant differences relative weight of bursa and spleen compared with control group. According to the result of Al-Mashhadani (2014) that observed broiler chicken received 0.25 and 0.5 % of thyme in diet had significantly difference in spleen index heart while, 0.5% only was significantly difference bursa weight compared with control group. Other author mentioned Manafi et al. (2014) studied that added 500 ppm of rosemary essence to broiler diet had no differences relative weight spleen and bursa when compared with control group. Also, Belenli et al. (2015) studied that adding 100 ppm of rosemary oil and thyme oil to diet did not effect on growth hormone in broiler blood serum compared with control group. However, another researcher noted that thyme extract in broiler drinking water caused no difference in T3 serum hormone compared with control group, while Serum T4 concentrations numerically was higher in thyme group, but this difference was not statistically significant (Motlagh et al. 2015). Moreover, Souri et al. (2015) indicated that added 1% of thyme extract in broiler drinking water had no significant differences spleen and bursa percentage of body weight when compared with control group. Other author Zeweil et al. (2015) noted that 1.5, 3 and 9 g/kg rosemary powder in broiler diet was no significant differences bursa and spleen weight of body weight when compared with control group. According to result mentioned by Hashemipour et al. (2013) that used different level of mixture thymol and carvacrol (60, 100 and 200 mg/kg) which is most

active compound of thyme and added to broiler diet had no significantly differences bursa Fabricius and spleen weight compared to control group. Same result was noted by Soltani et al. (2016) that used rosemary at 3 and 7 g/kg in diet and 2.5, 5.0 g/kg in broiler drinking water had no significantly differences bursa and spleen percent of body weight compared with control group. However, Pourmahmoud et al. (2016) mentioned that used 0.2, 0.4 and 0.6 % of thyme extract in broiler diet had no significant difference relative weight of spleen compared with control group.

2.5. The Effect of Thyme, Adiantum, Rosemary and Their Mixture on Broiler's Blood Hematological Parameters

Demir et al. (2008) described that 1 g/kg of thyme powder in broiler diet had significantly reduced the RBC cont. while the PLT was not difference compared with control group. However, AL-Kassie (2009) noted that 100 and 200 ppm of thyme extract oil in broiler diet had significantly differences RBC and Hb percentage compared with control group while, PCV percentage did not show any affected. According to result mentioned by Najafi and Torki (2010) that used 200 mg/kg thyme essential oil in broiler diet had no significantly differences RBC cont. compared with control group. Similar result obtained by Toghyani et al. (2010) that 5 and 10 g/kg of thyme powder in broiler diet had no significant differences RBC and Hb when compared with control group. Same result observed by Rahimi et al. (2011) that used 1% of thyme powder in diet had improved Hb but not significantly compared with control group. However, Sameh (2013) indicated that broiler chicken fed by 200 mg/kg of thyme essential oil in diet had significant difference Hb% over whole trail period (46 days) compared with control group, while did not show any affected PCV % respectively. Also, Saleh et al. (2014) observed that added 100, 200 and 300 mg/kg of thyme essential oil in broiler diet had no significant affected RBC and Hb was significant affected while, 200 and 300 mg/kg was PCV % affected compared with control group. According to result of Al-Shuwaili (2014) that mentioned 0.25% of thyme and 0.50% rosemary in broiler diet had no significantly differences RBC cont., PCV% and Hb % compared with control group. Moreover, Jameel et al. (2014) described that added 1% of thyme powder to broiler diet caused higher significantly RBC cont., PCV% and Hb compared with control group. Also using different level of mixture thymol and carvacrol (60, 100 and 200 mg/kg) which is most active compound of thyme

and added to broiler diet had no significantly differences RBC and Hb compared with control group (Hashemipour et al. 2013). Also, Moomivand et al. (2015) observed that 0.1, 0.15 and 0.2 % of thyme essence in broiler drinking water had significant difference in RBC cont. while, 0.15 did not affected Hb % compared with control group. Similar result obtained by Osman et al. (2010) that used 0.5 and 1 g/kg of rosemary in broiler diet had no significantly differences PCV and Hb when compared with control group while, significant difference in RBC cont. Broiler chicken fed 100 and 200 mg/kg of rosemary oil in diet had significant differences PCV and Hb when compared with control group, while RBC cont. did not affected (Abd El-Latif et al. 2013).

2.6. The Effect of Thyme, Adiantum, Rosemary and Their Mixture on Broiler's Biochemical Parameters

Serum biochemical profiling has been used in several species of poultry using laboratory procedure to provide the diagnosis of several diseases and dysfunctions, as they aid reliable results, and may also give inputs for research studies on nutrition, physiology, and pathology (Bounous et al. 2000). To study the effects of medical plant (Thyme, Adiantum and Rosemary) on broiler's biochemical parameters many experiment been done (Moomivand et al. (2015); Ahmed et al. (2015); Souri et al. (2015); Fallah and Mirzaei (2016).

Tekeli et al. (2006) reported that 120 mg/kg of thyme essential oil in broiler diet had no significantly differences serum glucose and total cholesterol level when compared with control group. Also, Ghazalah and Ali (2008) observed that 0.5, 1 and 2% of rosemary leaves meal in broiler diet was significantly differences serum glucose and total cholesterol while, did not affected albumin level when compared with control group but 0.5 and 1% had significant difference in serum globulin and A/G ratio while, 1 and 2% did not affected total protein concentration. Other author Abd El-Hakim et al. (2009) mentioned that added 2% of thyme powder to broiler diet had no significant differences serum globulin, albumin and total protein level when compared with control group. However, AL-Kassie (2009) indicated that added 100 and 200 ppm of thyme extract oil to broiler diet had significant difference total cholesterol level compared with control group, while 200 ppm wasn’t have any affected total protein concentration. Moreover,

result observed by El-Ghousein and Al-Beitawi (2009) that added 0.5, 1, 1.5 and 2% of dried thyme in broiler diet had significantly differences serum globulin, total protein, glucose and cholesterol level when compared with control group while, albumin concentration did not affected. Furthermore, Osman et al. (2010) noted that 1 g/kg of rosemary in broiler diet had significant difference in serum globulin, A/G rate and albumin level while, did not affected cholesterol and total protein concentration but 1 g/kg was significantly difference glucose concentration when compared with control group. However, Toghyani et al. (2010) observed that used 5 and 10 g/kg of thyme powder in broiler diet had no significant differences serum total protein, A/G ratio, albumin and total cholesterol level when compared to control group. Also, Najafi and Torki (2010) reported that 200 mg/kg of thyme essential oil in broiler diet had no significant difference cholesterol level when compared with control group.

Broiler chicken fed 8.6 and 11.5 g/kg of ground rosemary and 100 mg/kg of rosemary volatile oil in diet was not significant differences total cholesterol and A/G rate while, 5.7 g/kg ground rosemary and 100 and 200 mg/kg of rosemary volatile oil was significantly differences when compared with control (Polat et al. 2011). Other author noted that 200 ppm of rosemary extract in broiler diet was significant difference in serum cholesterol level while, did not affected glucose concentration when compared with control group (Ashan 2011). However, Mansoub and Myandoab (2011) reported that 1, 1.5 and 2% of thyme powder in broilers diets caused significantly higher glucose level compared to 0.75% and control group, while did not have any effect total cholesterol, albumin and globulin concentration compared with control group. Other author mentioned that using different level of ground rosemary leaves (5.7, 8.6 and 11.5 g/kg) and rosemary volatile oil(100, 150 and 200 mg/kg) in broiler diet had significantly increased A/G ratio and total cholesterol in blood serum compared with control group (Polat et al. 2011). Also, Abdulkarimi et al. (2011) noted that 0.2, 0.4 and 0.6% of thyme extract in broiler drinking water caused reduced total cholesterol concentration in blood serum compared with control group. However, Mansoub et al. (2011) mentioned that added 0.75, 1, 1.5 and 2 % of thyme powder in broiler diet had no significant differences serum globulin, albumin and cholesterol level while, 1, 1.5 and 2 % have significantly difference in glucose level when compared with control group. According to result of Amouzmehr et al. (2012) that used 0.3 and 0.6 % of thyme extract in broiler diet had significant

difference in serum cholesterol level when compared with control group. Broiler chicken fed by 5 and 7.5 g/kg of thyme powder in diet had significant differences serum Total protein, albumin and cholesterol level when compared with control group (Hossein et al. 2013). Other result studied indicated that 0.5 and 0.1% of thyme powder in broiler chicken diet had significant difference serum albumin level while, 0.1% was significantly difference total protein when compared with control group (AL-Khdri 2013). Furthermore, Abd El-Latif et al. (2013) 100 and 200 mg/kg of rosemary oil in broiler diet had no significant differences serum total protein, albumin, globulin and A/G rate when compared with control group. However, Manafi et al. (2014) reported 500 ppm of rosemary essence in broiler diet was no significantly differences serum cholesterol concentration when compared with control group. According to result of Ali (2014) observed that used 0.5, 1.0 and 1.5% of thyme leaves powder in broiler was no significant differences serum total protein, albumin, globulin and A/G ratio concentration when compared with control group, while glucose level was significant difference. Also, Zhu et al. (2014) noted that 0.05 and 0.25 mg/kg of thyme essential oil in broiler diet had significant differences serum total protein and globulin level when compared with control group while, 0.1, 0.15, 0.2, 0.3 and 0.35 mg/kg did not show any differences on it but A/G ratio level was significantly differences with whole treatment groups. Other author Amouei et al. (2015) indicated that using thyme essential oil in broiler diet at level 0.05, 0.075 and 0.1 % had significant reduced the cholesterol concentration when compared with control group while, 0.075% did not have any effect in glucose level. Moreover, Souri et al. (2015) observed that used thyme extract in broiler drinking water at 1% was no significantly differences serum glucose and total cholesterol level compared with control group. According to Moomivand et al. (2015) reported that 0.1, 0.15 and 0.2% of broiler drinking thyme essence was significant differences serum total protein, albumin, globulin, glucose and cholesterol concentration compared with control group while, 0.15% did not show any effect in A/G ratio level. Broiler chicken fed 100 ppm of thyme and rosemary essential oil in broiler diet have significantly difference in total protein, albumin and total cholesterol concentration in blood serum compared with control group while, did not effect on glucose level (Deniz Belenli et al. 2015). Furthermore, Zeweil et al. (2015) obtained that added 0.5, 3 and 9 g/kg of rosemary powder in broiler diet was significant difference serum total protein, globulin, glucose and cholesterol level while albumin level did not affected. Rosemary leaf in broiler diet at level 0.75 and 1.5 g/kg

was significant lower cholesterol concentration while, 0.75 g/kg had no significantly differences serum globulin, glucose and albumin level but total protein was no significant by both dose compared with control group (Ahmed et al. 2015). Also, Fallah and Mirzaei (2016) indicated that added 5 g/kg of thyme extract to broiler diet had no significant different serum glucose and total protein compared with control group while, reduced serum total cholesterol level. According to data mentioned by Pourmahmoud et al. (2016) indicated that thyme extract at 0.2, 0.4 and 0.6% in broiler diet had significantly higher total cholesterol level compared with control group.

2.7. The Effect of Thyme, Adiantum, Rosemary and Their Mixture on Broiler's Serum Enzyme

Ghazalah and Ali (2008) who reported that using rosemary leaves meal at 0.5, 1 and 2% in broiler diet had significant differences serum AST and Creatinine level while, ALT concentration was not affected when compared with control group. Broiler chicken fed by 0.5 and 1 g/kg of rosemary powder in diet had no significant differences serum ALT, AST and Creatinine concentration when compared with control group (Osman et al. 2010). Also, Polat et al. (2011) noted that serum AST and ALT level did not affected by different level of ground rosemary (5.7, 8.6 and 11.5 g/kg) and rosemary volatile oil (100, 200 and 300 mg/kg) in broiler diet when compared with control group, while 11.5 g/kg of ground rosemary and 300 mg/kg of rosemary volatile oil was significant difference in serum Creatinine level. Furthermore, Tawfeekand Mustafa (2012) described that high dose 2000 mg/kg of thyme powder in broiler diet had significantly reduced ALT and AST concentration compared to control while, using half doses 1000 mg/kg did not show any affected. Broiler chicken fed 100 and 200 mg/kg of rosemary oil had significant difference serum AST level when compared with control group while, ALT concentration did not have any affected (Abd El-Latif et al. 2013). According to result mentioned by Zhu et al. (2014) that used different level of thyme essential oil (0.05, 0.1, 0.15, 0.2, 0.25, 0.3 and 0.35 mg/kg) in broiler diet had significant difference ALT level compared with control group, while did not show any effected on AST level. However, Saleh et al. (2014) reported that added 100, 200 and 300 mg/kg of thyme essential oil to broiler diet had no significant differences serum AST and ALT concentration compared with control group. Similar result noted by Moomivand et al. (2015) that used 0.1, 0.15 and 0.2 % of

thyme essence in broiler drinking water had no differences serum AST and ALT concentration compared with control group. Serum AST and ALT concentration was no significant difference when added 0.75 and 1.5 g/kg of rosemary powder to broiler diet as compared with control group (Ahmed et al. 2015).

2.8. The Effect of Thyme, Adiantum, Rosemary and Their Mixture on Broiler's Meat Color

The most important terms that define consumer acceptability of meat are appearance (including color), taste, and aroma characteristics. Rapid growth in the production of fresh meat category is due to escalating highly demand for suitable meats (Rimini et al. 2014). According to the author knowledge there is little information available on the use of Thyme, Rosemary and Adiantum in chicken diet and their effects on meat color. Therefore, the reviews on the effect of using other herbs and/or active compounds on meat color in the chicken diets are shown. various medicinal plants with different concentration (about 15 treatment) in broiler chicken diets had significantly affect meat color.; chicks fed 2.5 kg Chamomile flower heads / ton recorded the lowest values, followed by chicks fed mixture of herbs (2.5 kg of each Chamomile flower heads + Nigella seeds and 5.0 kg of Thyme flowers)/ton and then the chicks fed 2.5 kg Nigella seeds + 5.0 kg of Thyme flowers, while the control group were statistically equal to other values (Abaza 2001). Dietary onion extract in broiler chicken had not significantly affect the meat color in White mini broiler (An et al. 2015). Similarly, Jang et al. (2011) reported that the color of thigh meat after slaughtering chickens were not significantly influenced by dietary quercetin and methoxylated quercetin extracted from onion.

3. MATERIAL AND METHOD

3.1. Study Location

The present study was carried out in Poultry Farm of Animal Science, Faculty of Agriculture, University of Bingol, Bingol city/ Turkey. It's above altitude 1152 m, 38.886°N, 40.4978° E, from May 26, 2016 to July 6, 2016.

3.2. Selection of Medical Plants

The thyme, adiantum and rosemary were obtained from Akery city, Duhok province, Kurdistan region, Iraq. It's above altitude 603m, 36°43'60N, 43°52'47E. The plants were dried under room temperature and grinded to fine powders by Retsch device. The active compounds of the three plants were analyzed by Gas Chromatography/Mass Spectrometry (GC/MS) in central Bingol laboratory, University of Bingol. Fourteen compounds were identified in the Thyme (Thyme Kotshyanus) sample by GC-MS. The major compounds of this plant were carvacrol (60.77%), p-cymene (9.05%) and 2-amino-5-nitrothizole (5.77%) (Table 3.1) (Figure 3.1). Fifteen compounds were identified in the Adiantum (Adiantum capillus veneris) sample and gamma-terpinene (41.23%) was the most abundant component, followed by phenol (33.82%) and cis-piperitol, acetate (8.78%) (Table 3.2) (Figure 3.2). Twenty one compounds were detected in the Rosemary (Rosmarinus Officinalis) sample; the most compounds were α-Pinene (51.87%), Eucalyptol (31.63%) and Camphor (5.88%) (Table 3.3) (Figure 3.3).

Table 3.1. The volatile compounds in Thyme *(Thyme Kotshyanus*) samples analyzed by GC-MS

Peak no.	RT (mint)	Area (% of total)	Identified Compound	Quality
1	15.494	1.96	Pyrimidine	38
2	16.856	**9.05**	**P-Cymene**	95
3	17.640	4.03	Gamma-Terpinene	94
4	19.586	5.11	Nonanal	80
5	20.198	0.94	Unknown	27
6	24.369	0.68	Lathosterol	37
7	26.349	**60.77**	**Carvacrol**	90
8	28.266	1.23	2-Ethyl-5-Propylphenol	49
9	29.444	3.15	Santolina Triene	45
10	32.483	0.67	Dodecane	59
11	44.459	**5.77**	**2-Amino-5-Nitrothiazole**	72
12	46.118	3.91	2-Ethoxy-4,6-Dichloro-Symmtriazine	38
13	46.702	1.24	Silane	14
14	48.785	1.48	Acenaphthenedione	50

Table 3.2. The volatile compounds in Adiantum (*Adiantum capillus veneris*) samples analyzed by GC-MS

Peak no.	RT (mint)	Area (% of total)	Identified Compound	Quality
1	14.762	4.66	Myrcene	91
2	15.884	0.30	Alpha-Phellandrene	93
3	16.255	8.78	**Cis-Piperitol, Acetate**	56
4	16.851	5.59	2-Isopropyltoluene	86
5	17.526	0.52	Sabinene	94
6	17.978	41.23	**Gamma-Terpinene**	89
7	18.687	0.47	Terpinolene	95
8	19.105	0.23	3-Carene	90
9	19.620	0.66	Dehydro-P-Cymene	97
10	22.481	0.21	A-Terpinene	90
11	24.498	33.82	**Phenol**	93
12	29.508	2.44	Caryophyllene	95
13	30.200	0.24	Valencene	94
14	30.446	0.41	Unknown	91
15	54.627	0.46	Ethyltetramethylcyclopentadiene	89

Table 3.3. The volatile compounds in Rosemary (*Rosmarinus Officinalis*) samples analyzed by GC-MS

Peak no.	RT (mint)	Area % of total	identified Compound	Quality
1	17.989	51.87	**Alpha-Pinene**	96
2	21.674	31.63	**Eucalyptol**	96
3	22.367	0.60	Gamma-Terpinene	95
4	23.294	0.33	Terpinolene	95
5	24.112	0.64	Nonanal	90
6	24.678	0.09	Filifolone	90
7	27.019	5.88	**Camphor**	94
8	27.368	2.86	Isoborneol	94
9	27.980	1.09	Alpha-Terpineol	86
10	28.970	0.14	Unknown	52
11	29.519	0.58	Verbenone	99
12	29.742	0.37	Trans-2-Tridecen-1-Ol	90
13	30.189	0.33	Bornyl Acetate	91
14	31.161	0.21	Sphingosine	94
15	31.716	0.06	Carvacrol	90
16	32.237	0.68	Unknown	90
17	32.746	0.08	Copaene	96
18	32.998	0.37	Trans-2-Octenal	94
19	33.988	0.10	Hexane	35
20	34.778	1.91	Beta-Caryophyllene	99
21	36.145	0.19	Humulene (Alpha)	98

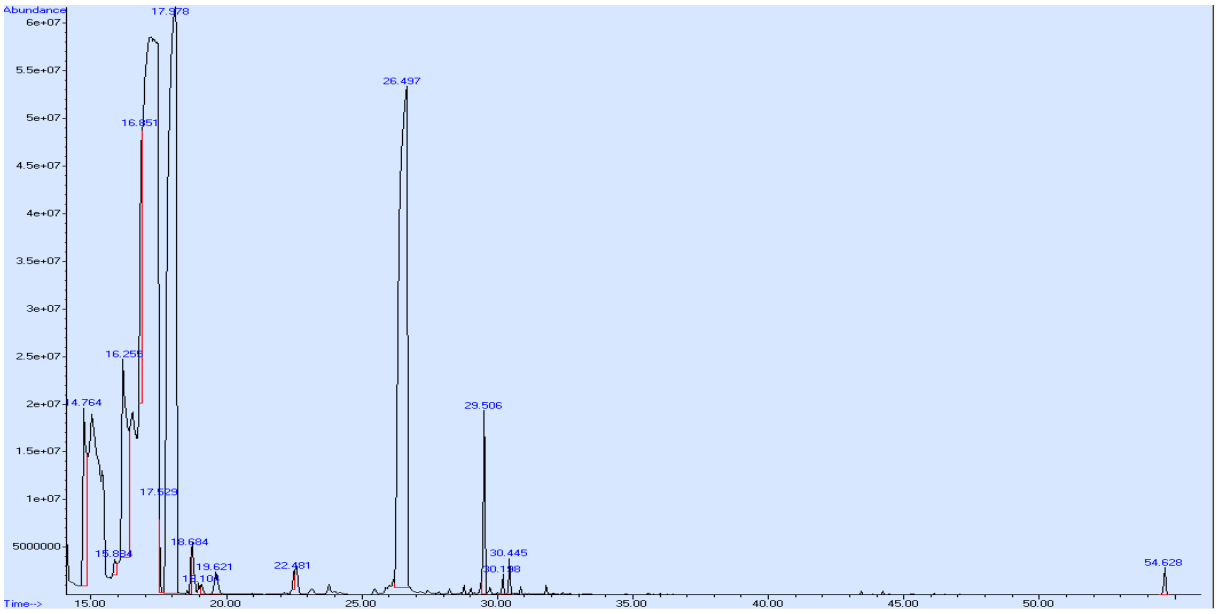


Figure 3.1. Analysis of *Thymus kotshyanus* by GC-MS

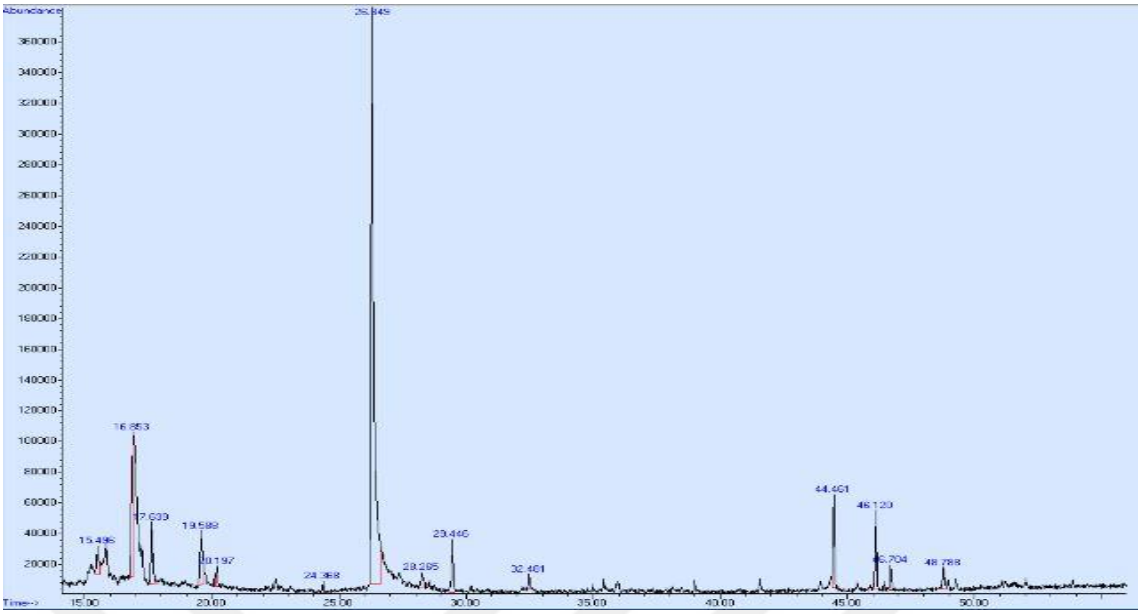


Figure 3.2. Analysis of *Adiantum capillus-veneris* by GC-MS

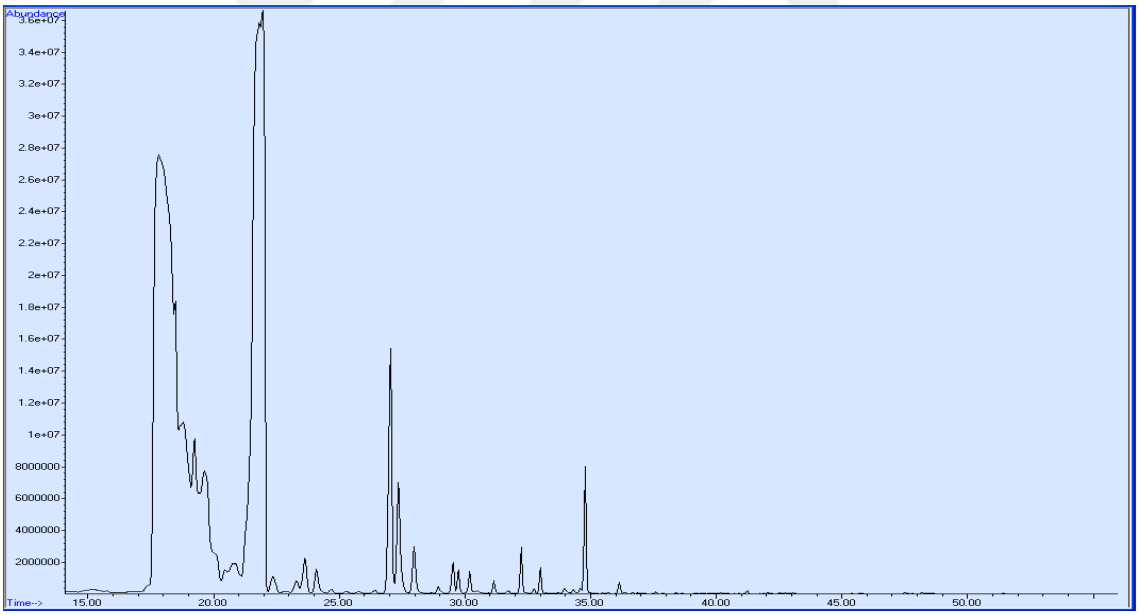


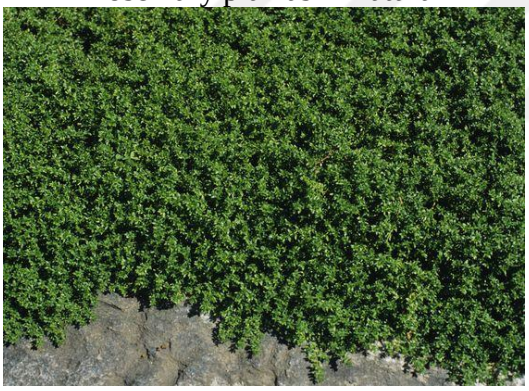
Figure 3.3. Analysis of *Rosamarinus officinalis* L. by GC-MS

Adiantum plant as in natural

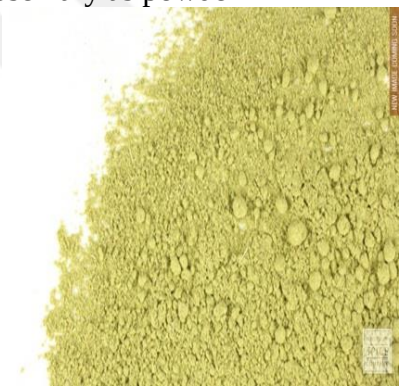
Adiantum as powder

Rosemary plan as in natural

Rosemary as powder



Thyme plan as in natural



Thyme as powder

Figure 3.4. The medical plants images as in whole and powder

3.3. Experimental Design

An investigation was performed on Ross-line 308. A Total of 288 day old mixed sex broiler chicks were purchased from BANVİT Company from Elazig city, Turkey. On arrival, the chicks were raised in cages for 7 days. At 7^{th} day old, the birds were randomly distributed to eight treatments with three replicate of twelve chicks based on completely randomized design (Table 3.4) (Figure 3.5).

Birds were housed in a proper atmosphere and hygienic conditions. The birds were fed with standard broiler starter (1 to 21 days) and finisher (22 to 42 days) rations throughout the experimental period. Tables 3.5 shows the ingredients and the chemical composition of the diets for experimental broiler starter and finisher diets. The ration was formulated to meet nutrient requirements of chicks according to NRC (1994). The birds had free fed non-pelleted diets and water throughout the period of the experiment. The thyme, adiantum and rosemary powders were added to diets at 7^{th} day old to different experimental diets (Table 3.4) (Figure 3.5). The Lighting program was provided for broiler flock according to the Ross manual guide 2009 (Table 3.6). Heating was provided by electrical heaters. The initial first day temperature was set at 32 C˚ and gradually reduced by 2 C˚ per week to final temperature of 24 C˚ at 28 days old then kept constant until the end of experiment according to Ross manual guide 2009 (Table 3.7).

Table 3.4. Addition of medical plants to experimental rations as follow

Experimental groups	**Additives**	**Amount (g)/kg**
T1	Control (no additive)	-
T2	Thyme powder	0.5 g/kg
T3	Thyme powder	10 g/kg
T4	Adiantum powder	3 g/kg
T5	Adiantum powder	5 g/kg
T6	Rosemary powder	0.5 g/kg
T7	Rosemary powder	10 g/kg
T8	Mixture (Thyme , Adiantum and Rosemary)	7.5 g/kg +4 g/kg and 7.5 g/kg, respectively.

Table 3.5. Percent of diets ingredient for experimental broiler starter and finisher diets and their calculated chemical analysis

Ingredient	Starter diet	Finisher diet
Corn	50	52
Wheat	5	4
Barley	3	4
Wheat bran	5	5
Soybean meal	32	28
vegetable oil	2	3
Limistone	1.5	2.05
Dicalcium phosphate	0.8	0.8
DL methionine	0.2	0.2
L- lysine	0.2	0.2
Anti-fungul	0.05	0.05
Salt	0.2	0.2
vit. Primex	0.5	0.5
Approximately Analysis	**Chemical Composition**	
Crude protein	21.76	18.88
Energy Kcal/kg	2978.10	3027.60
Fat	4.40	5.46
Linoleic acid	2.18	2.71
Crude fiber	3.17	3.15
Methionine	0.58	0.56
Lysine	1.40	1.28
Tryptophan	0.35	0.32
Meth. + Cystine	0.74	0.68
Threonine	0.88	0.81
Arginine	1.44	1.30
Ca	0.93	1.14
P	0.44	0.43
Na	0.15	0.15
Cl	0.18	0.18

Table 3.6. The lightening program using during the experiment period

Age (Days)	Light intensity (Foot Candles)	Day length (Hours)
0-7	3-4	23 light 1 dark
8-38	0.5-1	18 light 6 dark
39-49	0.5-1	23 Light 1 dark

*Lightening program was provided to broiler flock according to Ross Broiler Manual Guide 2009.

Table 3.7. The temperature program using during the experiment

Age of birds (days)	Temperature (C°)
1-7	32
8-14	30
15-21	28
22-28	26
29-49	24

*Temperature program was providing to broiler flock according to Ross Broiler Manual Guide 2009.

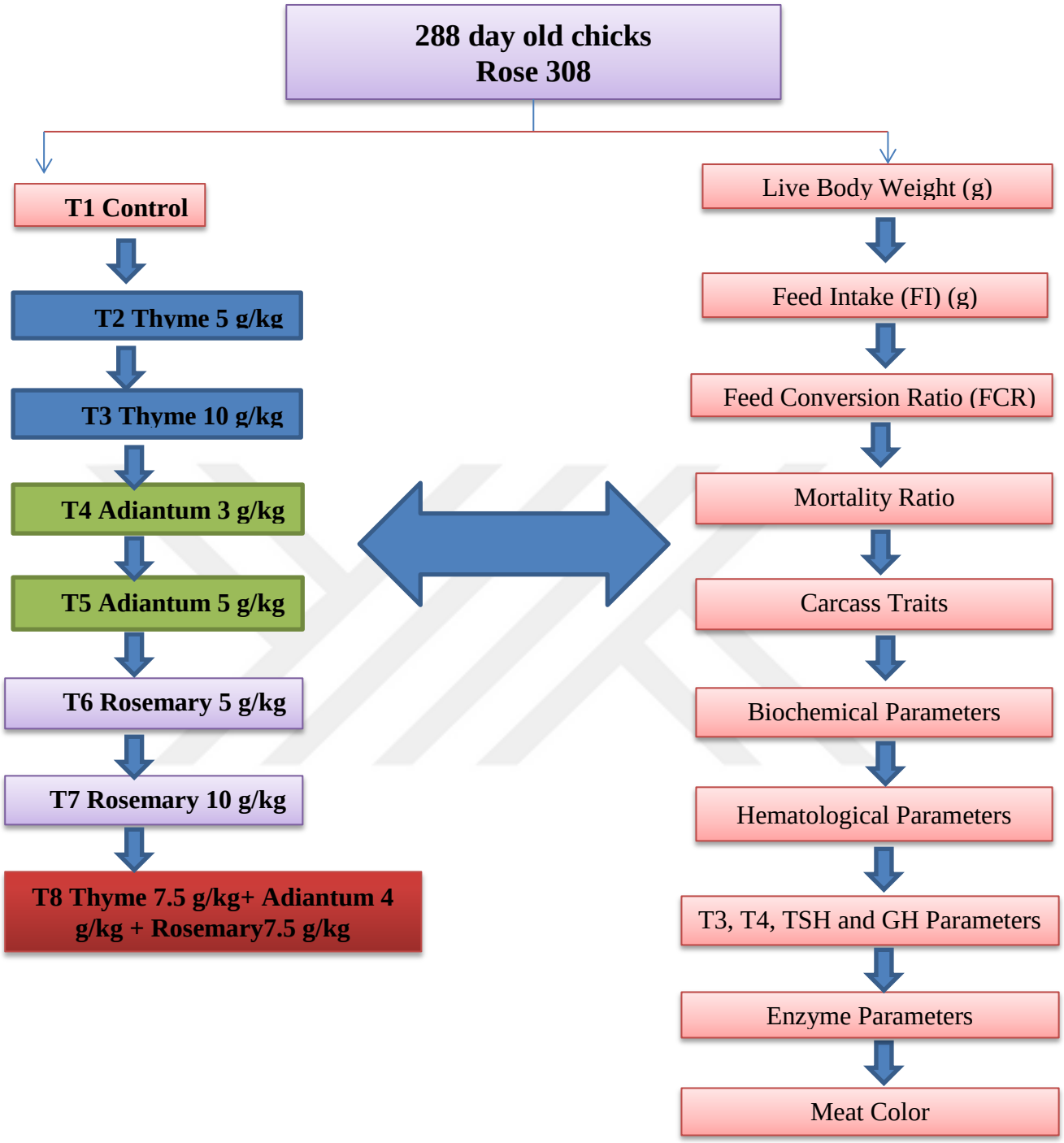


Figure 3.5. The experimental design and parameters which studied in the present experiment

3.4. The Performance Traits

3.4.1. Live Body Weight

Live body weight was measured weekly throughout the experimental period by digital balance for all chicks (Naji 2006).

3.4.2. Feed Conversion Ratio (FCR) and Feed Intake (FI)

Feed conversion ratio (FCR) was calculated at the end of experiment according to the following equation (Naji, 2006).

$$\text{Feed conversion ratio} = \frac{\text{Feed consumed (g) during a period}}{\text{Weight gain (g) during the same period}}$$

During the experimental period (42 days), growth performance was evaluated. Feed intake is the amount of feed consumed every week; it was calculated for each treatment at weekly basis. At the end of each week, the residual amount of feed was weighted and subtracted from the known weight of the feed at the begging of week. The total consumed feed or feed intake was divided by total number of chicks.

3.4.3. Mortality Rate

Mortality rate (daily record/ replicate) and the livability percentage were calculated by the following equations (Naji, 2006):

$$\text{Mortality rate} = \frac{\text{Total mortality}}{\text{Total number of birds}} \times 100$$

Livability percentage (%) = 100 – mortality rate (%)

3.5. Carcass Cuts Preparation and Sampling

At the end of the experiment, a sample of two random birds (male and female) from each replicate with in a treatment was slaughtered to determine the dressing percentage. Before the slaughtering, each bird was weighed and numbered and after that the birds were slaughtered, dressing, carcass, breast, legs, wings, back with neck, abdominal fat, visceral orange (liver, heart and gizzard), and lymphoid organs index (bursa of fabricious and spleen) percentages were then measured as follows:

3.5.1. Dressing Percentage

Dressing percentage was calculated by both methods with and without edible giblet using following equations (Al-Fayadh and Naji, 1989):

$$\text{Dressing percentage} = \frac{\text{Carcass weight (g)}}{\text{Live body weight (g)}} \times 100$$

3.5.2. Carcass Cuts Weight

Weight of breast, legs, wings, abdominal fat, visceral organs (liver, heart, and gizzard) and back with neck was calculated by electronic balance.

3.5.3. Lymphoid Organs Weight

The bursa and spleen weight was calculated by using electronic balance.

3.6. Collection and Analysis of Blood Samples

At the end of the experiment (49 days), the birds were fasting for 12 h. Two birds (male and female) in each replicate were randomly chosen for blood sample collection. 4 ml of blood samples were obtained from wing vein. Sample was separated into two portions, 2 ml in a test tube containing EDTA anticoagulant and used for hematological parameters

such as RBCs, PCV and Hb and another 2 ml was used for serum preparation by centrifuging at speed 4000 rpm for 10 minutes. Serum samples were saved at -20 C^o until use for biochemical, enzyme and hormone parameters.

3.6.1. Blood Analysis

3.6.1.1. Hematological Parameters

The fresh blood samples were used for hematological parameters (RBC, PCV and Hb) by animal culture device.

3.6.1.2. Biochemical, Hormonal and Enzymes Parameters

The blood serum samples were used for biochemical, hormone and enzyme analysis. Blood biochemical (Serum total protein, albumin, globulin, Creatinine, glucose and cholesterol) and enzymes (Aspartate amino transferase and Alanine Amino Transferase) were analyzed by Spectrophotometer using BIOLABO, Maizy, France. Hormonal responses (gh) were measured by ELISA using Proflok ELISA Kit (Synbiotics-USA).

3.7. Meat Color

L* = lightness; a* = redness and b* = yellowness (meat color), were measured of breast meat according to CIE system (CIE, 1976). Sample of breast was skin removed and then color parameters (L*, a*, b*) were measured using a colorimeter (Lovibond RT-Series 500).

3.8. Statistical Analysis

The experiment executed as a complete randomized design (CRD), all data analyzed using the CRD (Completely Randomized Design) of (SAS 2002–2003). Duncan`s multiple range tests were used to compare differences among treatments means (Duncan, 1955).

The statistical model:

$Yij = \mu + tj + eij$

Where:

Yij = represent the observation value which affected by ith treatment (feed supplement) that found with in jth replicate.

μ = general mean of population.

ti = represent the effect of ith treatment .

eij = represent the experimental error.

4. RESULT AND DISCUSSION

4.1. The Performance Traits

4.1.1. The Effect of Medicinal Plant on Live Body Weight of Broiler Chicken

Table 4.1 and Appendix Table 1 indicate the influence of different levels of thyme, rosemary, adiantum and their combination on live body weight of broiler chicken. There is a significant effect of medicinal plants on live body weight. In 1st week, there was a significant effect in live body weight in T4 group which contain 3 g/kg of adiantum while, T8 and T3 groups had lowest live body weight and not significantly differ compared with control group. There was no significant difference in live body weights among treatments in 2nd week compared to control group. While T2, T6 and T7 groups tend to be significantly higher and T8 group had numerically lower live body weight compared to control group. On the other hand, it was revealed that all treated groups chicks at 3rd and 4th weeks of age had no significant differences in live body weights compared to control group. In the exception of T3 group, there were no significant effects of medical plant on live body weight compared to control group in 5th week of ages. In 6th week of ages, in the exception of T3 group, medical plants significantly improved live body weight while, T4 and T7 groups had higher live body weight compared to control group. There was a significant heavier live body weight effect of gender on live body weight; the male gender had higher live body weight than females chicks during all experimental period. The results are in agreement with many published paper of thyme (Foroughi et al. 2011; Amouzmehr et al. 2012; Sameh 2013; Al-Mashhadani, 2014), rosemary (Norouzi et al. 2015; Mathlouthi et al. 2015; Cetin et al. 2016; Fallah and Mirzaei 2016; Soltani et al. 2016) who mentioned that adding thyme and rosemary powder or essential oil into the broiler diet or drinking water had a significantly improvement the live body weight of chicks compared to control group. On the other

hand, the results of the present study are not consistent with those of (Ali 2013; Ayoola et al. 2014; Souri et al. 2015; Franciosini et al. 2015; Belenli et al. 2015).

The supplemented plants to diet, it is of substantial importance to expect prospect of suboptimal performance (Loetscher et al. 2013). The improvement of live body weight in T2 group which contain thyme powder (5 g/kg) may be due to the beneficial impact of the active compound of these herbs (e.g. carvacrol) (Table 3.1) on nutrient digestibility. Consequently, this may lead to an improvement of endogenous increased production of digestive enzyme secretion (amylase, lipase, trypsin, chemo trypsin, trypsin and protease) and the improved utilization of digestive products through enhanced liver function which enhance the digestion and absorption process of carbohydrates, lipids and proteins (Langhout 2000; Williams and Losa 2001; Ocaña and Reglero 2012). Although mechanism of action of thyme product is not sufficiently clarified yet, there are opinions that this compound destruct the permeability of the cell membranes and lead to a destruction of the pathogenic microbes (Skandamis and Nychas 2001). Because there is no published paper about using adiantum in poultry nutrition, we assumed that the improvement of live body weight in T4 and T5 group which contain adiantum powder at level (3 and 5 g/kg) could be related to the active compound of this plant such as phenolic compound (Table 3.2). A clear conclusion to emerge improvement in the live body weight in T6 and T7 groups which contain rosemary powder at level (5 and 10 g/kg) could be due to strong flavor of rosemary that shows a need to adaptation period. Moreover, cell walls of rosemary leaves contain high crude fiber particularly, cellulose which may have hampered nutrient utilization by chickens and the appetizing effect of active ingredient (Cabuk et al. 2003; Ghazalah and Ali 2008; Soltani et al. 2016). Also the improvement in T8 group which is containing combination of medicinal plants may be due to active compound of three medical plants.

Table 4.1. The influence of different levels of thyme, adiantum, rosemary and their combination on broiler´s live body weight (Mean± Standard error)

Factor / Treatment	1st week	2nd week	3rd week	4th week	5th week	6th week
T1	126.82±3.47^{bc}	360.39±16.51^{ab}	613.50±24.64^{abc}	1039.23±34.35^{ab}	1682.02±39.39^{a}	2108.44±50.47^{d}
T2	130.50±3.47^{abc}	378.45±16.51^{a}	660.26±24.64^{a}	1069.68±34.35^{a}	1707.72±39.39^{a}	2233.04±50.47^{c}
T3	122.25±3.47^{c}	334.62±16.51^{ab}	534.07±24.64^{c}	936.46±34.35^{b}	1468.39±39.39^{b}	2198.35±50.47^{cd}
T4	135.63±3.5^{a}	340.35±16.61^{ab}	605.55±24.80^{ab}	1063.70±34.57^{a}	1669.49±39.65^{a}	2374.49±50.80^{a}
T5	128.30±3.47^{abc}	348.01±16.51^{ab}	542.01±24.64^{bc}	1017.64±34.35^{ab}	1606.82±39.39^{a}	2278.85±50.47^{abc}
T6	128.89±3.5^{abc}	362.86±16.61^{a}	568.49±24.80^{abc}	993.67±34.57^{ab}	1573.02±39.65^{a}	2352.29±50.80^{ab}
T7	134.99±3.47^{ab}	372.46±16.51^{a}	614.49±24.64^{ab}	1054.28±34.35^{a}	1640.32±39.39^{a}	2428.02±50.47^{a}
T8	119.87±3.5^{c}	299.55±16.61^{b}	578.87±24.80^{abc}	1018.65±34.57^{ab}	1605.84±39.65^{a}	2209.33±50.80^{bc}
Gender	S	S	S	S	S	S
Male	138.24±1.61^{a}	398.63±7.67^{a}	656.43±4.45^{a}	1115.53±15.96^{a}	1749.02±18.31^{a}	2477.45±23.46^{a}
Female	118.57±1.91^{b}	300.55±9.09^{b}	522.89±13.57^{b}	932.80±18.92^{b}	1489.38±21.70^{b}	2068.25±27.81^{b}

*a, b, c, d, Means with different superscripts in the same column differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg. S= Significant.

Table 4.2 and Appendix Table 2 and 3 summarized the influence of different levels of thyme, rosemary, adiantum and their combination on live body weight of broiler chicken at different period with gender. In male, there was a significant difference of medical plant on live body weight among all 6 weeks trail period. According to data of 1st week of age, male broiler had no significant effect of medical plants on live body weight compared to control group while, T4 and T7 groups tend to be significantly improved and had highest live body weight. In the 3rd week of age, live body weight was similar to that of 1st week of age. On the other hand, T8 group had a significantly lighter live body weight compared to control and other treated groups in 2nd week of ages. At 4th week of age, male broiler chicks of T3 group were significantly decreased live body weight compared to control group while other treated groups tend to be significantly differ. Male broiler of T3 group had significantly lower live body weight in 5th week of age while, male broiler of T2 and T4 groups tend to be significantly improved live body weight compared to control groups. However, final week of age (6th) there were significantly improvements of live body weight of male broiler in T4, T6 and T7 groups compared to control group.

In female, medical plants was a significant difference on live body weight during experiment period. In 1st and 3rd weeks of age, there was no significant effect of medical plants on live body weight compared to control group. On the other hand, T2, T5 and T6 groups was numerically higher live body weight and tend to be significant difference and T4 groups was lighter live body weight compared to control group in 2nd week of ages. However, in 4th week of age, T7 and T8 groups numerically higher live body weight and tend to be significant improved compared and T3 group was lighter live body weight control group. In 5th week of ages, medical plant had not significant difference in live body weight while, T2, T4 and T7 groups numerically improved live bod weight and tend to be significant compared to control group. Moreover, the final week of ages (6th) the diet contain 10 g/kg of rosemary group (T7) was significant improved live body weight compared to control group while, T2, T4,T5, T6 and T8 groups was numerically higher live body weight and tend to be significant differ compared to control group. The main causes of that higher male body weight than female body weight are genetic constituents. Additionally, higher feed requirement is another reason for higher male live body weight. These reasons may come from that male has greater efficiency of feed intake than female which may be due to higher water, protein and lower fat contents in their body (Colin et al. 2003).

Table 4.2. The effect of different levels of thyme, adiantum, rosemary and their combination on broiler gender´s live body weight (Mean± Standard error)

Factor	1st		2nd		3rd		4th		5th		6th	
Treatment	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
T1	138.05 ±4.83^{abc}	115.86 ±5.21^{a}	413.82 ±22.29^{a}	307.85 ±23.80^{ab}	683.02 ±38.60^{ab}	543.53 ±32.37^{a}	1196.36 ±51.18^{a}	895.26 ± 41.18^{ab}	1857.02 ±62.33^{a}	1516.03 ±50.22^{ab}	2294.48 ±75.77^{c}	1918.69 ±68.96^{b}
T2	142.37 ±4.32^{ab}	118.17 ±5.82^{a}	428.59 ±19.94^{a}	328.03 ±26.61^{a}	745.44 ±34.52^{a}	570.48 ±36.19^{a}	1206.49 ±45.78^{a}	921.52 ±46.04^{ab}	1869.66 ±55.75^{a}	1537.76 ±56.14^{a}	2445.79 ±67.77^{abc}	2018.26 ±77.09^{ab}
T3	130.83 ±4.32^{bc}	113.98 ±5.82^{a}	379.78 ±19.94^{ab}	290.43 ±26.61^{ab}	592.38 ±34.52^{b}	477.68 ±36.19^{a}	1040.26 ±45.78^{b}	829.56 ±46.04^{b}	1595.99 ±55.75^{b}	1341.35 ±56.14^{b}	2437.32 ±67.77^{abc}	1950.79 ±77.09^{b}
T4	146.46 ±3.95^{a}	123.79 ±6.72^{a}	419.92 ±18.20^{a}	230.25 ±30.73^{b}	695.23 ±31.52^{ab}	492.97 ±41.79^{a}	1147.84 ±41.79^{ab}	986.78 ±53.16^{ab}	1764.75 ±50.89^{ab}	1608.81 ±64.83^{a}	2629.58 ±61.82^{a}	2068.91 ±89.02^{ab}
T5	137.31 ±4.32^{abc}	119.51 ±5.82^{a}	376.41 ±19.94^{ab}	324.78 ±26.61^{a}	612.53 ±34.52^{b}	470.55 ±36.19^{a}	1125.83 ±45.78^{ab}	905.26 ±46.04^{ab}	1763.99 ±55.75^{ab}	1442.79 ±56.14^{ab}	2424.07 ±67.77^{abc}	2148.47 ±77.09^{ab}
T6	138.35 ±3.95^{abc}	119.82 ±6.72^{a}	404.76 ±18.20^{a}	328.11 ±30.73^{a}	625.92 ±31.52^{b}	520.43 ±41.79^{a}	1065.54 ±41.79^{ab}	941.29 ±53.16^{ab}	1695.58 ±50.89^{ab}	1457.77 ±64.83^{ab}	2583.65 ±61.82^{ab}	2094.15 ±89.02^{ab}
T7	148.62 ±4.32^{a}	120.41 ±5.82^{a}	423.97 ±19.94^{a}	320.34 ±26.61^{ab}	676.71 ±34.52^{ab}	553.42 ±36.19^{a}	1108.97 ±45.78^{ab}	1008.77 ±46.04^{a}	1733.55 ±55.75^{ab}	1556.24 ±56.14^{a}	2592.58 ±67.77^{ab}	2273.45 ±77.09^{a}
T8	125.02 ±3.95^{c}	119.41 ±6.72^{a}	339.74 ±18.20^{b}	268.19 ±30.73^{ab}	622.49 ±31.52^{b}	558.39 ±41.79^{a}	1061.19 ±41.79^{ab}	1024.92 ±53.16^{a}	1730.15 ±50.89^{ab}	1487.04 ±64.83^{ab}	2396.45 ±61.82^{bc}	2039.70 ±89.02^{ab}

*a, b, c, Means with different superscripts in the same column differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg.

4.1.2 The Effect of Medicinal Plants on Total Feed Intake, Feed Conversion Ratio and Mortality Rate of Broiler Chicken

Table 4.3 and Appendix Table 4 indicated that the effects of different levels of thyme, rosemary, adiantum and their combination on total feed intake, feed conversion and mortality of broiler chicken. There is a significant effect of medicinal plants on feed intake and mortality rate while, feed conversion ratio did not affected among treatment. Addition of thyme to broiler diet (T2 and T8) tend to be significant reduce total feed intake while, rosemary powder addition to diet tend to be significant increase total feed intake in T6 group (Rosemary 5 g/kg) was highest and T2 (Thyme 5 g/kg) lowest total feed intake compared to control group. Adiantum supplementation was not affecting the total feed intake compared to control group. Different level and types of medicinal plants did not have any effects on feed conversion ratio while, T4 (adiantum 3 g/kg) and T2 (thyme 5 g/kg) tend to be significantly improvement compared control group. Mortality rate in T2 and T7 was significantly higher while, other treated groups weren't affected by medicinal plants compared to control group. The results are in agreement with many published research papers (Mathlouthi et al. (2015); Zeweil et al. (2015); Cetin et al. (2016); Soltani et al. (2016) who reported that added thyme and rosemary to broiler diet or drinking water had not effect on total feed intake compared to control group. On the other hand, the results of the study are in contrast to that finding of (Loetscher et al. (2013); Saleh et al. (2014); Ahmed et al. (2015); Norouzi et al. (2016). The result of feed conversion ratio was in agreement with founding (AL-Khadri (2013); Belenli et al. (2015); Souri et al. (2015); Soltani et al. (2016); that mention thyme and rosemary added to diets or drinking water did not had any effects on feed conversion ratio compared to control group. In contrast, the results are in disagreement with the findings of (Adel Feizi et al. (2014); Zhu et al. (2014); Norouzi et al. (2015); Mathlouthi et al. (2015); Cetin et al. (2016) who noted that using rosemary and thyme powders in the broiler`s diets had a significant effect on feed conversion ratio of broiler chicks. These results of mortality rate were agreed with the previous results obtained by Foroughi et al. (2011); Rahim et al. (2011); Loetscher et al. (2013) that observed thyme and rosemary added to broiler chicken diet or drinking water had no difference on mortality rate compared to control group. On the other hand, the results are in disagreement with the findings of (AL-Khdri (2013); Adel Feizi et al. (2014); Jameel et al. (2015) that mentions different levels of

thyme and rosemary in broiler diets or drinking water had significantly effect on mortality compared to control group. The highest rate of mortality rate in T2 and T7 groups may be due to some factors such as physiological condition of animals, rearing environment, diet composition and various experimental approaches have resulted in those discrepancies.

Table 4.3. The influence of different levels of thyme, adiantum, rosemary and their combination on broiler´s total feed intake, feed conversion ratio and mortality rate (Mean± Standard error)

Factor / Treatment	Total Feed Intake (g)	Feed Conversion Ratio	Mortality Rate %
T1	4135.9±158.81^{ab}	1.73±0.06^{a}	10.33±0.41^{b}
T2	3785.0±158.81^{b}	1.71±0.06^{a}	12.00±0.41^{a}
T3	4003.7±158.81^{ab}	1.72±0.06^{a}	11.67±0.41^{ab}
T4	4320.7±158.81^{ab}	1.70±0.06^{a}	11.33±0.41^{ab}
T5	4029.7±158.81^{ab}	1.73±0.06^{a}	11.67±0.41^{ab}
T6	4461.6±158.81^{a}	1.79±0.06^{a}	11.33±0.41^{ab}
T7	4175.8±158.81^{ab}	1.74±0.06^{a}	12.00±0.41^{a}
T8	3972.0±158.81^{ab}	1.72±0.06^{a}	11.67±0.41^{ab}

*a, b, Means with different superscripts in the same column differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum 4 g/kg+ Rosemary 7.5 g/kg.

4.2 The Effect of Medical Plants on Carcass Traits of Broiler Chicken:

4.2.1. Carcass Cut and Dressing Percentage

Table 4.4 and Appendix Table 5 indicate the influence of different levels of thyme, rosemary, adiantum and their combination on carcass traits of broiler chicken. There is a significant effect of medicinal plants on carcass yield, dressing percentage, breast, legs, wings, neck and back. Broiler chicken fed T2, T3 and T8 which contain (5 g/kg, 10 g/kg of thyme powder and mixture of medical plants) were significantly higher in carcass yield while, broiler chicken fed T5 was lower compared to control group. There are significant differences in different levels and type of medical plants on carcass yield. Broiler chicken fed T3 (10 g/kg of thyme powder) had significant higher dressing percentage compared to

control group. There is no significant effect on breast weight fed different levels and type of medical plants compared to control group while, there are significant effect of different levels and kind of medical plants on breast weight. Relative weight of legs, T3 (414.5g) had significant highest and T5 (320.33g) had lowest compared to control group (349.5g) while, there were significant effects of different levels and type medical plants on legs weight. Broiler chicken fed T2, T3, T4 and T7 had significant higher weight of wings compared to control group and the differences between treated groups was significant. Relative weight of neck and back was significant higher in broiler chicken fed T3 group compared to control groups. There is a non-significant effect of gender on relative weight of carcass yield, dressing percent, breast, legs, wings, back and neck.

The result was in agreement of many published paper (Bolukbasi et al. 2006) that broiler chicken fed thyme powder or essential oil of thyme in broiler diet had significant differences in carcass yield compared to control, while rosemary in broiler diet had no effect on carcass yield compared to control group as mention by those authors Ghazalah and Ali (2008); Norouzi et al. (2015); Zeweil et al. (2015). In contract, the result was disagreed of those founded by many researchers Rahimi et al. (2011); Amouzmehr et al. (2012); Alfaig et al. (2013); AL Khdri (2013) they observed that thyme powder or essential oil in diet or drinking water had not affected carcass yield compared to control group, while rosemary powder in broiler diet had significant effect on carcass yield compared to control as observed by those researchers Osman et al. (2010); Loetscher et al. (2013); Ahmed et al. (2015); Soltani et al. (2016).

The results of the present study are similar with those El-Ghousein and Al-Beitawi (2009); AL-Kassie (2009) that founded significant effect of thyme powder in broiler diet on dressing percentage when compared to control group. While, the result of Loetscher et al. (2013) that reported when added 25 g/kg of rosemary powder to male broiler diet had no effect on dressing percentage compared to control group. In contract, the result was disagreed of those Ocak et al. (2008); AL Khdri (2013); Ayoola et al. (2014) that observed added thyme powder in broiler diet had not effect on dressing percentage compared to control group. However, Ahmed et al. (2015) mention that 0.75 and 1.5 g/kg of rosemary leaf in broiler diet had significant differences dressing percentage compared to control group. Relative weight of breast, the result was consistent of those Ayoola et

al. (2014); Norouzi et al. (2015); Ahmed et al. (2015); Pourmahmoud et al. (2016) they observed that thyme or rosemary in broiler diet or drinking water had no effect on breast weight compared to control group While, the result of present study was not consistent with those of Mansoub and Myandoab (2011); Mansoub et al. (2011); Ashan (2011). The result of the present study was consistent of El-Ghousein and Al-Beitawi (2009) who mention that 1.5 and 2.0% of dried thyme in broiler diet had significant differences the relative weight of legs compared to control group. While, according to result that mention by Ahmed et al. (2015) who added 0.75 and 1.5 g/kg of rosemary leaf in broiler diet had significant differences compared to control group. In contract, the result was disagreed with the findings of Alfaig et al. (2013); AL Khdri (2013); Ayoola et al. (2014). Regarding the accumulative wings weight, these results agree with the previous results obtained by (El-Ghousein and Al-Beitawi 2009; Abdulkarimi et al. 2011; Ahmed et al. 2015) who observe significant improvements in the relative weight of wings of broilers fed on diet or drank water containing thyme and/ or rosemary compared to the control group. On the other hand, the results are in disagreement with the findings of (AL Khdri 2013; Ayoola et al. 2014) who did not observe any significant improvements in relative weight of wings of broilers fed on diet containing thyme and/or rosemary compared to the control group. Regarding to back and neck weight, the result of our study were disagreed with those found (AL Khdri 2013; Ayoola et al. 2014; Al-Mashhadani 2014) they reported that thyme powder did not effect on neck and/or back weight compared to control group.

The improvement of carcass yield may be due to some reasons likewise the present of phenolic and antioxidants substance in thyme may be the basic motive of improvement in carcass yield weight of broilers chicken (Lee et al. 2003; Gulcin et al. 2004). The presence groups of harmful bacterial in the gastrointestinal tract perhaps main cause breakdown of amino acids and therefore decrease their absorption as antimicrobial substances are present in thyme can decrease the harmful bacterial populations in the gastrointestinal tract and speed up the amount of absorbed amino acids (Lee et al. 2003; Gulcin et al. 2004). The main substance presence in thyme is carvacrol which has stimulatory effects on pancreatic secretions through increased the secretions of digestive enzymes more amounts of nutrients like amino acids can be digested and absorbed from the digestive tract and through improves carcass traits (Lee et al. 2003).

Table 4.4. The influence of different levels of thyme, adiantum, rosemary and their combination on carcass cuts and dressing percentage of broiler chicks at 42 days of age (Mean ± Standard Error)

Factor / Treatment	Carcass yield (g)	Dressing (%)	Breast (g)	Legs (g)	Wings (g)	Neck and Back (g)
T1	1255±41.81^{bc}	67.34±1.1^{b}	436.5±17.6^{abc}	349.5±14.07^{bc}	146.67±5.57^{b}	357.5±15.53^{b}
T2	1427±41.81^{a}	67.29±1.1^{b}	463±17.6^{a}	385±14.07^{ab}	149.17±5.57^{a}	385.33±15.53^{b}
T3	1484±41.81^{a}	73.51±1.1^{a}	444.83±17.6^{ab}	414.5±14.07^{a}	176±5.57^{a}	436.33±15.53^{a}
T4	1364±41.81^{ab}	69.85±1.1^{b}	427.5±17.6^{abc}	386±14.07^{ab}	168.33±5.57^{a}	373.33±15.53^{b}
T5	1210±41.81^{c}	66.75±1.1^{b}	397.17±17.6^{bc}	320.33±14.07^{c}	144.67±5.57^{b}	341.33±15.53^{b}
T6	1258±41.81^{bc}	68.97±1.1^{b}	381.33±17.6^{c}	355.67±14.07^{bc}	142±5.57^{b}	335.67±15.53^{b}
T7	1384±41.81^{ab}	68.42±1.1^{b}	418.67±17.6^{abc}	386.33±14.07^{ab}	174.17±5.57^{a}	368.17±15.53^{b}
T8	1452±41.81^{a}	68.93±1.1^{b}	468.17±17.6^{a}	383.33±14.07^{ab}	144.17±5.57^{b}	368.33±15.53^{b}
Gender	N.S	N.S	N.S	N.S	N.S	N.S
Male	1357.67±20.9	69.28±0.55	432.67±8.79	377.75±7.04	157.75±2.79	372.83±7.76
Female	1350.91±20.9	68.48±0.55	426.63±8.79	367.42±7.04	158.54±2.79	368.79±7.76

*a, b Means with different superscripts in the same column differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg.

Table 4.5 and Appendix Table 6 and 7 indicate the influence of different levels of thyme, rosemary, adiantum and their combination on carcass traits of broiler chicken´s gender. In male, there are significantly effect of different levels and type of medical plants on carcass yield, dressing percent, breast, legs, wings, back and neck. Carcass yield had significant higher value in T2, T3 and T8 groups compared to control group. Broiler chicken fed 10 g/kg (T3) of thyme powder in diet had significant highest dressing percent compared to control group. T6 group had significant higher breast weight compared to control group while, there are significant effect of different levels and type of medical plants on breast weight. Added different levels and type of medical plants had significant effect on legs weight while, the highest value was T3, T4 and T7 and T5 was lower weight of legs. Broiler chicken fed T3 (183.33 g) had significant higher and T7 (176.33 g) had lower weight of wings compared to control group (144.67 g) while, there is significant effect of different concentration and kind of medical plants on wings. Broiler chicken fed diet T3 had higher weight of neck and back compared to control group.

Table 4.5. The influence of different levels of thyme, adiantum, rosemary and their combination on carcass cuts and dressing percentage of broiler with gender at 42 days of age (Mean± Standard Error)

Factor	Carcass yield (g)		Dressing %		Breast (g)		Legs (g)		Wing (g)		Neck and Back (g)	
Treatment	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
T1	1244 ±57.64^{b}	1266 ±69.32^{ab}	66.85 ±1.18^{b}	67.82 ±1.17^{a}	455.67 ±19.03^{a}	417.33 ±32.2^{ab}	341 ±14.63^{cd}	358 ±21.84^{ab}	144.67 ±6.66^{c}	148.67 ±9.29^{ab}	375 ±20.93^{b}	340 ±23.86^{b}
T2	1442 ±57.64^{a}	1412.67 ±69.32^{ab}	66.62 ±1.18^{b}	67.95 ±1.17^{a}	464.67 ±19.03^{a}	461.33 ±32.2^{ab}	384.67 ±14.63^{bc}	385.33 ±21.84^{a}	162.33 ±6.66^{bc}	176 ±9.29^{a}	394 ±20.93^{ab}	376.67 ±23.86^{ab}
T3	1259 ±57.64^{a}	1438 ±69.32^{a}	76.61 ±1.18^{a}	70.41 ±1.17^{a}	444.67 ±19.03^{ab}	445 ±32.2^{ab}	452.67 ±14.63^{a}	376.33 ±21.84^{ab}	183.33 ±6.66^{a}	168.67 ±9.29^{ab}	450 ±20.93^{a}	423.67 ±23.86^{a}
T4	1351 ±57.64^{ab}	1376 ±69.32^{ab}	69.78 ±1.18^{b}	69.93 ±1.17^{a}	424 ±19.03^{ab}	431 ±32.2^{ab}	403.67 ±14.63^{b}	368.67 ±21.84^{ab}	161.33 ±6.66^{bc}	175.33 ±9.29^{a}	352 ±20.93^{b}	394.67 ±23.86^{ab}
T5	1224 ±57.64^{b}	1195.67 ±69.32^{b}	67.65 ±1.18^{b}	65.86 ±1.17^{a}	410 ±19.03^{ab}	384.33 ±32.2^{ab}	330.67 ±14.63^{d}	310 ±21.84^{b}	144.67 ±6.66^{c}	144.67 ±9.29^{b}	326 ±20.93^{b}	356.67 ±23.86^{ab}
T6	1236 ±57.64^{b}	1278.67 ±69.32^{ab}	67.47 ±1.18^{b}	70.46 ±1.17^{a}	387.33 ±19.03^{b}	375.33 ±32.2^{b}	355.33 ±14.63^{bcd}	356 ±21.84^{ab}	142 ±6.66^{c}	142 ±9.29^{b}	342 ±20.93^{b}	328.67 ±23.86^{b}
T7	1386 ±57.64^{ab}	1382.33 ±69.32^{ab}	69.07 ±1.18^{b}	67.76 ±1.17^{a}	425 ±19.03^{ab}	412.33 ±32.2^{ab}	392 ±14.63^{b}	380.67 ±21.84^{ab}	176.33 ±6.66^{ab}	172 ±9.29^{ab}	377.67 ±20.93^{b}	359.33 ±23.86^{ab}
T8	1446 ±57.64^{a}	1458 ±69.32^{a}	70.19 ±1.18^{b}	67.68 ±1.17^{a}	450 ±19.03^{ab}	486.33 ±32.2^{a}	362.33 ±14.63^{bcd}	404.33 ±21.84^{a}	147.33 ±6.66^{c}	141 ±9.29^{b}	366 ±20.93^{b}	370.67 ±23.86^{ab}

In female, there are significant effect of different concentration and type of medical plants on relative weight of carcass yield, breast, legs, wings, neck and back while; there is no significant effect on dressing percent. T3 and T8 groups tend to be significant increase the carcass yield while, T5 group was lowest value compared to control group. Relative weights of breast in T8 groups which contain combination of herbs tend to be significant different compared to control group. T2 and T8 groups were numerical highly relative weight of legs compared to control group. Numerical T5 and T6 was lowest value of wings weight and T2 was highest weight compared to control group. Thyme powder at 10 g/kg (T3) was significantly increased the relative weight of back and neck compared to control group.

4.2.2. Internal Organ Weights of Broiler Chicken

Table 4.6 and Appendix Table 8 indicated that the effect of different levels of thyme, adiantum, rosemary and their combination on Internal Organ Weights of Broiler Chickens. Different types and levels of medical plants have significant effects on relative weight of abdominal fat and liver. T3 and T8 had significant lower value and T5 have highest value of relative weight of abdominal fat compared to control group. T3 had significant higher value of relative weight of liver compared to control group. There is a non-significant effect of gender on relative weight of hearts, gizzard, abdominal fat and liver. Fat abdominal, the result of our study was similar to these researchers (Mansoub and Myandoab (2011); Mansoub et al. (2011); AL Khdri (2013) Pourmahmoud et al. (2016) achieved that thyme powder in broiler diet had significant effect on relative weight of fat abdominal compared to control group. In contract, the result is not consistent with those of (Rahimi et al. (2011); Sadeghi et al. (2011); Al-Mashhadani (2014). Liver, the result was in agreement with (AL-Kassie (2009); Mansoub and Myandoab (2011); Abdulkarimi et al. (2011) who reported that relative weight of liver significantly differences compared to control group when added thyme or rosemary in broiler diet. While, our result was disagreed of those (Sadeghi et al. (2011); AL Khdri (2013); Pourmahmoud et al. (2016) reported that broiler chicken fed different levels of thyme or rosemary had no effect in relative weight of liver compared to control group. It has been reported that the digestive system of poultry could be more activation by oil extracts from herbs, nevertheless improve the function of liver and increasing the

pancreatic digestive enzymes. Enhancement of the metabolism of carbohydrates, proteins and oil in the most organs which lead to increase growth rate of the liver weight (Mellor, 2000a;2000b).

Table 4.6. The influence of different levels of thyme, rosemary, adiantum and their combination on internal organ weights of broiler chickens (Mean± Standard error)

Factor Treatment	Hearts (g)	Gizzard (g)	Abdominal fat (g)	Liver (g)
T1	9.24±0.78^{a}	25.18±1.22^{a}	13.57±1.5^{ab}	39.73±2.16^{b}
T2	9.33±0.78^{a}	25.65±1.22^{a}	16.99±1.5^{ab}	40.29±2.16^{b}
T3	11.56±0.78^{a}	23.04±1.22^{a}	12.70±1.5^{b}	47.26±2.16^{a}
T4	9.53±0.78^{a}	25.69±1.22^{a}	17.04±1.5^{ab}	39.50±2.16^{b}
T5	10.53±0.78^{a}	25.24±1.22^{a}	18.26±1.5^{a}	44.49±2.16^{ab}
T6	9.23±0.78^{a}	24.66±1.22^{a}	15.48±1.5^{ab}	40.85±2.16^{ab}
T7	9.29±0.78^{a}	25.33±1.22^{a}	16.27±1.5^{ab}	38.74±2.16^{b}
T8	9.27±0.78^{a}	24.04±1.22^{a}	13.31±1.5^{b}	44.88±2.16^{ab}
Gender	N.S	N.S	N.S	N.S
Male	9.69±0.39	25.52±0.61	15.09±0.75	43.13±1.08
Female	9.81±0.39	24.18±0.61	15.81±0.75	40.80±1.08

*$^{a, b,}$ Means with different superscripts in the same column differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg. N.S = not significant.

Table 4.7 and Appendix Table 9 and 10 indicated that the effect of different levels of thyme, adiantum, rosemary and their combination on Internal Organ Weights of Broiler Chickens. In male, there are no differences in relative weight of gizzard, lever and abdominal fat fed different levels and type of medical plants. T3 and T5 groups were highest value of relative weight of heart while, T8 group was lower value compared to control group. However, there are significantly differences between treated groups.

In female, the relative weight of hearts and abdominal fat was not effect by different levels and type of medical plants compared to control group. T7 group was highest and T8 group was lowest value of relative weight of gizzard compared to control group. Also, there are significantly differences between treated groups. Relative weight of liver in T3 and T7 group tend to be significant different compared to control group.

Table 4.7. The effect of different level of thyme, rosemary, adiantum and their combination on internal organ weights of broiler chickens gender (Mean± Standard error)

Factor	Hearts (g)		Gizzard (g)		Liver (g)		Abdominal fat (g)	
Treatment	Male	Female	Male	Female	Male	Female	Male	Female
T1	10.27 ±0.76^{ab}	8.19 ±1.38^{a}	25.27 ±1.67^{a}	25.08 ±1.61^{ab}	39.36 ±3.29^{a}	40.09 ±3.16^{ab}	13.16 ±2.11^{a}	13.97 ±2.51^{a}
T2	8.92 ±0.76^{ab}	9.72 ±1.38^{a}	27.77 ±1.67^{a}	23.52 ±1.61^{ab}	42.71 ±3.29^{a}	37.88 ±3.16^{ab}	16.48 ±2.11^{a}	7.51 ±2.51^{a}
T3	10.97 ±0.76^{a}	12.14 ±1.38^{a}	23.30 ±1.67^{a}	22.78 ±1.61^{ab}	47.38 ±3.29^{a}	47.14 ±3.16^{a}	12.82 ±2.11^{a}	12.58 ±2.51^{a}
T4	9.64 ±0.76^{ab}	9.42 ±1.38^{a}	26.09 ±1.67^{a}	25.29 ±1.61^{ab}	41.58 ±3.29^{a}	37.42 ±3.16^{ab}	15.92 ±2.11^{a}	18.17 ±2.51^{a}
T5	11.41 ±0.76^{a}	9.66 ±1.38^{a}	26.72 ±1.67^{a}	23.75 ±1.61^{ab}	44.95 ±3.29^{a}	44.04 ±3.16^{ab}	17.87 ±2.11^{a}	18.66 ±2.51^{a}
T6	9.06 ±0.76^{ab}	9.40 ±1.38^{a}	25.14 ±1.67^{a}	24.17 ±1.61^{ab}	43.81 ±3.29^{a}	37.88 ±3.16^{ab}	15.93 ±2.11^{a}	15.03 ±2.51^{a}
T7	9.11 ±0.76^{ab}	9.47 ±1.38^{a}	23.20 ±1.67^{a}	27.47 ±1.61^{a}	41.33 ±3.29^{a}	36.14 ±3.16^{b}	15.38 ±2.11^{a}	17.16 ±2.51^{a}
T8	8.11 ±0.76^{b}	10.43 ±1.38^{a}	26.66 ±1.67^{a}	21.41 ±1.61^{b}	43.94 ±3.29^{a}	45.81 ±3.16^{ab}	13.16 ±2.11^{a}	13.46 ±2.51^{a}

*$^{a, b}$ Means with different superscripts in the same row differ significantly (P<0.05). T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg.

4.2.3. Lymphoid Organs Weights of Broiler Chickens

Table 4.8 and Appendix Table 11 indicate to influence of different levels of thyme, rosemary, adiantum and their combination on lymphoid organs weights of broiler chickens. The influences of different levels of medical plants on relative weight of bursa Fabricius and spleen of broiler had no significantly differences compared to control group. Otherwise, there are significant differences between treated groups. There is a non-significant effect of gender on relative weight of bursa and spleen. Relative weight of Bursa in T5 group was numerical highest and T7 group was lowest value compared to control group. T4 group tend to be significant difference in relative weight of spleen compared to control group.

These searchers (Manafi et al. (2014); Souri et al. (2015); Zeweil et al. (2015); Hashemipour et al. (2016); Pourmahmoud et al. (2016) achieved the same results as we did and they did not find any effect of thyme and/ or rosemary on the relative weight of bursa and spleen in the broiler chicks compared to control group.

Otherwise, the results are not consistent with those of (Osman et al. 2010; Saleh et al. 2014; Al-Mashhadani 2014).

Table 4.8. The influence of different levels of thyme, rosemary, adiantum and their combination on lymphoid organs weights of broiler chickens (Mean± Standard error)

Factor / Treatment	Bursa (g)	Spleen (g)
T1	1.62±0.13^{ab}	2.20±0.17^{abc}
T2	1.47±0.13^{ab}	2.04±0.17^{bc}
T3	1.43±0.13^{ab}	1.82±0.17^{c}
T4	1.47±0.13^{ab}	2.62±0.17^{a}
T5	1.77±0.13^{a}	2.03±0.17^{bc}
T6	1.46±0.13^{ab}	2.03±0.17^{bc}
T7	1.28±0.13^{b}	1.93±0.17^{bc}
T8	1.45±0.13^{ab}	2.47±0.17^{ab}
Gender	N.S	N.S
Male	1.44±0.07	2.20±0.09
Female	1.55±0.07	2.09±0.09

*$^{a, b, c}$ Means with different superscripts in the same row differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg.

Table 4.9 and Appendix Table 12 and 13 indicated that the effect of different levels of thyme, adiantum, rosemary and their combination on lymphoid organs of broiler chicken´s gender. In male, medicinal plants significantly affected relative weight of bursa by different levels and type of medicinal plants. The highest value was in T5 group, while the lower value was in T7 compared to control group. Relative weight of spleen was not effect by different levels and type of medicinal plants. In female, the medicinal plants had non-significant effect on relative weight of bursa and spleen compared to control group.

Table 4.9. The influence of different levels of thyme, rosemary, adiantum and their combination on lymphoid organs of broiler chickens gender (Mean± Standard error)

Factor	Bursa (g)		Spleen (g)	
Treatment	Male	Female	Male	Female
T1	1.47±0.16^{ab}	1.77±0.23^{a}	2.24±0.29^{a}	2.17±0.23^{a}
T2	1.41±0.16^{ab}	1.53±0.23^{a}	2.13±0.29^{a}	1.95±0.23^{a}
T3	1.34±0.16^{b}	1.51±0.23^{a}	1.77±0.29^{a}	1.86±0.23^{a}
T4	1.35±0.16^{b}	1.59±0.23^{a}	2.70±0.29^{a}	2.55±0.23^{a}
T5	1.89±0.16^{a}	1.64±0.23^{a}	2.05±0.29^{a}	2.01±0.23^{a}
T6	1.49±0.16^{ab}	1.44±0.23^{a}	2.11±0.29^{a}	1.94±0.23^{a}
T7	1.25±0.16^{b}	1.30±0.23^{a}	1.93±0.29^{a}	1.92±0.23^{a}
T8	1.34±0.16^{b}	1.58±0.23^{a}	2.63±0.29^{a}	2.31±0.23^{a}

*$^{a, b,}$ Means with different superscripts in the same column differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg. N.S = not significant.

4.3. The Effect of Medicinal Plants on Hematological Parameters of Broiler

Table 4.10 and Appendix Table 14 indicate the influence of different levels of thyme, rosemary, adiantum and their combination on hematological parameters of broiler chicken. There was no significant effect of different type and level of medical plants on PCV&, Hb% and PLAT cont. among trail period otherwise; there was significant effect of different levels and type of medical plants on RBC cont. among experiment period. Also T2 group was significant lower RBC cont. compared to control group. There were no significant effect of different level and type of medical plants on PCV%, Hb%, RBC and PLAT cont. compared to control group. There were no significant effect of gender on PCV%, Hb% and PLAT cont. by different type and levels of medical plants. T5 group (adiantum 5 g/kg) tend to be significant different on PCV% compared to control group. Hb values in T5group tend to be significant different compared to control group. The result was in agreement with those (AL-Kassie (2009): Osman et al. (2010); Sameh (2013); Al-Shuwaili (2014) that reported added thyme and/or rosemary in broiler diet or drinking water was not effect PCV% compared to control group. In contrast, the results are contrary to those done by (Abd El-Latif et al. (2013); Jameel et al. (2014); Saleh et al. (2014). The results of Hb% are in agreement with the studies of (Hashemipour et al. (2013); Al-Shuwaili (2014); Moomivand et al. (2015) that observed rosemary and/ or

thyme in broiler diet had not effect Hb% compared to control group. In contract, the results are disagreement of (Abd El-Latif et al. (2013) Saleh et al. (2014); Jameel et al. (2014).

Table 4.10. The influence of different levels of medical plant (thyme, adiantum, rosemary and their combination) on broiler´s hematological (Mean± Standard error)

Factor / Treatment	PCV %	Hb%	RBC	PLAT
T1	36.17±0.8[a]	11.67±0.26[a]	3.01±0.08[a]	8.17±0.55[a]
T2	35.17±0.8[a]	11.34±0.26[a]	2.62±0.08[b]	7.33±0.55[a]
T3	34.17±0.8[a]	11.02±0.26[a]	2.87±0.08[ab]	8.00±0.55[a]
T4	35.33±0.8[a]	11.40±0.26[a]	2.78±0.08[ab]	8.17±0.55[a]
T5	36.20±0.9[a]	11.68±0.28[a]	2.88±0.09[ab]	7.39±0.61[a]
T6	35.40±0.9[a]	11.42±0.28[a]	2.82±0.09[ab]	7.19±0.61[a]
T7	35.40±0.9[a]	11.42±0.28[a]	2.94±0.09[a]	7.99±0.61[a]
T8	35.17±0.8[a]	11.34±0.26[a]	2.90±0.09[a]	7.83±0.55[a]
Gender	N.S	N.S	N.S	N.S
Male	35.38±0.44	11.41±0.58	2.88±0.04	7.73±0.3
Female	35.38±0.41	11.39±0.66	2.82±0.04	7.79±0.28

[*a, b, c] Means with different superscripts in the same Colum differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg. PCV= packed cell volume, Hb= hemoglobin, RBC= Red blood cells and PLAT= Platelets, N.S= non-significant.

Table 4.11 and Appendix Table 15 and 16 indicate the influence of different levels of thyme, rosemary, adiantum and their combination on hematological parameters of broiler chicken with gender. In male, there were no significant effect of different type and levels of medicinal plants on RBC, Hb%, PCV% and plat compared to control and treated groups. In female, Hb%, PCV% and plat did not affected by different levels and type of herbs compared to control group and treated groups. RBC cont. in T2 (thyme 5 g/kg) and T4 (adiantum 3 g/kg) groups significant decrease compared to control group. However, there are a significant different in RBC cont. between treated groups.

Table 4.11. The influence of different levels of medical plant (thyme, adiantum, rosemary and their combination) on broiler chickens gender's hematological (Mean± Standard error)

Factor	Hb%		PCV%		RBC		PLAT	
Treatment	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
T1	11.51±0.38^{a}	11.83±0.37^{a}	36.67±1.16^{a}	35.67±1.23^{a}	3.06±0.13^{a}	2.95±0.09^{a}	8.67±0.71^{a}	7.67±0.83^{a}
T2	11.40±0.38^{a}	11.29±0.37^{a}	35±1.16^{a}	35.33±1.23^{a}	2.62±0.13^{a}	2.61±0.09^{b}	7.33±0.71^{a}	7.33±0.83^{a}
T3	11.29±0.38^{a}	11.75±0.37^{a}	33.33±1.16^{a}	35±1.23^{a}	2.79±0.13^{a}	2.95±0.09^{a}	8±0.71^{a}	8±0.83^{a}
T4	11.40±0.38^{a}	11.39±0.37^{a}	35.33±1.16^{a}	35.33±1.23^{a}	2.95±0.13^{a}	2.61±0.09^{b}	9±0.71^{a}	7.33±0.83^{a}
T5	11.50±0.38^{a}	11.94±0.46^{a}	37±1.42^{a}	35.67±1.23^{a}	2.95±0.16^{a}	2.82±0.09^{ab}	6.5±0.87^{a}	8±0.83^{a}
T6	11.50±0.38^{a}	11.29±0.46^{a}	35±1.42^{a}	35.67±1.23^{a}	2.67±0.16^{a}	2.91±0.09^{ab}	7±0.87^{a}	7.33±0.83^{a}
T7	11.07±0.38^{a}	11.94±0.46^{a}	37±1.42^{a}	34.33±1.23^{a}	2.98±0.16^{a}	2.91±0.09^{ab}	8±0.87^{a}	8±0.83^{a}
T8	11.61±0.38^{a}	11.08±0.37^{a}	34.33±1.16^{a}	36±1.23^{a}	2.97±0.13^{a}	2.82±0.09^{ab}	7±0.71^{a}	8.67±0.83^{a}

*a, b Means with different superscripts in the same Colum differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg. PCV= packed cell volume, Hb= hemoglobin, RBC= Red blood cells and PLAT= Platelets.

4.4. The Effect of Medical Plant on Broiler Gender´s Serum Biochemical

Table 4.12 and Appendix Table 17 show the effect of medical plant on broiler serum biochemical. Treatments have no significant effect on the total protein, albumin, globulin and A/G ratio compared to control group, while there were significant differences among treated groups (albumin and globulin). Moreover, cholesterol level was significant affected by treated groups compared to control group in either directions (negative and positive). Regarding the treated groups, T3 was recorded highest and T7 lower cholesterol level. Glucose concentration in the T4, T7 and T8 was significantly higher than T1 (Control group), however, glucose level in the T2, T3, T5 and T6 were not significantly affected compared to T1 (Control group). There is a non-significant effect of gender on total protein, albumin, globulin, A/G ratio, cholesterol and glucose levels. The results of total protein are in agreement with the findings of many studies using different levels of thyme (Ali (2014); Ahmed et al. (2015); Fallah and Mirzaei (2016) and rosemary (Osman et al. (2010); Abd El-Latif et al. (2013) compared to control in broiler chicken. While, disagreement to the presents results, serum total protein significantly affected by different levels of thyme (Zhu et al. (2014); Moomivand et al. (2015) and Belenli et al. (2015) and rosemary (Zeweil et al. (2015) in broiler diet or throughout drinking water compared to control group. Concerning to serum albumin, the results are in harmony with the findings of (Abd El-Latif et al. (2013); Ali (2014); Ahmed et al. (2015) who noticed that there is no differences in serum albumin concentration when they used thyme and/ or rosemary in broiler diet compared with control group. In contrast, the findings of this study are not consistent with those of (Zeweil et al. (2015); Belenli et al. (2015); Moomivand et al. (2015) compared to control group. In contrast to our result regarding total globulin (Ghazalah and Ali (2008); Osman et al. (2010); Zhu et al. (2014); Zeweil et al. (2015) who reported that serum globulin increased significantly when using thyme and rosemary, respectively in broiler diet compared to control group. In addition, (Mansoub and Nezhady (2011); Abd El-Latif et al. (2013); Ali (2014); Ahmed et al. (2015) observed that there is no significant effect of thyme and rosemary on serum globulin in broiler chicken diet or throughout drinking water. Regarding the A/G ratio, the results are in agreement with the studies of (Abd El-Latif et al. (2013); Ali (2014); Moomivand et al. (2015) that reported added thyme and/ or rosemary in broiler diet had no effect on serum globulin compared to control group.

On the other hand, the results are in disagreement with the findings of (Polat et al. (2011); Zhu et al. (2014); Moomivand et al. (2015) who studied different levels of thyme and/ or rosemary in broiler diet had significantly affect total globulin concentration compared with control group. About total cholesterol Results of the present study are in agreement with those of (Amouei et al. (2015); Zeweil et al. (2015); Pourmahmoud et al. (2016) that observed different levels of thyme and/ or rosemary in broiler diet or throughout the drinking water was significantly differences total cholesterol concentration compared to control group. While, the result was disagreed with the findings of (Manafi et al. 2014; Souri et al. 2015; Fallah and Mirzaei 2016) who reported that broiler chicken fed different levels of rosemary and/or thyme in diets or drinking water had no affected in total cholesterol level compared to control group. Regarding to result of glucose, there was a significant effect of medicinal plants on serum glucose level. However, T7 group had significantly higher serum glucose concentration (186.90 mg/dL) followed by T8 (181.27 mg/dL) and T4 (180.98 mg/dL) groups compared to control group (175.16 mg/dL), while the differences among control and other treated groups were not significant. The result of our study was in agreement with (Ali 2014; Zeweil et al. 2015; Ahmed et al. 2015; Qamar et al. 2015) who reported that rosemary and/ or mixture of herbs in broiler diet had significant differences on glucose levels compared to control group. Similarly (Souri et al. (2015); Fallah and Mirzaei (2016) observed the same result of the effect of thyme powder in broiler diet on glucose concentration. In contracts to our results Ashan (2011) observed that using rosemary in broiler diet had no significant differences in serum glucose compared to control group. Also, (Mansoub and Nezhady 2011; Ali 2014; Moomivand et al. 2015) observed that thyme powder and mixture herbs in broiler diet have significant differences in serum glucose compared to control group. Like the most medical herbs such as adiantum or thyme or rosemary supplementation, this improvement may be due to the biological function of these herbs which enhance the immune response (Mahfouz and El-Dakhakhny 1960; El-Ghamry 2004). Serum biochemical parameters indices directly express the status of nutrition, health and metabolism of the animals. Therefore, this induce can be used to assess the effect of herbs on growth conditions, food metabolism, immunity and mechanisms of broilers (Zhu et al. 2016). The effects of medicinal plants in serum biochemical of broiler are still unclear. The decrease of globulin concentration in T4 and T7 groups may be related to dose of these herbs. The reduction of cholesterol levels in T2 group in the present study may be

related to the lowering effect of thymol or carvacrol in thyme on HMG-Co A reeducates the rate-limiting enzyme of cholesterol synthesis (Elson 1995; Case et al. 1995; Lee et al. 2003) and the increase cholesterol in T3 group which contain 10 g/kg of thyme may related to effects of main compounds in this herbs on HMG-Co A reeducates the rate-limiting enzyme of cholesterol synthesis (Lee et al. 2003). Also the reduction of cholesterol level in T6 and T7 groups which contain rosemary powder may be due to the hypocholesterolemic properties attributed to the defatted part of the leaves which are rich in fibrous (25.24 %) content and may block intestinal cholesterol absorption (Lansky et al. 1993). The high level of fiber in herbs can increased the excretion of the bile and this may reduce the cholesterol concentration in blood (Akiba and Matsumoto 1982). The increase of cholesterol level in T4 group which contain adiantum powder may be related to active compound in these plants on cholesterol synthesis. The significant level of glucose in T4 and T7 groups may be attributed to the high crude fiber content (cellulose, hemicellulose and lignin) (15.59, 6.79 and 5.94%) (Ghazalah and Ali 2008) in particular cellulose from the cell walls of the plants leaves which may prevent enzymes to increase glucose by enfolding them, this action lead to delayed gut glucose absorption (Mohammed 2013).

Table 4.12. The influence of different levels of thyme, adiantum, rosemary and their combination on broiler´s serum biochemical (Mean± Standard error)

Factor / Treatment	Total Protein g/dL	Albumin g/dL	Globulin g/dL	A/G ratio	Cholesterol mg/dL	Glucose mg/dL
T1	2.77±0.04^{a}	1.61±0.04^{ab}	1.22±0.04^{a}	1.35± 0.08^{a}	167.41±2.59^{c}	175.16±1.31^{c}
T2	2.74±0.04^{a}	1.65±0.04^{ab}	1.17±0.04^{ab}	1.38±0.08^{a}	153.60±2.59^{d}	175.01±1.31^{c}
T3	2.78±0.04^{a}	1.62±0.04^{ab}	1.13±0.04^{ab}	1.45±0.08^{a}	186.52±2.59^{a}	176.93±1.31^{c}
T4	2.75±0.04^{a}	1.69±0.04^{a}	1.08±0.04^{b}	1.52±0.08^{a}	177.73±2.59^{b}	180.98±1.31^{b}
T5	2.75±0.05^{a}	1.53±0.04^{b}	1.22±0.04^{a}	1.29±0.08^{a}	146.71±2.85^{d}	175.23±1.4^{c}
T6	2.65±0.05^{a}	1.55±0.04^{b}	1.13±0.04^{ab}	1.35±0.08^{a}	149.94±2.85^{d}	175.13±1.44^{c}
T7	2.65±0.05^{a}	1.58±0.04^{ab}	1.08±0.04^{b}	1.47±0.08^{a}	138.63±2.85^{e}	186.90±1.44^{a}
T8	2.68±0.05^{a}	1.56±0.04^{b}	1.14±0.04^{ab}	1.36±0.08^{a}	182.49±2.59^{ab}	181.27±1.31^{b}
Gender	N.S	N.S	N.S	N.S	N.S	N.S
Male	2.7±0.02	1.61±0.02	1.14±0.02	1.41±0.04	162.52±1.4	178.51±0.71
Female	2.7±0.02	1.59±0.02	1.59±0.02	1.38±0.04	163.24±1.3	163.24±0.66

*a, b, c, d, e Means with different superscripts in the same column differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg. A/G ratio= albumin to globulin ratio.

Table 4.13 and Appendix Table 18 and 19 show the effect of medical plant on broiler gender´s serum biochemical. In male, there was a non-significant effect of used medical plants on total protein, albumin, globulin and A/G ratio. While, cholesterol and glucose level were significantly affected when using different levels and type medical plants, serum cholesterol were significantly increased in blood of broiler chicken fed T3, T4 and T8 diets and significantly decreased in T5, T6 and T7 compared to control group. Glucose level in chickens fed T7 diet significantly higher than that of control group, although the differences among other treated groups and control group were similar. In female, there was significantly effect of added medical plants on total protein, cholesterol and glucose levels. While, there was a non- significant effect of using medical plants on albumin, globulin and A/G ratio. However, total protein was significant decreased in serum of broiler chicken fed T7 compared to control group. Also, T2, T5, T6 and T7 were significantly decreased in cholesterol levels compared to control group. Moreover, T4, T7 and T8 were significant increased glucose level compared to control group.

4.5. The Effect of Medical Plant on Broiler Gender´s Serum Hormone

Table 4.14 and Appendix Table 20 show the effect of medical plants on broiler‘s serum hormone. Various types and levels of medical plants have significant effects on T3, T4, TSH and GH hormones. King and King, (1973) mention that thyroid hormones play most important role in chickens in growth regulation as demonstrated by thyroidectomy, which results in reduced growth rate. T5 (adiantum 3 g/kg) had significantly lower level and T8 (thyme 7.5 g/kg+ adiantum 4 g/kg + rosemary 7.5 g/kg) had higher level of T3 hormone, the two levels of adiantum (T4 and T5) had significant effect ($P<0.05$) on T3 hormone compared to control group. While, T3 hormone in blood of chicken fed different levels of thyme (T2 and T3), rosemary (T6 and T7) and mixture of used medical plants (T8) were similar to that of control (T1) group. In concern to TSH hormone, T7 (rosemary10 g/kg) significantly ($P<0.05$) had lower level compared to control and all other treated groups, the differences among control and other treated groups were not significant. Broiler chicken fed diets with different levels and mixture of medicinal plants have similar concentration of T4 and GH hormones compared to control group and there were significant effect among treated groups.

Table 4.13. The influence of different levels of thyme, adiantum, rosemary and their combination on broiler chickens gender's biochemical (Mean± Standard error)

Factor	Total Protein g/Dl		Albumin g/dL		Globulin g/dL		A/G Ratio		Cholesterol mg/dL		Glucose mg/dL	
Treatment	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
T1	2.73 ±0.09^{a}	2.81 ±0.04^{a}	1.63 ±0.05^{a}	1.59 ±0.07^{a}	1.22 ±0.05^{a}	1.23 ±0.07^{a}	1.36 ±0. 1^{a}	1.34 ±0.13^{a}	163.15 ±2.99^{c}	171.66 ±4.25^{a}	177.29 ±1.83^{bc}	173.0.3 ±1.67^{d}
T2	2.76 ±0.09^{a}	2.71 ±0.04^{ab}	1.69 ±0.05^{a}	1.61 ±0.07^{a}	1.18 ±0.05^{a}	1.16 ±0.07^{a}	1.37 ±0. 1^{a}	1.39 ±0.13^{a}	154.2 ±2.99^{cd}	152.99 ±4.25^{b}	173.77 ±1.83^{c}	176.25 ±1.67^{cd}
T3	2.8 ±0.09^{a}	2.76 ±0.04^{ab}	1.66 ±0.05^{a}	1.58 ±0.07^{a}	1.14 ±0. 05^{a}	1.14 ±0.07^{a}	1.46 ±0. 1^{a}	1.43 ±0.13^{a}	190.21 ±2.99^{a}	182.83 ±4.25^{a}	177.09 ±1.83^{bc}	176.76 ±1.67^{cd}
T4	2.71 ±0.09^{a}	2.8 ±0.04^{a}	1.66 ±0.05^{a}	1.71 ±0.07^{a}	1.08 ±0.05^{a}	1.08 ±0.07^{a}	1.56 ±0. 1^{a}	1.49 ±0.13^{a}	178.12 ±2.99^{b}	177.34 ±4.25^{a}	182.13 ±1.83^{ab}	179.84 ±1.67^{bc}
T5	2.68 ±0.1^{a}	2.8 ±0.04^{a}	1.51 ±0.06^{a}	1.54 ±0.07^{a}	1.17 ±0. 05^{a}	1.26 ±0.07^{a}	1.35 ±0. 1^{a}	1.25 ±0.13^{a}	148.03 ±3.66^{d}	145.94 ±4.25^{b}	174.62 ±2.24^{c}	175.58 ±1.67^{cd}
T6	2.6 ±0.1^{a}	2.69 ±0.04^{ab}	1.52 ±0.06^{a}	1.56 ±0.07^{a}	1.13 ±0. 05^{a}	1.12 ±0.07^{a}	1.3 ±0. 1^{a}	1.38 ±0.13^{a}	149.28 ±3.66^{d}	150.49 ±4.25^{b}	177.12 ±2.24^{bc}	173.74 ±1.67^{d}
T7	2.64 ±0.1^{a}	2.67 ±0.04^{b}	1.59 ±0.06^{a}	1.57 ±0.07^{a}	1.05 ±0. 05^{a}	1.1 ±0.07^{a}	1.51 ±0. 1^{a}	1.45 ±0.13^{a}	136.71 ±3.66^{e}	140.03 ±4.25^{b}	188.16 ±2.24^{a}	186 ±1.67^{a}
T8	2.68 ±0.09^{a}	2.69 ±0.04^{ab}	1.57 ±0.05^{a}	1.52 ±0.07^{a}	1.15 ±0. 05^{a}	1.13 ±0.07^{a}	1.38 ±0. 1^{a}	1.34 ±0.13^{a}	180.38 ±2.99^{ab}	184.59 ±4.25^{a}	178.58 ±1.83^{bc}	183.96 ±1.67^{ab}

*a, b Means with different superscripts in the same row differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg. A/G ratio= albumin to globulin ratio.

There is a non-significant effect of gender on T3, T4, TSH and GH hormones. The result of our study was in agreement with those found (Motlagh et al. 2015) who reported that thyme powder in broiler diet had no significant effect on T3 and T4 hormones compared to control group. While, the disagreement to our result Ghazalah and Ali (2008) found that T3 and T4 hormones were significantly differ when broiler chicken fed rosemary leaves compared to control group. Serum growth hormone concentration were no statistical difference in treated groups compared to control groups because growth hormone shows pulsatile secretion, therefore blood serum samples should be taken several times during the day for determination of growth hormone's effect exactly. Further work will be necessary to determine the effected with regards to the thyme, adiantum and rosemary supplemented to broiler diets and its effect on growth hormone secretion need to better investigate.

Table 4.14. The influence of different levels of thyme, rosemary, adiantum and their combination on broiler´s serum hormones (mean± standard error)

Factor / Treatment	T3 ng/ml	T4 ng/ml	TSH ng/ml	GH µIU/ml
T1	1.86±0.10^{ab}	0.83±0.08^{ab}	0.57±0.02^{b}	3.89±0.09^{ab}
T2	1.52±0.10^{bcd}	0.84±0.08^{ab}	0.58±0.02^{b}	3.68±0.09^{b}
T3	1.67±0.10^{abc}	1.01±0.08^{a}	0.59±0.02^{b}	3.82±0.09^{ab}
T4	1.44±0.10^{cd}	1.04±0.08^{a}	0.58±0.02^{b}	4.01±0.09^{a}
T5	1.26±0.10^{d}	0.73±0.09^{b}	0.56±0.03^{b}	3.90±0.10^{ab}
T6	1.55±0.10^{bcd}	0.98±0.09^{ab}	0.66±0.03^{a}	4.09±0.10^{a}
T7	1.71±0.10^{ab}	0.98±0.09^{ab}	0.55±0.03^{b}	4.02±0.10^{a}
T8	1.93±0.10^{a}	1.1±0.08^{a}	0.57±0.02^{b}	4.05±0.09^{a}
Gender	N.S	N.S	N.S	N.S
Male	1.60±0.06	0.97±0.04	0.58±0.01	3.94±0.05
Female	1.64±0.05	0.91±0.04	0.59±0.01	3.92±0.05

*$^{a, b, c, d}$ Means with different superscripts in the same Column differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ 4 g/kg, Adiantum g/kg+ Rosemary 7.5 g/kg. GH= growth hormone, TSH= thyroid stimulation hormone, T4= tetraiodothyronine or thyroxine, T3= Triiodothyronine. N.S= not significant.

Table 4.15 and Appendix Table 21 and 22 show the effect of medical plants on broiler's gender serum hormone. In male, in the exception of GH hormones there is non-significant effect of treatments on blood hormones (T3, T4 and TSH). Broiler chicken fed 5 g/kg of rosemary (T6) had higher level of GH hormones while, the lower content observed in T2 (thyme 5 g/kg) and the differences between them was significant. GH

hormone level in the serum of broiler chickens fed control diets were numerically differ compered to all other types and levels of herbs as well as the mixture of herbs. In female, in the exception of GH there is a significant effect of treatment on serum T3, T4 and TSH hormones. Broiler chicken received 5 g/kg of adiantum (T5) had significantly lower level of T3 hormone while compared to control group, while the mixture of medicinal plant had higher level and similar to control group.

4.6. The Effect of Medical Plant on Broiler Gender´s Serum Enzyme

Table 4.16 and Appendix Table 23 show the effect of different levels of thyme, rosemary, adiantum and their combination on broiler enzymes. Supplementation of medicinal plant to broiler chicken diets affected significantly on each of Creatinine, AST and ALT enzymes. Broiler chicken fed diet with thyme powder (5 g/kg) had higher Creatinine level compared to control and other treated groups. AST in the blood of group T7 significantly lower than control and other treatments groups. Broiler chicken feeding diets containing mixture of thyme, rosemary and adiantum had significantly lower level of ALT enzyme compared to control and T5, while both of them numerically higher than other treated groups. There is a non-significant effect of gender on Creatinine, AST and ALT enzymes. The result was in agreement with (Osman et al., 2010) that used 0.5 and 1.0 g/kg of rosemary in broiler diet had no significantly affected in Creatinine levels compared to control group. Moreover, The result of our study was disagreed with (Ghazalah and Ali (2008); Polat et al. (2011) that used different levels of rosemary in broiler diet had significantly differences in Creatinine concentration compared to control group. There is a non-significant effect of gender on Creatinine, AST and ALT concentration While, result of AST was in agreement with (Zhu et al. (2014); Saleh et al. (2014); Moomivand et al. (2015) who reported that using different levels of thyme in broiler diet had no affected in AST levels compare to control group. However, (Tawfeek and Mustafa 2012; Saleh et al. 2014; Zhu et al. 2014; Moomivand et al. 2015) who observed that broiler chicken fed different levels of thyme in diet or throughout drinking water had no affected AST concentration compared to control group. According to Ghazalah and Ali (2008) Creatinine enzyme is a chemical waste molecule that is generated from muscle metabolism.

Table 4.15. The influence of various levels of thyme, adiantum, rosemary and their combination on broiler chickens gender's serum hormonal (Mean± standard error)

Factor	T3 ng/ml		T4 µg/ml		TSH µIU/ml		GH µIU/ml	
Treatment	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
T1	1.75±0.18^{a}	1.97±0.15^{ab}	0.88±0.13^{a}	0.78±0.11^{ab}	0.57±0.03^{a}	0.58±0.03^{b}	3.93±0.12^{ab}	3.85±0.14^{a}
T2	1.55±0.18^{a}	1.48±0.15^{bc}	0.80±0.13^{a}	0.87±0.11^{ab}	0.59±0.03^{a}	0.58±0.03^{b}	3.64±0.12^{b}	3.71±0.14^{a}
T3	1.68±0.18^{a}	1.67±0.15^{abc}	1.06±0.13^{a}	0.97±0.11^{ab}	0.62±0.03^{a}	0.56±0.03^{b}	3.97±0.12^{ab}	3.68±0.14^{a}
T4	1.41±0.18^{a}	1.48±0.15^{bc}	1.09±0.13^{a}	0.99±0.11^{ab}	0.57±0.03^{a}	0.59±0.03^{b}	4.04±0.12^{ab}	3.97±0.14^{a}
T5	1.29±0.22^{a}	1.24±0.15^{c}	0.83±0.16^{a}	0.65±0.11^{b}	0.59±0.04^{a}	0.55±0.03^{b}	3.82±0.15^{ab}	3.95±0.14^{a}
T6	1.59±0.22^{a}	1.53±0.15^{abc}	1.10±0.16^{a}	0.89±0.11^{ab}	0.58±0.04^{a}	0.72±0.03^{a}	4.19±0.15^{a}	4.02±0.14^{a}
T7	1.71±0.22^{a}	1.72±0.15^{abc}	0.98±0.16^{a}	0.97±0.11^{ab}	0.54±0.04^{a}	0.57±0.03^{b}	3.82±0.15^{ab}	4.15±0.14^{a}
T8	1.88±0.18^{a}	1.99±0.15^{a}	1.04±0.13^{a}	1.15±0.11^{a}	0.55±0.03^{a}	0.59±0.03^{b}	4.06±0.12^{ab}	4.03±0.14^{a}

$^{a, b,}$ Means with different superscripts in the same row differ significantly (P< 0.05) between treatment for each gender.T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg. GH= growth hormone, TSH= thyroid stimulation hormone, T4= tetraiodothyronine or thyroxine, T3= Triiodothyronine.

The kidneys maintain the blood Creatinine in a normal range. The lower values derived that no muscular wastage which might have been possibly cause by inadequacy of protein in animals. According to Zhang (2011) blood serum ALT and AST enzyme are very low under normal conditions. When liver damages or an increase in the permeability of liver cells are present, ALT and AST enzyme are released into the blood to increase their activity. Therefore, their serum levels are sensitive indicators of liver cell damage. Alanine aminotransferase (ALT) is mainly distributed in the liver, followed by skeletal muscles, kidney, myocardial tissue, etc. Alanine aminotransferase (AST) enzyme can catalase the transmutation between alanine and -oxoglutarate, and between oxalo-acetic acid and glutamic acid. Alanine aminotransferase can influence the intermediate metabolism of glucose and amino acids. Aspartate transaminase is mainly distributed in myocardial cell, liver tissue, etc. However, Zhu et al. (2014) The reason for the lack of significant differences in Creatinine concentration fed 10 g/kg of thyme powder in broiler chicken diet during the whole period of experiment may be due the active compound of thyme (thymol and carvacrol).

Table 4.16. The influence of different levels of thyme, adiantum, rosemary and their combination on broiler´s serum enzyme (Mean± Standard error)

Factor / Treatment	Creatinine (mg/dL)	AST (U/L)	ALT (U/L)
T1	1.27±0.04^{b}	0.18±0.01^{a}	0.30±0.01^{a}
T2	1.33±0.04^{b}	0.16±0.01^{a}	0.27±0.01^{ab}
T3	1.78±0.04^{a}	0.17±0.01^{a}	0.26±0.01^{ab}
T4	1.27±0.04^{a}	0.15±0.01^{a}	0.26±0.01^{ab}
T5	1.39±0.05^{b}	0.16±0.01^{a}	0.29±0.01^{a}
T6	1.30±0.05^{b}	0.15±0.01^{a}	0.27±0.01^{ab}
T7	1.34±0.05^{b}	0.09±0.01^{b}	0.27±0.01^{ab}
T8	1.25±0.04^{b}	0.15±0.01^{a}	0.24±0.01^{b}
Gender	N.S	N.S	N.S
Male	1.34±0.02	0.15±0.01	0.27±0.01
Female	1.39±0.03	0.15±0.01	0.27±0.01

*a, b, c Means with different superscripts in the same Column differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg. AST= Aspartate amino transferase, ALT= Alanine Amino Transferase.

Table 4.17 and Appendix Table 24 and 25 show the effect of different levels of thyme, rosemary, adiantum and their combination on broiler gender´s enzymes. In male, there are non-significant effect of medicinal plants on ALT levels compared to control and treated groups during all experiment period. Creatinine concentration in T4, T5 and T8 groups are significant increased while, T3 group is significant decreased compared to control group. Also there is a significant difference between treated groups. AST levels in T4, T5, T6, T7 and T8 groups are significant reduced compared to control and treated groups. However, there are significant differences between treated groups. In female, there is a significant lower Creatinine level in T3 group compared to control and treated groups. There is significant reduced the concentration of AST enzyme in T6 group which contain rosemary powder at 10 g/kg compared to control and treated groups. There are non-significant differences of ALT level in all treated groups compared to control group while, there are a significant difference between treated groups.

Table 4.17. The influence of different levels of thyme, adiantum, rosemary and their combination on broiler chickens gender's serum enzyme (Mean± Standard error)

Factor	Creatinine (mg/dL)		AST (U/L)		ALT (U/L)	
Treatment	Male	Female	Male	Female	Male	Female
T1	1.25±0.07^{ab}	1.29±0.06^{a}	0.198± 0.01^{a}	0.15±0.01^{a}	0.31±0.02^{a}	0.28±0.02^{ab}
T2	1.36±0.07^{ab}	1.30±0.06^{a}	0.157±0.01^{ab}	0.17±0.01^{a}	0.26±0.02^{a}	0.28±0.02^{ab}
T3	1.73±0.07^{b}	1.82±0.06^{b}	0.173±0.01^{ab}	0.17±0.01^{a}	0.27±0.02^{a}	0.25±0.02^{b}
T4	1.19±0.07^{a}	1.36±0.06^{a}	0.14±0.01^{b}	0.15±0.01^{a}	0.25±0.02^{a}	0.27±0.02^{ab}
T5	1.44±0.07^{a}	1.30±0.07^{a}	0.149±0.02^{b}	0.16±0.01^{a}	0.26±0.02^{a}	0.31±0.02^{a}
T6	1.24±0.07^{ab}	1.39±0.07^{a}	0.147±0.02^{b}	0.15±0.01^{a}	0.27±0.02^{a}	0.27±0.02^{ab}
T7	1.33±0.07^{ab}	1.33±0.07^{a}	0.09±0.02^{c}	0.09±0.01^{b}	0.26±0.02^{a}	0.27±0.02^{ab}
T8	1.19±0.07^{a}	1.30±0.06^{a}	0.163±0.01^{ab}	0.14±0.01^{a}	0.26±0.02^{a}	0.23±0.02^{b}

*a, b, c Means with different superscripts in the same Column differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg. AST= Aspartate amino transferase, ALT= Alanine Amino Transferase.

4.7. The Effect of Medical Plant on Broiler´s Meat Color

Table 4.18 and Appendix Table 26 indicated that the effect of different levels of thyme, adiantum, rosemary and their combination on broiler´s meat color. The different levels of medical plant have no significant effect on lightness, redness and yellowness of meat color in broiler compared to control group. The effect of gender on meat lightness was

significantly affected. While, the redness and yellowness of meat color were not affected by gender. Regard to lightness, male broiler chicken had significantly darker meat (54.20) than female broiler chicken (51.29). The result was in agreement with finding of (Jang et al. 2011; An et al. 2015) who's reported that using dietary quercetin and methoxylated quercetin extracted from onion or dietary onion in broiler diet had no significantly effected in broiler´s meat color.

Table 4.18. The influence of different levels of thyme, rosemary, adiantum and their combination on meat color of broiler chickens (Mean± Standard error)

Factor / Treatment	L*	a*	b*
T1	53.15±1.79[a]	1.77±0.32[a]	6.83±0.72[a]
T2	54.29±1.79[a]	1.22±0.32[a]	6.60±0.72[a]
T3	51.25±1.79[a]	1.48±0.32[a]	6.41±0.72[a]
T4	53.35±1.79[a]	1.73±0.32[a]	7.13±0.72[a]
T5	50.97±1.79[a]	1.20±0.32[a]	6.35±0.72[a]
T6	53.73±1.79[a]	1.08±0.32[a]	8.13±0.72[a]
T7	53.49±1.79[a]	1.23±0.32[a]	7.12±0.72[a]
T8	51.72±1.79[a]	0.78±0.32[a]	6.20±0.72[a]
Gender	S	N.S	N.S
Male	54.20±0.9[a]	1.2±0.16	6.75±0.36
Female	51.29±0.9[b]	1.42±0.16	6.95±0.36

[*a, b] Means with different superscripts in the same row differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg. . L*= lightness, a*= redness; b* = yellowness.

Table 4.19 and Appendix Table 27 and 28 indicated that the effect of different levels of thyme, adiantum, rosemary and their combination on broiler´s meat color with gender. In male, medicinal plants significantly affected redness of meat. While, lightness and yellowness of meat not affected by different levels and types of medical plants. Mixture medical plants had significantly lower value of meat redness compared to control group. In female, medicinal plants significantly affected yellowness of meat. While, lightness and redness of meat not affected by different levels and types of medical plants. The lower value of yellowness was in T7 and T6 had highest value. Although there is significant difference between male and female in redness and yellowness in T8 group, according to our knowledge there is no previous study done on this parameter to describe the reason behind this.

Table 4.19. The influence of different levels of thyme, rosemary, adiantum and their combination on meat color of broiler chickens gender (Mean± Standard error)

Factor	L*		a*		b*	
Treatment	Male	Female	Male	Female	Male	Female
T1	53.52±2.69^{a}	52.77±2.85^{a}	2.13±0.41^{a}	1.40±0.5^{a}	6.23±1.26^{a}	7.44±0.74^{ab}
T2	55.89±2.69^{a}	52.68±2.85^{a}	1.34±0.41^{ab}	1.09±0.5^{a}	6.30±1.26^{a}	6.91±0.74^{ab}
T3	52.55±2.69^{a}	49.95±2.85^{a}	1.02±0.41^{ab}	1.94±0.5^{a}	6.20±1.26^{a}	6.63±0.74^{ab}
T4	55.43±2.69^{a}	51.26±2.85^{a}	1.32±0.41^{ab}	2.14±0.5^{a}	6.39±1.26^{a}	7.88±0.74^{ab}
T5	52.45±2.69^{a}	49.50±2.85^{a}	1.20±0.41^{ab}	1.20±0.5^{a}	6.01±1.26^{a}	6.69±0.74^{ab}
T6	54.98±2.69^{a}	52.48±2.85^{a}	1.03±0.41^{ab}	1.14±0.5^{a}	7.97±1.26^{a}	8.29±0.74^{a}
T7	55.63±2.69^{a}	51.34±2.85^{a}	1.18±0.41^{ab}	1.27±0.5^{a}	8.64±1.26^{a}	5.60±0.74^{b}
T8	53.14±2.69^{a}	50.31±2.85^{a}	0.36±0.41^{b}	1.19±0.5^{a}	6.23±1.26^{a}	6.17±0.74^{ab}

$^{a, b,}$ Means with different superscripts in the same row differ significantly (P<0.05).T1= control, T2=Thyme 5 g/kg, T3=Thyme 10 g/kg, T4= Adiantum 3 g/kg, T5=Adiantum 5 g/kg, T6= Rosemary 5 g/kg, T7=Rosemary 10 g/kg, T8=Thyme 7.5 g/kg+ Adiantum g/kg+ Rosemary 7.5 g/kg. L= lightness, a*= redness; b* = yellowness.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

1. In general the medicinal herbs powder supplements in broiler´s diet have a beneficial effect on most of broiler performance. Higher live body weight was recorded at T4 group (Adiantum 4 g/kg) and T7 group (Rosemary 10 g/kg) and male was heavier than female weight.

2. The total feed intake did not effected by different levels and type of medicinal plants compared to control groups while, it was significant affected between treated groups. Mortality rate was significant highest in T2and T7 compared to control group. Also, feed conversion ratio was not affect.

3. Various levels of dietary herbs treatments had effect on carcass traits and T3 group (thyme 10 g/kg) had best recorded dressing percentage.

4. The male broiler chicks had higher live body weight, carcass yield and carcass cut weight when compared with female.

5. Dietary herbs plant did not have any improvement in hearts and gizzard weights while, in general had effect on abdominal fat and liver weights.

6. Hematology parameters did not affect by added medicinal plants to broiler diets.

7. Supplement of medicinal plants in broiler diets generally improved biochemical parameters and enhance the immunity status for broiler chicks.

8. The combination of medicinal herbs (7.5 g/kg of thyme +4 g/kg of adiantum+ 7 g/kg of rosemary) has improvement in thyroid and growth hormones in broiler.

9. Herbs plants improvement the concentration of Creatinine, AST and ALT in blood serum.

10. In general redness, yellowness and lightness of meat did not change by added herbs to broiler diets.

5.2. Recommendations

1. Based on the research, it is highly recommended to use adiantum (4 g/kg) and rosemary (10 g/kg) as growth promoter instead of antibiotic in the diets of commercial broiler flocks.

2. Studying the influence of Adiantum supplementation in diet by using another percentages (0.6, 0.8 and 0.10 %) and (0.6, 0.7, 0.8 and 0.9 %) of thyme and rosemary in the broiler`s diet.

3. Mechanism action of herbal products is not very clear yet; so, we may have more studies to investigate the mode of action of these medicinal herbs alone or in combination in poultry nutrition.

4. More investigation must be carried out to study the effect of thyme, adiantum, rosemary and their combination on commercial broiler breeder’s performance, layer and quail throughout the drink water or added to diets.

5. Studying the diet added with thyme, adiantum, rosemary and their combination during to starter period or in finisher period alone and compared to that with continuous supplementation in starter and finisher.

6. More studies are necessary to isolate and characterize the active compound in the herbs plant for clarification of the mode of constituent actions.

7. Doing more investigation to show the effect of these medicinal herbs on the other enzyme and hormonal that related with the immunity and productive traits and also studying the histological properties of small intestine parts, liver, muscles, heart and kidneys.

8. More studies must be carried out to study the effect of the diet supplementation with thyme, adiantum, rosemary and their combination on the infected flocks by Newcastle and Infectious Bursal diseases.

9. The effect of diet supplementation with thyme, adiantum and rosemary on intestinal microflora and their relation with immunity, resistance to pathogens, their interaction with cytokines and hormones will be attractive subject for future investigation.

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APPENDICES

Appendix Table (1) Mean and test of significance for thyme powders, adiantum, rosemary and their combination on live body weight of broiler gender

Traits	d.f	Mean squares					
		1st week	2nd week	3rd week	4th week	5th week	6th week
Treatment	7	274.38	5714.74	1586.89	17308.74	51337.51	100861.66
Gender	1	6619.38	164612.54	305133.95	571308.5	1153483.22	2865118.88
Error	63	108.37	2447.92	5454.38	10601.05	13944.7	22892.68

*: p<0.05

Appendix Table (2) Mean and test of significance for thyme powders, adiantum, rosemary and their combination on live body weight of male broiler

Traits	d.f	Mean squares					
		1st week	2nd week	3rd week	4th week	5th week	6th week
Treatment	7	336.84	5220.29	13718.47	19364.2	37066.54	67358.38
Error	34	93.4	1988.26	5960.2	10477.19	15537.91	22961.62

*: p<0.05

Appendix Table (3) Mean and test of significance for thyme powders, adiantum, rosemary and their combination on live body weight of female broiler

Traits	d.f	Mean squares					
		1st week	2nd week	3rd week	4th week	5th week	6th week
Treatment	7	30.49	3964..31	5813.27	15817.59	24678.85	53287.91
Error	34	135.78	2833.15	5240.13	8478.63	12607.82	23775.06

*: p<0.05

Appendix Table (4) Mean and test of significance for thyme, adiantum, rosemary and their combination on total feed intake and feed conversion ratio of broilers chicken at 42 days.

S.O.V	d. f	Mean Square	
		FI	FCR
Treatment	7	135191.37	0.0018
Error	16	75664.889	0.01

*: p<0.05

Appendix Table (5) Mean and test of significance for thyme, adiantum, rosemary and their combination on relative weight of carcass parts of broiler chicken at 42 days.

S.O.V	d. f	Mean Square					
		Carcass yield	Dressing %	Breast	Legs	Wings	Back and neck
Treatment	7	62311.94	27.51	5475.54	5095.619	1345.92	5889.06
Gender	1	546.75	7.67	438.02	1281.33	7.52	196.02
Error	39	10488.24	7.43	1857.79	1188.17	186.38	1446.66

*: p<0.05

Appendix Table (6) Mean and test of significance for thyme, adiantum, rosemary and their combination on relative weight of carcass parts of broiler´s male at 42 days.

S.O.V	d. f	Mean Square					
		Carcass yield	Dressing %	Breast	Legs	Wings	Back and neck
Treatment	7	38870.38	31.61	2014.38	4639.50	742.54	4289.52
Error	16	9965.79	4.15	1086.91	642.00	133.04	1314.41

*: p<0.05

Appendix Table (7) Mean and test of significance for thyme, adiantum, rosemary and their combination on relative weight of carcass parts of broiler´s female at 42 days.

S.O.V	d. f	Mean Square					
		Carcass yield	Dressing %	Breast	Legs	Wings	Back and neck
Treatment	7	26148.45	7.93	3111.37	2338.35	746.47	2752.18
Error	16	14415.04	8.69	4215.66	1430.70	258.66	1707.54

*: p<0.05

Appendix Table (8) Mean and test of significance for thyme, adiantum, rosemary and their combination on male internal organs of broilers chicken at 42 days.

S.O.V	d. f	Mean Square			
		Hearts	Liver	Abdominal fat	Gizzard
Treatment	7	4.36	58.67	25.01	4.98
Gender	1	0.16	65.36	6.35	21.4
Error	39	3.62	28.06	13.53	8.94

*: p<0.05

Appendix Table (9) Mean and test of significance for thyme, adiantum, rosemary and their combination on female internal organs of broilers chicken at 42 days.

S.O.V	d. f	Mean Square			
		Hearts	Liver	Abdominal fat	Gizzard
Treatment	7	3.74	18.23	10.16	8.01
Error	16	1.71	32.49	13.4	8.39

*: p<0.05

Appendix Table (10) Mean and test of significance for thyme, adiantum, rosemary and their combination on internal organs of broilers chicken at 42 days.

S.O.V	d. f	Mean Square			
		Hearts	Liver	Abdominal fat	Gizzard
Treatment	7	3.83	29.9	16.42	9.91
Error	16	5.71	54.17	18.9	7.75

*: p<0.05

Appendix Table (11) Mean and test of significance for thyme, adiantum, rosemary and their combination on lymphoid organs of broilers chicken at 42 days.

S.O.V	d. f	Mean Square	
		Bursa	Spleen
Treatment	7	0.12	0.46
Gender	1	0.13	0.14
Error	39	0.11	0.17

*: p<0.05

Appendix Table (12) Mean and test of significance for thyme, adiantum, rosemary and their combination on male lymphoid organs of broiler chicken at 42 days.

S.O.V	d. f	Mean Square	
		Bursa	Spleen
Treatment	7	0.08	0.31
Error	16	0.12	0.25

*: p<0.05

Appendix Table (13) Mean and test of significance for thyme, adiantum, rosemary and their combination on female lymphoid organs of broiler chicken at 42 days.

S.O.V	d. f	Mean Square	
		Bursa	Spleen
Treatment	7	0.06	0.16
Error	16	0.16	0.17

*: p<0.05

Appendix Table (14) Mean and test of significance for thyme powders, adiantum, rosemary and their combination on broiler gender´s serum hematological.

S.O.V	d. f	Mean Square			
		PCV	HB	RBC	PLAT
Treatment	7	2.35	5.69	0.08	0.85
Gender	1	0.0000000	0.03	0.04	0.04

*: p<0.05

Appendix Table (15) Mean and test of significance for thyme powders, adiantum, rosemary and their combination on broiler male´s serum hematological.

S.O.V	d. f	Mean Square			
		HB	PCV	RBC	Plat
Treatment	7	1.81	4.57	0.07	1.99
Error	13	3.62	4.05	0.05	1.52

*: p<0.05

Appendix Table (16) Mean and test of significance for thyme powders, adiantum, rosemary and their combination on broiler female´s serum hematological.

S.O.V	d. f	Mean Square			
		HB	PCV	RBC	Plat
Treatment	7	3.74	0.80	0.06	0.66
Error	16	0.82	4.38	0.02	2.08

Appendix Table (17) Mean and test of significance for thyme powders, adiantum, rosemary and their combination on broiler gender´s serum biochemical.

S.O.V	d. f	Mean Square					
		Total protein	Albumin	Globulin	A/G ratio	Cholesrtol	Glucose
Treatment	7	0.01	0.02	0.016	0.03	1795.86	99.72
Gender	1	0.01	0.005	0.0007	0.007	5.71	1.46
Error	36	0.01	0.009	0.009	0.04	40.32	10.31

*: p<0.05

Appendix Table (18) Mean and test of significance for thyme powders, adiantum, rosemary and their combination on broiler male´s serum biochemical.

S.O.V	d. f	Mean Square					
		Total protein	Albumin	Globulin	A/G ratio	Cholesrtol	Glucose
Treatment	7	0.01	0.01	0.007	0.02	880.3	48.17
Error	16	0.02	0.007	0.008	0.034	26.79	10.07

*: p<0.05

Appendix Table (19) Mean and test of significance for thyme powders, adiantum, rosemary and their combination on broiler female´s serum biochemical.

S.O.V	d. f	Mean Square					
		Total protein	Albumin	Globulin	A/G ratio	Cholesrtol	Glucose
Treatment	7	0.01	0.01	0.01	0.02	949.07	66.79
Error	16	0.005	0.013	0.01	0.05	54.29	8.35

*: p<0.05

Appendix Table (20) Mean and test of significance for thyme powders, adiantum, rosemary and their combination on broiler gender´s serum hormone.

S.O.V	d. f	Mean Square			
		T3	T4	TSH	GH
Treatment	7	0.27	0.09	0.006	0.107
Gender	1	0.014	0.04	0.002	0.005
Error	36	0.07	0.04	0.003	0.05

*: p<0.05

Appendix Table (21) Mean and test of significance for thyme powders, adiantum, rosemary and their combination on broiler male´s serum hormones.

S.O.V	d. f	Mean Square			
		T3	T4	TSH	GH
Treatment	7	0.09	0.04	0.002	0.07
Error	13	0.1	0.05	0.003	0.05

*: p<0.05

Appendix Table (22) Mean and test of significance for thyme powders, adiantum, rosemary and their combination on broiler female´s serum hormone

S.O.V	d. f	Mean Square			
		T3	T4	TSH	GH
Treatment	7	0.19	0.07	0.008	0.08
Error	16	0.07	0.04	0.003	0.06

*: p<0.05

Appendix Table (23) Mean and test of significance for thyme, adiantum, rosemary and their combination on the levels of enzymes in the blood serum of broilers at 42 days.

S.O.V	d. f	Mean Square		
		Creatinine	AST	ALT
Treatment	7	0.18	0.004	0.002
Gender	1	0.03	0.0003	0.00007
Error	36	0.013	0.0004	0.001

*: p<0.05

Appendix Table (24) Mean and test of significance for thyme, adiantum, rosemary and their combination on the levels of enzymes in the blood serum of broiler´s male at 42 days.

S.O.V	d. f	Mean Square		
		Creatinine	AST	ALT
Treatment	7	0.1	0.002	0.001
Error	13	0.14	0.0005	0.001

*: p<0.05

Appendix Table (25) Mean and test of significance for thyme, adiantum, rosemary and their combination on the levels of enzymes in the blood serum on broiler´s female at 42 days.

S.O.V	d. f	Mean Square		
		Creatinine	AST	ALT
Treatment	7	0.09	0.002	0.002
Error	13	0.1	0.0004	0.001

*: p<0.05

Appendix Table (26) Mean and test of significance for thyme, adiantum, rosemary and their combination on meat color of broiler chickens.

S.O.V	d. f	Mean Square		
		L*	a*	b*
Treatment	7	9.28	0.66	2.33
Gender	1	102.05	0.59	0.49
Error	39	19.24	0.61	3.14

*: p<0.05

Appendix Table (27) Mean and test of significance for thyme, adiantum, rosemary and their combination on meat color of male broiler chickens.

S.O.V	d. f	Mean Square		
		L*	a*	b*
Treatment	7	6.17	0.72	2.92
Error	16	21.77	0.51	4.73

*: p<0.05

Appendix Table (28) Mean and test of significance for thyme, adiantum, rosemary and their combination on meat color of female broiler chickens.

S.O.V	d. f	Mean Square		
		L*	a*	b*
Treatment	7	4.93	0.47	2.36
Error	16	24.35	0.75	1.64

*: p<0.05

BACKGROUND

He was born in 1985 in Duhok city of Kurdistan region / Iraq. He completed her primary and secondary school in duhok. İn 2009, he was placed at Animal Production Department of Faculty of Agriculture at Duhok University. He was graduated in 2012. He was appointed as agriculture engineer at Animal Project of Faculty of Agriculture at Duhok University in 2013. He enrolled at the postgraduate programmer in Bingol University Institute of Science Department of Animal Science in 2015.